

Western association of physicians  
 Western society for clinical investigation  
 Plenary session  
 9:30 AM  
 Thursday, January 23, 2020

1 PREDICTIVE VALUE OF CT FOR ENDOSCOPICALLY REFRACTORY UNCONTROLLED VARICEAL BLEEDING IN CIRRHOTIC PATIENTS REQUIRING PORTAL VENOUS INTERVENTION

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10.1136/jim-2019-WMRC.1

**Purpose of study** The objective of this study was to identify features on abdominal CT imaging associated endoscopically refractory uncontrolled variceal hemorrhage requiring portal venous intervention.

**Methods used** Between January 2009 to January 2018, CT scans from 64 patients who experienced endoscopically refractory variceal hemorrhage requiring intervention such as transjugular intrahepatic portosystemic shunt (TIPS) placement or retrograde transvenous obliteration (RTO) and 67 patients without variceal hemorrhage but with severe symptomatic pressure gradient proven portal hypertension were analyzed. Two blinded radiologists reviewed the scans for the following parameters: size of varices, degree of variceal intraluminal protrusion, liver and splenic volumes, and portal vein diameter.

**Summary of results** Gastric intraluminal variceal protrusion was found to be a strong CT parameter associated with refractory variceal hemorrhage (0.75 mm vs -2.91 mm,  $p=0.001$ ). Regarding size, the hemorrhage group had larger gastric varices compared to the control group (8.03 mm vs 6.51 mm, respectively,  $p=0.001$ ). However, this trend was not demonstrated in the sizes of the esophageal varices (6.28 mm vs 6.43 mm,  $p=0.370$ ). Larger splenic volume (1312 cc vs 1152 cc,  $p=0.029$ ) and liver volume (1514 cc vs 1143 cc,  $p=0.004$ ) were also found to be predictors of endoscopically refractory variceal hemorrhage.

**Conclusions** Imaging parameters on abdominal CT, such as intraluminal protrusion of gastric varices, gastric variceal size, larger splenic and liver volumes were predictive of portal venous intervention while esophageal variceal size was not.

Adolescent medicine and general pediatrics I  
 Concurrent session  
 12:45 PM  
 Thursday, January 23, 2020

2 RACIAL/ETHNIC DIFFERENCES IN PRENATAL AND POSTNATAL COUNSELING ABOUT MATERNAL AND INFANT HEALTH PROMOTING PRACTICES AMONG ADOLESCENT MOTHERS

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10.1136/jim-2019-WMRC.2

**Purpose of study** Racial/ethnic disparities in teen birth rates persist. In 2017, the teen birth rate was 27.5 per 1000 for non-Hispanic black (NHB) teens and 28.9 per 1000 for Hispanic teens, compared with 13.2 per 1000 for non-Hispanic white (NHW) teens. Despite this difference, data describing racial/ethnic differences in counseling is lacking. This study evaluates racial/ethnic differences in 1) prenatal counseling and 2) postnatal counseling of teen mothers.

**Methods used** Pregnancy Risk Assessment Monitoring System (PRAMS) 2012–2016 data, a national perinatal surveillance system was analyzed. Prenatal counseling topics included substance use (tobacco, alcohol and illicit drug use), medical care (HIV testing, influenza vaccination and recommended weight gain), and breastfeeding. Postnatal counseling topics included infant safe sleep, postpartum depression, and contraception. Bivariate associations of maternal/infant characteristics and receipt of counseling were estimated using chi-square tests. Multivariable logistic regression was used to assess the independent relationship between race/ethnicity and receipt of pre-/postnatal counseling, controlling for maternal and infant demographic and clinical factors.

**Summary of results** 11805 teen mothers surveyed represent a weighted sample of 544,930, including 20.4% NHB, 29.5% Hispanic and 42.1% NHW teens. Compared to NHW teens, NHB teens were more likely to receive any prenatal substance use [AOR 8.42, 95%CI (3.47, 20.42)] and breastfeeding counseling [AOR 2.51, 95%CI (1.12, 5.65)]. Compared to NHW teens, Hispanic teens were more likely to receive postpartum birth control counseling [AOR 9.99, 95%CI (1.81, 55.22)].

**Conclusions** This study demonstrates racial/ethnic differences in substance use and postpartum family planning counseling with minority teens being more likely to receive this counseling compared to their NHW counterparts. Ongoing investigation is needed to better understand the drivers of these differences including additional factors that vary by region.

### 3 EVALUATING THE PREDICTIVE VALIDITY OF THE MYHEARTSMAP PSYCHOSOCIAL SELF-ASSESSMENT TOOL IN YOUTH PRESENTING TO THE EMERGENCY DEPARTMENT WITH MENTAL HEALTH CONCERNS

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10.1136/jim-2019-WMRC.3

**Purpose of study** The number of youth visiting the pediatric emergency department (PED) for mental health care is increasing. The use of digital self-assessment tools is an efficient method of evaluating mental health due to ease of administration without a clinician. We quantified the predictive validity of a psychosocial self-assessment tool, MyHEARTSMAP, in youth presenting to the PED with mental health concerns.

**Methods used** We conducted a prospective cohort study in two tertiary PEDs from December 2017–June 2019. Youth 10–17 years old triaged for a mental health concern were screened and enrolled to complete MyHEARTSMAP on a mobile device. A blinded clinician conducted a HEARTSMAP assessment, which was the reference standard. Both tools collect information about ten sections: Home, Education and activities, Alcohol and drugs, Relationships and bullying, Thoughts and anxiety, Safety, Sexual health, Mood and behavior, Abuse, and Professional resources. Based on scoring from 0–3 (no concern, mild, moderate, or severe), a score for psychosocial domains (psychiatry, social, youth health, and function) is computed and resources are recommended based on need. Sensitivity and specificity were measured for youth and guardian MyHEARTSMAP assessments in detecting severe psychiatric concerns and any other domain concerns.

**Summary of results** We screened 510 youth and 167 families enrolled. Concerns included suicidality or safety concerns (49.7%) and mood (25.7%) and behavioral disorders (12.6%). The remaining were substance use, social issues, and eating and thought disorders. Youth and guardian's sensitivity for detecting a severe psychiatric concern was 70.5% (95% CI: 54.8%, 83.2%) and 80% (65.4%, 90.4%) respectively. Specificity was 34% (24.6%, 44.5%) and 41.2% (31.5%, 51.4%). The sensitivity for detecting any domain concern in youth and guardians were 93.9% (87.3%, 97.7%) and 93.3% (86.8%, 97.3%) for social, 88.2% (80.4%, 93.8%) and 90% (82.8%, 94.9%) for youth health, and 96.8% (91.9%, 99.1%) and 97% (92.4%, 99.2%) for function.

**Conclusions** Assessment by families using MyHEARTSMAP is sensitive for detecting psychosocial concerns requiring mental health follow-up beyond PED evaluation.

### 4 TREATING STREPTOCOCCAL PHARYNGITIS WITH PENICILLIN VERSUS BROAD SPECTRUM ANTIBIOTICS

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10.1136/jim-2019-WMRC.4

**Purpose of study** Dysbiosis of the human microbiome, caused especially by a decline in its microorganism diversity, can play a role in the development of harmful, long-term conditions that impact human health. A major contributor to this dysbiosis is the use of antibiotics to treat bacterial infections. Antibiotics can be divided into two groups: narrow spectrum antibiotics, which are effective against a specific group of bacteria, and broad spectrum antibiotics (BSA), which are effective over a wider range of bacteria and can pose a risk of disrupting the microbiome. Antibiotic treatment of Group A strep (GAS) infection, which causes strep throat and scarlet fever, serves as area where microbiome harm can be reduced via treatment with penicillin (PCN), a narrow spectrum drug that GAS are 100% sensitive to. Antibiotics commonly used for treatment, however, include amoxicillin, a moderate BSA, along with other broader spectrum antibiotics. We sought to characterize the antibiotics used to treat strep throat and scarlet fever and to further describe the extent to which BSA are used for treatment.

**Methods used** We performed retrospective data extraction and analyses of 3,169 patients who were less than 22 years old, received a diagnosis of strep throat or scarlet fever, and were seen in an outpatient setting. Patients were further excluded if they had a PCN allergy or had any diagnoses of co-infections or comorbidities that would require the use of BSA. We then used descriptive statistics as our primary mode of data analysis.

**Summary of results** In summary, 2,208 patients were determined to have simple strep throat or scarlet fever. Of these patients, 65% were treated with various BSA, mainly amoxicillin; 27% were treated with PCN; and 8% were given no antibiotics. With subjects divided by age group (0–3, 4–12, 13+), the trend of BSA being used more often for treatment continues, though a greater proportion of patients aged 13 and above were found to be treated with PCN.

**Conclusions** Our findings highlight opportunities for clinicians to reflect on their use of antibiotics in treating strep throat and scarlet fever. It is important for providers to prioritize the reduction of harm to the microbiome, which is essential in maintaining human health, by reducing their use of BSA whenever possible.

### 5 INTEGRATING TECHNOLOGY INTO PATIENT EDUCATION TO EMPOWER PEDIATRIC ENDOCRINOLOGY PATIENTS TO IMPROVE THEIR HEALTH THROUGH A PATIENT-CENTERED CARE APPROACH

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10.1136/jim-2019-WMRC.5

**Purpose of study** In a patient-centered care approach, one of the roles of the healthcare professional is to act as their patient/family's health coach. It is thus imperative that medical professionals be able to educate their patients and to have that education easily accessible, easy to understand and retain, and actively engaging. This is particularly true in a chronic disease model. The use of technology with its ability to access information 24/7 can be especially advantageous in

providing information in a multimedia format, and as such can serve as a supplement to the more traditional forms of education in order to improve self-efficacy in patients and their families.

**Methods used** Two high school students enrolled in the UCSF Fresno Medical Education Program Summer Biomedical Research Internship Program were charged with the creation of the websites. 34 diabetes patients and 47 patients with other endocrine disorders were surveyed, along with their parents. Websites were built using Google Sites given its easy accessibility, with all content either original or with Creative Commons licensing. Videos were created using iMovie and housed in a YouTube site.

**Summary of results** 77% of diabetes patients/parents and 64% of other endocrine patients/parents were interested in the development of educational websites. Two separate websites were created: one for diabetes and for patients with other endocrine disorders. Both websites contain easy-to-understand information written for those even with lower literacy levels. Brief educational videos were created to reinforce concepts taught in the clinic, and diabetes videos such as 'My Diabetes Monster' were created by our patients and parents to empower them and show them that they are not alone in their struggles with diabetes.

**Conclusions** The majority of patients and parents surveyed expressed interest in the development of easily accessible educational websites, which can be easily accessed by both inpatients and outpatients even outside normal business hours. Such sites can be built by high school students interested in health careers under the guidance of the physician, thus providing medical pipelines as well as patient education. These sites should help patients and their families improve their self-efficacy in providing care for their disease.

## 6 THE EFFECTIVENESS OF AN ADOLESCENT REPRODUCTIVE HEALTH SYMPOSIUM ON INTERPROFESSIONAL PERCEPTIONS OF PROVIDING COMPREHENSIVE CARE FOR ADOLESCENTS IN CALIFORNIA'S CENTRAL VALLEY

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10.1136/jim-2019-WMRC.6

**Purpose of study** In California's Central Valley, the teen birth rate is almost double the national average and sexually transmitted infection (STI) rates are disproportionately higher amongst minority populations. In this study we assessed the effectiveness of an adolescent reproductive health symposium for interprofessionals in offering comprehensive reproductive services to adolescents in this region.

**Methods used** The sample consisted of interprofessionals, including pediatricians, pediatric residents, nurses, and community healthcare educators. Participants were recruited from a one-day, lecture style symposium where education was provided on national and local current trends in STI and pregnancy rates amongst adolescents, effective contraceptive methods, community resources, and

referral options to provide comprehensive reproductive healthcare services to adolescents. A pre and post survey instrument and a 3-month post survey were utilized to assess provider perceptions of providing comprehensive care for adolescents.

**Summary of results** Participant perceptions of their clinical competencies in offering comprehensive adolescent reproductive health services improved after the symposium (n=64). Statistically significant differences were noted in the perceptions of having adequate training (p<0.001) and feeling comfort taking a psychosocial and sexual history (p=0.001). There were also statistically significant differences in the perceptions of being adequately prepared to counsel adolescent patients on contraceptive methods (p<0.001), including options for long acting reversible contraceptives (p=0.003) and local referral options (p<0.001). There were no statistically significant differences found 3 months after the initial education; however, participants showed maintenance of perceptions.

**Conclusions** A symposium based intervention demonstrates the positive impact that interprofessional education has on adolescent reproductive health by increasing provider competency in offering comprehensive adolescent reproductive health services.

## 7 LONGITUDINAL EVALUATION OF PEDIATRIC RESIDENCY DIDACTICS TRANSITION FROM NOON CONFERENCE TO AN ACADEMIC HALF DAY

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10.1136/jim-2019-WMRC.7

**Purpose of study** In 2009, the University of New Mexico (UNM) Pediatric Residency transitioned program didactics from noon conference to an academic half day. Immediate evaluation of resident and faculty satisfaction, resident attendance, board exam pass rate and In-Training-Exam (ITE) scores showed improvements with this change. These results by Dr. Walter Dehority were published in 2012. The primary aim of this study was to investigate the longitudinal impact of the academic half day at UNM on resident and faculty satisfaction, resident attendance and clinical knowledge in the form of standardized exam results. In addition, use self-determination theory to explore effects of the academic half day on autonomy, competence and relatedness in pediatric residents.

**Methods used** In this mixed methods study, surveys regarding satisfaction were conducted of current pediatric residents (n=32) and faculty (n=32) at UNM. To assess clinical knowledge, quantitative measures such as pediatric board exam pass rate were evaluated. Finally, focus groups were conducted with pediatric residents and faculty separately to evaluate concepts related to resident autonomy, competence and engagement with the academic half day.

**Summary of results** Resident and faculty satisfaction was sustained with significance at 88% and 67% (p-value of 0.02 and 0.009), respectively. Resident attendance was also sustained at 88.4% (p=0.005). Board exam pass rates are increased since 2009, with unclear significance. Focus groups

identify overall satisfaction from residents and faculty and identified a need for addressing resident engagement with didactics secondary to clinical pressures and interactivity of didactics.

**Conclusions** The academic half day shows continued success in terms of faculty and resident satisfaction and resident attendance. More research is needed to investigate other factors related to the board pass rate. Further intervention and research will be needed to improve resident engagement in the academic half day.

## 8 PEDIATRIC COMMUNICATION: BIG WORDS AREN'T FOR LITTLE PATIENTS

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10.1136/jim-2019-WMRC.8

**Purpose of study** Current curriculums teach medical trainees how to talk with patients and families through online videos, simulated patients, small groups, and clinical encounters, with or without feedback given by trained providers. Few pediatric curriculums address communication fundamentals: semantics, phrasing, and developmental milestones. The purpose of this curriculum is for pediatric residents to learn effective semantic and phrase usage as well as understand developmental milestones to improve their communication knowledge and skill confidence.

**Methods used** Pediatric residents of all training levels at one academic institution participated in a one-time 45-minute workshop. The curriculum included three exercises covering semantics, phrasing and milestones via small group discussions and self-assessments of communication/milestone knowledge. Pre-, post-, and 7-month intervention surveys that evaluated knowledge and confidence about their communication skills with pediatric patients were collected. Qualitative feedback was acquired for curriculum improvement.

**Summary of results** Forty-one pediatric residents participated in the workshop: 71% female, 88% categorical pediatrics, and 17% with children. Residents included 1st, 2nd, 3rd, and 4th years: 34%, 44%, 20%, 2%, respectively. Survey participation (3 surveys) averaged at 68%. Significant improvement occurred following the workshop: knowledge about speaking with patients increased from 9% to 44% ( $p \leq 0.01$ ,  $Z\text{-score} = -3.1$ ), knowledge in developmental stages increased from 28% to 72% ( $p \leq 0.01$ ,  $Z\text{-score} = -3.5$ ), confidence while speaking with patients increased from 16% to 53% ( $p \leq 0.01$ ,  $Z\text{-score} = -3.2$ ). At 7-month follow up, 91% of participants stated that they used at least one piece of knowledge or skill gained from this workshop.

**Conclusions** This workshop increases communication knowledge and confidence immediately after as well as 7 months after the session by focusing on the semantics, phrasing, and developmental milestones. It provides pediatric trainees with the fundamentals for communicating with pediatric patients, which are applicable for all patients, compared to learning through experience in feedback, which may be patient-specific.

## 9 IMPROVING SUPPORT OF BREASTFEEDING AT A BABY-FRIENDLY™ DESIGNATED LARGE URBAN HOSPITAL IN ALBUQUERQUE, NEW MEXICO

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10.1136/jim-2019-WMRC.9

**Purpose of study** Breastfeeding has conclusively proven to be the healthiest feeding option for infants. Baby-Friendly™ designated hospitals and birthing centers follow the Ten Steps to Successful Breastfeeding, which are considered to be the gold standard for supporting mothers who wish to breastfeed. However, even a Baby-Friendly™ designated hospital may have room for improvement. The University of New Mexico Hospital (UNMH) is an urban hospital serving a predominantly Hispanic and Native American population, and the majority of pediatric patients are covered by Medicaid. Despite its Baby-Friendly™ designation, UNMH had low rates of physician documentation of discussing the health impacts of breastfeeding in the postpartum setting and discussion of home visitation prior to discharge. We aimed to improve these measures using the Plan-Do-Study-Act (PDSA) model.

**Methods used** We conducted this study from August 2018 to August 2019 in the UNMH Mother Baby Unit. Providers reviewed 61 to 86 charts for each of four medical record reviews (MRR). Based on the results of the first two MRRs, providers decided to focus on increasing home visitation referrals. After the third MRR, providers worked to increase discussion and documentation of the health impacts of breastfeeding. Changes made included creation of a discharge planning checklist, modifying admission and discharge templates, educating attending and resident physicians via emails, meetings, chart reviews, and bulletin boards in the team room, and adding home visitation referral forms to all patient charts.

**Summary of results** Over the one year study period, rates of discussing home visitation status increased from 49.2% to 89.2%. The rates of discussing health impacts of breastfeeding increased from 31.1% to 86.5%.

**Conclusions** Implementation of these quality improvement measures resulted in substantial gains in several key breastfeeding metrics, despite having already earned the designation Baby-Friendly™. We propose that all hospitals, including those that are designated Baby-Friendly™, can better support breastfeeding through ongoing quality improvement initiatives.

## 10 BUCKLE FRACTURE TREATMENT WITH REMOVABLE WRIST ORTHOSIS ACHIEVING CLINICAL EXCELLENCE

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10.1136/jim-2019-WMRC.10

**Purpose of study** Distal radius and ulna buckle fractures are a frequent reason for pediatric emergency department (ED) visits. Previously, providers used immobilization in a short arm cast. Studies have shown equivalent outcomes in using a removable splint over a cast, with reduced costs, increased

efficiency, and improved patient/family satisfaction. Our baseline data demonstrated that nearly all children with distal radius/ulna buckle fractures were being casted at our ED. We planned to increase the use of removable splints in children 2–18 years old with these fractures from 17% to >90% and to reduce orthopedic consultations in the ED from 88% to <10% over a 12 month period.

**Methods used** We performed a retrospective chart review to obtain baseline data. In collaboration with orthopedics, a standardized protocol was created and implemented in January 2019. Treatment involved placing splints for patients ages 2–18 with distal forearm buckle fractures seen on x-ray without consulting or following up with orthopedics. Emergency medicine, pediatric, and orthopedic physicians were educated on the protocol. Standardized instructions for caregivers and primary care providers were made. We reviewed monthly data on the number of splint placements, orthopedic consults and follow-ups, x-rays, and length of stay.

**Summary of results** In the first seven months of implementation there have been 11 patients that fit the inclusion criteria. The proportion of removal splints increased from 17% (n=9) to 63% (n=7) (p=0.01). Orthopedic and plastic surgery consults decreased from 88% (n=46) to 36% (n=4) (p=0.02), and surgical clinic follow up decreased from 86% (n=45) to 36% (n=4) (p=0.008). Average x-rays done decreased from 1.3 to 1.0 (p=0.02), and length of stay decreased from 202.9 to 154.3 minutes (p=0.0001).

**Conclusions** Initiation of a protocol for distal forearm buckle fractures in our pediatric ED has increased the use of removal splints and reduced orthopedic consults, clinic follow up, number of x-rays, and length of stay. We plan to increase the duration of data collection to achieve adequate sampling. Next steps include educating plastic and trauma surgery services about the protocol and further partnering with caregivers to prevent unnecessary orthopedic referrals.

## Cardiovascular I

### Concurrent session

12:45 PM

Thursday, January 23, 2020

#### 11 ELECTRONIC CIGARETTES TOGETHER WITH A HIGH FAT DIET INDUCES CARDIAC DYSFUNCTION AND CARDIAC STRUCTURAL CHANGES

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10.1136/jim-2019-WMRC.11

**Purpose of study** The disturbing trend of youth electronic cigarette (EC) use has been classified as an urgent, unpredicted public health epidemic. Similarly, high fat diets (HFDs) have been shown to be addictive and common in present day

youth. This translational model investigates the cardiovascular effects of ECs in mice exposed to a HFD.

**Methods used** Male C57BL/6J mice were exposed to chronic, intermittent EC aerosol for twelve weeks with ad lib access to a HFD. Mice were exposed to ECs in the presence (2.4%) or absence (0%) of nicotine and saline. Echocardiography, histology, and western blot analysis were used to determine the cardiovascular effects of EC aerosol exposure.

**Summary of results** Echocardiographic data revealed mice exposed to 2.4% ECs had a decreased left ventricular fractional shortening, left ventricular ejection fraction, and velocity of circumferential fiber shortening compared to mice exposed to 0% ECs or saline. Transmission electron microscopy revealed that cardiomyocytes of mice treated with 2.4% ECs exhibited left ventricular abnormalities, including lipid accumulation (ventricular steatosis), myofibrillar derangement and destruction, and mitochondrial hypertrophy. The detrimental effects of 2.4% ECs on cardiac structure and function were associated with significantly greater oxidative stress, increased plasma free fatty acid levels, cardiomyocyte apoptosis, and inactivation of AMP-activated protein kinase as well as activation of its downstream target, acetyl-CoA carboxylase.

**Conclusions** This study suggests adverse effects of 2.4% EC use in conjunction with a HFD on cardiac function and biochemistry. Chronic EC use may cause cardiomyopathy, potentially leading to significant morbidity and mortality. These results support limiting EC use with nicotine to prevent the renormalization and glamorization of nicotine and tobacco products, particularly in adolescents and those consuming a HFD.

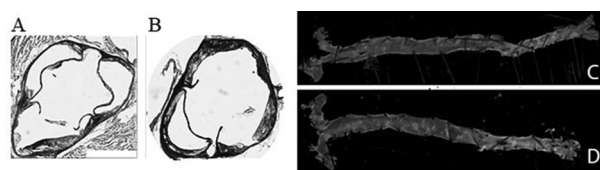
#### 12 T-CELL DEFICIENT MICE DEMONSTRATE REDUCED ATHEROSCLEROTIC PLAQUE BURDEN

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10.1136/jim-2019-WMRC.12

**Purpose of study** Atherosclerosis is characterized by arterial plaque deposition. The CD40-CD154 inflammatory dyad is a major driver of the auto-inflammation seen in atherosclerosis and type 1 diabetes (T1D). A sub-type of CD4+ T cells that express CD40 (Th40 cells) is increased in T1D, but has not been defined in atherosclerosis. Thus, this study seeks to explore the role of this pathogenic T-cell on plaque formation.

**Methods used** ApoE<sup>-/-</sup> transgenic mice represent a model of atherosclerotic disease. We have generated a novel TCR $\alpha$ -



**Abstract 12 Figure 1** ApoE<sup>-/-</sup> transgenic mice represent a model of atherosclerotic disease

ApoE<sup>-/-</sup> mouse model to investigate the role of Th40 cells. Baseline and 'add back' T cell experiments have been conducted. Mice are sacrificed at 8 months of age and then dissected to obtain the aortas and hearts. The aorta is used for en-face Sirius Red stain analysis while serial aortic valve cross sections are used to characterize the lesion in terms of area, volume, necrosis, and cellular content.

**Summary of results** Trichrome-stained aortic valve cross sections show a significant reduction in overall plaque as well as ability to form advanced plaque (as determined by macrophage content) in the ApoE<sup>-/-</sup> TCR $\alpha$ <sup>-/-</sup> mouse model (shown in image B) as compared to its ApoE<sup>-/-</sup> counterpart (A). This reduction in plaque deposition is also shown in the Sirius Red analysis of the whole aorta. Representative samples of double KO mice show 16% plaque deposition (C) compared to 33% within ApoE<sup>-/-</sup> mice (D).

**Conclusions** T-cell deficient ApoE<sup>-/-</sup> mouse models demonstrate a decreased plaque burden in comparison to the ApoE<sup>-/-</sup> counterparts illustrating that T-cells are implicated in atherosclerosis pathogenesis. Future studies will characterize the cell populations within the plaques.

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#### WARFARIN ANTICOAGULATION FOLLOWING PEDIATRIC HEART SURGERY: COMPARING HOME VERSUS TRADITIONAL LAB MONITORING

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10.1136/jim-2019-WMRC.13

**Purpose of study** Warfarin is commonly used following placement of mechanical heart valves or an extracardiac conduit in the Fontan procedure in order to minimize risk of thrombotic events. The degree of anticoagulation is monitored by the patient's international normalized ratio (INR), which is traditionally done by serial outpatient blood draws. The goal of this pilot study is to determine if anticoagulation can be better managed using a home INR monitoring system compared to traditional laboratory monitoring.

**Methods used** Patients who underwent artificial mechanical valve placement and/or an extracardiac Fontan procedure were consented and randomized to one of two 3-month arms: INR testing via 1) traditional laboratory monitoring (venipuncture), or 2) a home INR monitor (finger stick test). After 3 months, patients were crossed-over to the other arm (6 months total in the study). Frequency of INR checks was determined per cardiologists' clinical judgement. A questionnaire was completed after each arm of the study. Eleven subjects have been enrolled into the study thus far: 10 have completed at least one arm of the study, 5 have completed both arms, and 1 patient was withdrawn after the first arm due to non-compliance. Student t-tests were performed to compare time and cost differences between the two arms.

**Summary of results** The ease of obtaining INR value between home and laboratory monitoring was rated as similar (3.4/5

vs 3.8/5), with similar pain rating experience by the subject (2/5 vs 2.4/5). However, parents were more satisfied with using the home INR system (4/5 vs 2.9/5) and were more likely to recommend to others (4.2/5 vs 2.5/5). The average time it took to use the home INR monitor versus lab monitoring was also significant (3.8 minutes vs 53.3 minutes;  $p < 0.0001$ ). The percentage of INR in therapeutic range for subjects was also similar between arms (home 46.9% vs lab 43.4%;  $p = 0.6396$ ).

**Conclusions** Overall, preliminary data show similar outcomes between home vs lab INR monitoring, with the former showing improved patient satisfaction and time saved. Ongoing cost-effective analysis is being conducted as the pilot study continues.

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#### ACTIVE SMOKING IS ASSOCIATED WITH DECREASED RATES OF WOUND HEALING AFTER ENDOVASCULAR TREATMENT OF CRITICAL LIMB ISCHEMIA

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10.1136/jim-2019-WMRC.14

**Purpose of study** To examine whether active smoking is associated with worse complete wound healing rates in patients with CLI undergoing endovascular interventions.

**Methods used** A single center observational study was conducted. Consecutive patients with CLI who underwent endovascular interventions were included. Smoking status was assessed at the time of the intervention and active smoking was compared to no active smoking at the time of the intervention. Cox and logistic regression analyses were conducted to compare the complete wound healing rates of the two groups during follow-up.

**Summary of results** In total, 264 patients (active smokers:  $n = 41$ ; not active smokers:  $n = 223$ ) and 553 lesions were included. Active smoking was associated with decreased rates of complete wound healing in the 6-month univariate cox regression analysis (HR: 0.22; 95% CI: 0.07 - 0.71;  $p = 0.012$ ). The 6-month KM estimates for complete wound healing were 8.9% for the active smoking group vs 34% for the no current smoking group. Active smoking was also associated with decreased rates of complete wound healing in the 9-month univariate (HR: 0.43; 95% CI: 0.21- 0.90;  $p = 0.026$ ) and multivariate analysis (HR: 0.11; 95% CI: 0.01 - 0.94;  $p = 0.044$ ). The 9-month KM estimates for complete wound healing were 25.2% in the active smoking group vs 46% in the no active smoking group. No difference was found between the two groups in the 9-month major amputation rates. The time to complete wound healing was longer in the active smoking group ( $269.7 \pm 187.5$  days vs.  $208.3 \pm 115.7$  days;  $p = 0.009$ ).

**Conclusions** Active smoking status at the time of intervention in CLI patients is associated with lower rates of complete wound healing during 6- and 9-month follow-up. Active smoking was associated with a two-month delay in the median time to wound healing. These findings emphasize the importance of smoking cessation for patients with CLI.

## 15 HOSPITAL REPORTING OF CRITICAL CONGENITAL HEART DISEASE SCREENING

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10.1136/jim-2019-WMRC.15

**Purpose of study** California passed legislation in 2013 mandating oxygen saturation (SpO<sub>2</sub>)-based screening for critical congenital heart disease (CCHD) screening and annual data submission to the Department of Health Care Services (DHCS). We conducted a retrospective review of CCHD screening data reported to California DHCS to describe reporting compliance and assess data accuracy.

**Methods used** This was a retrospective review of hospital CCHD screening reports provided to California DHCS from January 2015 to December 2016. We compared the reported birth data to California's Office of Statewide Health Planning and Development (OSHPD) for accuracy of live births reported and to determine frequency of reporting from hospitals meeting the CCHD reporting requirement criteria. We also evaluated the data for other potential markers of accuracy using proxies such as number of report revisions required and accurate summation of variable cells (i.e. all screen results accounted for, or all eligible newborns undergoing screening).

**Summary of results** Thirty-four percent of hospitals did not comply to mandated CCHD screen reporting. When hospitals comply to reporting, 45.8% in 2015 and 44.2% in 2016 submitted reports in which the number of completed screens did not match the number of screen results. Only 21.8% in 2015 and 21.1% in 2016 of hospitals submitted live births that matched their respective live births reported to a second database. In 2015, the submitted data represented 375,283 live births, which was 80% of the 468,936 live births reported to OSHPD that year. In 2016, the submitted data represented 318,424 live births, or 56% of the 570,786 live births reported to OSHPD that year. For the two years combined, up to 623 newborns with CCHD could have been missed or unaccounted for due to non-reporting.

**Conclusions** A third of hospitals do not comply to reporting guidelines and over half of the submitted reports are inaccurate. A large number of newborns with CCHD may potentially be missed due to under/inaccurate reporting.

## 16 AGE-SPECIFIC CARDIAC REMODELING OUTCOMES INDUCED BY ISOPROTERENOL

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10.1136/jim-2019-WMRC.16

**Purpose of study** Heart failure (HF) impacts patients of all ages and is an enormous public health problem. Historically, HF has been treated with a single, multi-purpose approach, despite the observation that biological differences such as age influence the pathogenesis and thus treatment of this disease.

We hypothesized that molecular mechanisms of HF pathogenesis differ across the life-course, a hypothesis which we tested with a mouse model of cardiac dysfunction at three distinct stages of life.

**Methods used** C57BL/6 mice at pediatric (5 weeks; n=12), adult (3–5 months; n=12), and old (18 months, n=10) ages were treated with a subcutaneous mini-osmotic pump that eluted isoproterenol (ISO; 30 mg/kg/hour), a non-selective  $\beta$ -adrenergic receptor agonist commonly used to induce acute cardiomyopathy in mice. Following 6 days, we performed echocardiography, biochemical assessments, and RNA sequencing of the left ventricle (LV).

**Summary of results** Both the pediatric and adult groups underwent hypertrophic remodeling in response to ISO, as evident by higher LV weight relative to tibia length (TL). However, ISO exposure did not increase LV/TL in old mice. Echocardiographic imaging demonstrated thickening of the ventricular wall in ISO mice compared to control. Expression of pro-fibrotic mediators also differed across the life-course in response to ISO, with adults inducing a pro-fibrotic transcriptional program ( $\alpha$ -smooth muscle actin, fibronectin, collagen, periostin) that was attenuated in old and absent in pediatric animals. RNA-sequencing identified that 119, 1515, and 33 genes were significantly differentially expressed in pediatric, adult, and old mice exposed to ISO, respectively (p<0.05). Of these genes, only 2 transcripts were differentially expressed across all three ages.

**Conclusions** Biological age significantly impacts the molecular mechanisms of ISO-induced cardiac remodeling. Ongoing analysis of these molecular targets will inform HF therapies using age as a biological variable.

## 17 VARIABILITY OF END-TIDAL CARBON DIOXIDE IN OUT-OF-HOSPITAL CARDIAC ARREST

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10.1136/jim-2019-WMRC.17

**Purpose of study** End-tidal carbon dioxide (ETCO<sub>2</sub>) guides decision-making during out-of-hospital cardiac arrest (OHCA), but its prognostic value is poorly understood. We investigated the relationship between ETCO<sub>2</sub>, return of spontaneous circulation (ROSC), and outcome in OHCA patients.

**Methods used** This retrospective study included adult OHCA patients treated by Seattle Fire Department (SFD) in 2018. Those who were not intubated, had advance directives, or received prior advanced life support interventions were excluded. Median peak ETCO<sub>2</sub> was evaluated for the following intervals: the first and last minute (initial [non-intubated] and final, respectively), the entire pre-intubation period, 30 seconds post-intubation, 90 seconds pre- and post-ROSC, and 90 seconds pre- and post-defibrillation. ETCO<sub>2</sub> during each interval was compared to cardiac rhythm and outcome. ETCO<sub>2</sub> changes were observed after defibrillation based on identification of ROSC on the subsequent pulse-check. Reported values are medians with quartiles [25%/75%].

**Summary of results** Of 353 included patients, initial ETCO<sub>2</sub> were 24 mmHg [11/34] and 10 mmHg [2/22] for shockable and non-shockable rhythms, respectively. Pre-intubation values for these cohorts were 27 mmHg [4/40] and 10 mmHg [3/27] and post-intubation values were 43 mmHg [33/59] and 46 mmHg [25/64]. Post-defibrillation, ETCO<sub>2</sub> increased from 38 mmHg [30/53] to 54 mmHg [41/60] among patients who achieved ROSC and 41 mmHg [25/57] to 42 mmHg [27/56] among those without ROSC. With initial VF/VT, higher post-intubation and post-ROSC ETCO<sub>2</sub> were associated with worse cerebral performance categorization (CPC) among survivors (post-intubation CPC 1/2: 35 mmHg [28/44], CPC 3/4: 59 mmHg [48/71]; post-ROSC CPC 1/2: 50 mmHg [45/59], CPC 3/4: 64 mmHg [57/67]).

**Conclusions** Patients with ROSC after defibrillation had larger rises in ETCO<sub>2</sub> than patients without ROSC. Pre-intubation ETCO<sub>2</sub> values appear clinically unreliable. Our finding that higher ETCO<sub>2</sub> is associated with worse neurologic outcomes for patients who survive to hospital discharge warrants further investigation.

### 18 KENCOR REMOTE MONITORING SYSTEM OPTIMIZES BLOOD PRESSURE CONTROL AND IMPROVES SERUM CREATININE LEVELS IN HYPERTENSIVE PATIENTS

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10.1136/jim-2019-WMRC.18

**Purpose of study** Hypertension (HTN) costs the US \$48.6 billion per year, it occurs in one third of the US population with only 54% reaching guideline values. We used KenCor Remote Monitoring System (KRMS) to evaluate its utility in optimizing blood pressure control.

**Methods used** 43 clinic patients with HTN were enrolled in KRMS. Patients were oriented into KRMS software which was downloaded onto their smartphones. Patients were provided with a Bluetooth-enabled blood pressure (BP) cuff and weigh scale. Patients completed a daily questionnaire and recorded their vitals, with uploading of that data to the clinic nurse. KRMS then stratified the patients into low (green), medium (yellow), or high (red) risk vitals. Patients with red alerts were contacted by the nurse. Patients at high risk for more than 1 day were seen in the clinic for medication adjustment. We collected data for one year pre and post KRMS enrollment on blood pressure (BP), weight, serum creatinine (Cr), brain natriuretic peptide (BNP), and ejection fraction (EF).

**Summary of results** 40/43 patients were compliant with KRMS. The majority of patients uploaded data between two to seven times per week. The patients (20 women) were aged 39–96 years (average 64.5 years). 19/40 patients were diabetic with an average weight of 102.3 kg. The average EF was 41.5%. Data was analyzed for twelve months pre and post KRMS enrollment. The average Cr pre and post was 1.49 and 1.25 (p=0.0180). The average BNP pre and post was 6572.7 to 5339.4 (p=NS). The average systolic/diastolic BPs pre and

post were 139.8/84.0 and 119.4/69.0 (p=0.0035 and 0.0001 respectively).

**Conclusions** 1/In hypertensive patients, KRMS led to a significant reduction in BP levels with the majority of patients reaching guideline values.

2/Serum Cr was significantly reduced in patients on KRMS.

3/KRMS appears to be an effective tool to aid in the chronic care management of HTN and its related complications.

### 19 NSTEMI AND HFREF DUE TO METHAMPHETAMINE

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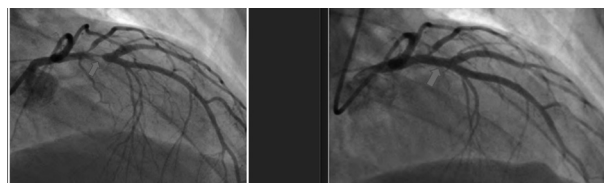
10.1136/jim-2019-WMRC.19

**Purpose of study** To discuss the diagnosis, evaluation, and management of methamphetamine-induced acute myocardial infarction in the presence of methamphetamine induced cardiomyopathy.

**Methods used** Retrospective Chart Review.

**Summary of results** A 35-year-old male with no pmh who has a social history significant for tobacco, alcohol, methamphetamine, cocaine, and PCP abuse presented to the emergency department 3 days h/o dyspnea and acute onset of new onset of pressure-like pain in his chest, which was constant, 7/10, and non-radiating, with no alleviating or aggravating factors. Upon presentation he was hemodynamically stable, and admitted to using methamphetamine hours prior. Chest x-ray was unremarkable. EKG showing no ST segment elevations or depressions. Initial serum troponin was elevated at 0.63 and urine toxicology was positive for methamphetamine and PCP. NSTEMI was diagnosed. He was admitted and started on ACS protocol, and TTE ordered. Repeat troponin was 2.45, and TTE revealed a LVEF of 25–30%. Patient subsequently underwent a left heart catheterization which found the proximal left anterior descending (LAD) artery to have a lesion of 80% with the left ventriculography estimating a LV EF of 20%. Patient was transferred to MICU while pending transfer to tertiary institution for PCI. Patient underwent revascularization and bare metal stenting of proximal LAD bearing no complications and closely followed up in cardiology clinic.

Medications on discharge were aspirin, clopidogrel, carvedilol, lisinopril, furosemide, atorvastatin, and spironolactone. Eight months later, the repeated TTE resulted in significant improvement of the LV EF of 40–45% from 20–25%. The dual antiplatelet therapy with aspirin and clopidogrel was given for a duration of 12 months. Patient is now 14 months post PCI and is remaining clinically asymptomatic.



Abstract 19 Figure 1



**Conclusions** Amphetamine associated acute myocardial infarction may become more common if the rate of amphetamine abuse continues to increase. Methamphetamine associated cardiomyopathy appears to be potentially reversible upon cessation of methamphetamine and guideline directed management for heart failure.

## Endocrinology and metabolism I

### Concurrent session

12:45 PM

Thursday, January 23, 2020

#### 20 UNMASKING OF *PNEUMOCYSTIS JIROVECI* PNEUMONIA TRIGGERED BY TREATMENT OF CUSHING'S SYNDROME

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10.1136/jim-2019-WMRC.20

**Case report** Case: A previously healthy 29 year old man presented with new onset hypertension, diabetes mellitus (DM), easy bruising, 70-lbs weight gain and painful purple stretch marks. Physical examination was notable for blood pressure of 156/91 mmHg, moon facies, facial plethora, acne, dorso-cervical and supraclavicular fat pads, violaceous striae, abdominal bruising and thin skin. Labs showed hypokalemia (3.1 mmol/L), markedly elevated adrenocorticotropic hormone (ACTH 480 pg/mL; NI <45) and 24 hour urine free cortisol (UFC 7950 ug/day; NI <60), consistent with an ACTH-dependent Cushing's syndrome (CS). Pituitary MRI showed a possible 4 mm lesion, however inferior petrosal sinus sampling confirmed ectopic ACTH CS. CT and nuclear imaging were negative. Escalating doses of ketoconazole were started with UFC reduction to 73.3 ug/day. He developed transaminitis, as well as respiratory distress with hypoxemia. Chest imaging demonstrated bilateral ground glass opacities concerning for *Pneumocystis jiroveci* pneumonia (PJP). Serum 1,3 beta-D glucan was elevated (188 pg/mL; NL <80) increasing suspicion for PJP. Patient declined bronchoscopy to confirm diagnosis and was empirically treated with trimethoprim-sulfamethoxazole and prednisone, resulting in rapid improvement of respiratory symptoms. The patient underwent bilateral adrenalectomy for CS and started on replacement hydrocortisone and fludrocortisone. He had 30 pound weight loss and diabetes and hypertension resolved in 3 weeks.

**Conclusions** Patients with CS are at high risk for opportunistic infections. Cortisol excess depresses immune function allowing PJP to colonize the lungs. Treatment with cortisol decrease results in T cells recovery, which can cause an inflammatory reaction to PJP, analogous to immune reconstitution syndrome in HIV patients. Ectopic CS and higher cortisol levels increase PJP risk. Thus, PJP prophylaxis should be considered in patients with severe CS prior to initiation of any cortisol lowering therapies.

#### 21 EVALUATION OF THE IMMUNE SYSTEM IN PEDIATRIC CUSHING DISEASE

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10.1136/jim-2019-WMRC.21

**Purpose of study** Cushing Disease (CD) is a rare pediatric endocrine disorder that results from adrenocorticotropic hormone (ACTH) secreting pituitary adenomas. CD should be recognized as early as possible in the pediatric population due to the significant morbidity and mortality associated with late diagnosis and treatment. In the present study, we sought to describe the relationship between complete blood count (CBC) values, serum cortisol level, and size of the thymus. We also studied the association of the neutrophil to lymphocyte ratio (NLR), recently identified as a diagnostic and prognostic factor in cancer, with markers of hypercortisolemia.

**Methods used** The inclusion criteria for the study included diagnosis of CD before age 18 years, diagnosis between 1997 and 2019, and previous imaging study that included visualization of the thymus (obtained prior to transsphenoidal surgery). CBC and serum cortisol levels at diagnosis were retrieved from medical records via retrospective chart review. Neutrophil and lymphocyte z-scores were calculated based on age and sex specific reference ranges. NLR was calculated using absolute levels among patients 6–12yo and >12yo. All studies were approved by the NIH Institutional Review Board.

**Summary of results** Among 48 patients that met our inclusion criteria, no significant correlation was found between Hemoglobin (Hb) and cortisol. A significant correlation was found between cortisol levels and neutrophil ( $\beta=0.07$ ,  $R^2=0.1978$ ,  $p<0.01$ ) and lymphocyte ( $\beta=0.04$ ,  $R^2=0.1524$ ,  $p<0.01$ ) z-scores. Midnight cortisol was significantly correlated with the NLR in patients >12 years old ( $\beta=0.14$ ,  $R^2=0.6958$ ,  $p<0.0001$ ). Results of NLR for patients  $\leq 12$  years old did not reach statistical significance ( $p=0.096$ ). Thymic data are pending complete analysis.

**Conclusions** Immune dysregulation in CD can be used as supportive evidence of its diagnosis. NLR can be easily calculated from CBC and correlates with cortisol with a stronger coefficient of determination than solely using neutrophil or lymphocyte values. Further investigation is needed to establish a cutoff for NLR that can potentially differentiate patients with CD from eucortisolemic obese patients.

#### 22 TESTOSTERONE AND CORTISOL MODULATE THE METABOLIC EFFECTS OF SLEEP RESTRICTION

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10.1136/jim-2019-WMRC.22

**Purpose of study** Sleep restriction is highly prevalent and increases the risk of type 2 diabetes mellitus. The mechanisms by which sleep restriction causes insulin resistance (IR)

are not known. Understanding these mechanisms would allow targeted interventions beyond requiring more sleep. Sleep restriction decreases testosterone, and increases cortisol, which are the main anabolic and catabolic hormones, respectively. Through a dual hormonal clamp intervention, we investigated whether testosterone and cortisol affect IR due to sleep restriction.

**Methods used** 34 healthy men aged  $33.3 \pm 6.4$  y with BMI of  $25.4 \pm 2.5$  kg/m<sup>2</sup> completed the study. Subjects were admitted to the Clinical and Translational Research Center. They had one night with a 10h opportunity (22:00–08:00) for baseline sleep and were then restricted to 4h sleep (01:00–05:00) for 4 consecutive nights. This pattern was repeated on two separate occasions with different treatment conditions, in randomized order: dual testosterone/cortisol clamp (ketoconazole + transdermal testosterone gel + oral hydrocortisone at mid-physiological doses) during all sleep restriction days, or no clamp (matching placebo). A 3-hour intensively sampled (23 samples) oral glucose tolerance test was performed after the baseline night, and after the fourth sleep-restricted night, to calculate IR by Matsuda Index (Mi) and by minimal model (Si). Effects of condition and measurement day and their interaction were determined by mixed-model.

**Summary of results** Following sleep restriction, Mi showed greater IR in both conditions, but the increase was dampened in the dual clamp condition ( $F=4.90$ ,  $p=0.029$  for interaction). A composite sensitivity index that combined all glucose metabolic indices (Si, HOMA-IR, Matsuda Index) confirmed this finding ( $F=4.81$ ,  $p=0.029$  for interaction).

**Conclusions** A dual hormonal clamp intervention of testosterone and cortisol in a sample of healthy, young adult men dampened the negative effects of sleep restriction on glucose metabolism. Our results show that testosterone and cortisol modulate the effects of sustained sleep restriction on insulin resistance.

### 23 CHANGES IN METABOLIC PARAMETERS AFTER ADMINISTRATION OF NOVEL ORAL ANDROGENS WITH PROGESTATIONAL ACTIVITY FOR 28 DAYS

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10.1136/jim-2019-WMRC.23

**Purpose of study** While the metabolic effects of testosterone have been well studied, the effects of co-administration of an androgen and progestin are less established. Two novel compounds being investigated for male hormonal contraception, dimethandrolone undecanoate (DMAU) and 11 $\beta$ -methyl-19-nortestosterone dodecylcarbonate (11 $\beta$ -MNTDC), have both androgenic and progestational activity. Preliminary data suggest that these androgens decrease HDL-C and increase weight.

**Aim:** Characterize the effects of DMAU and 11 $\beta$ -MNTDC on metabolic parameters including weight, lipid parameters, insulin resistance, and adiponectin.

**Methods used** Two randomized, double-blind, placebo-controlled studies in healthy men were previously performed to assess the safety and tolerability of DMAU and 11 $\beta$ -MNTDC taken orally for 28 days. Insulin and adiponectin assays were performed on banked samples. Changes in weight, LDL-C, HDL-C, fasting glucose, HOMA-IR, and adiponectin were assessed. Log transformations were performed as needed. Two way ANOVA with post hoc Tukey HSD was performed to assess for dosage (0, 200, or 400 mg) and drug (DMAU or 11 $\beta$ -MNTDC) effects.

**Summary of results** A total of 85 subjects were included in this analysis. Overall, there was a significant decrease in HDL-C and increase in weight and LDL-C (all  $p<0.001$ ). For weight and HDL-C, both the 200 mg and 400 mg groups were significantly different from placebo, but there was no significant difference between the 200 mg and 400 mg groups. For LDL-C, the 200 mg groups were not significantly different from placebo ( $p=0.059$ ) but the 400 mg groups were significantly different from placebo ( $p<0.001$ ); there was no significant difference between the 200 mg and 400 mg groups ( $p=0.11$ ) nor differences between the two novel androgens. There was no difference in fasting glucose, adiponectin or HOMA-IR.

**Conclusions** DMAU and 11 $\beta$ -MNTDC reduced HDL-C and increased weight and LDL-C in these analyses. Changes in metabolic parameters may be considered during further development of male hormonal contraception.

### 24 A CASE OF PHEOCHROMOCYTOMA PRESENTING AS RIGHT BASAL GANGLIA INFARCT

<sup>1,2</sup>R Hall, <sup>1</sup>H Saab\*, <sup>1</sup>L Moosavi, <sup>1</sup>RD Polineni, <sup>1</sup>E Cobos. <sup>1</sup>Kern Medical-UCLA, Bakersfield, CA; <sup>2</sup>Ross University School of Medicine, Bridgetown, Barbados

10.1136/jim-2019-WMRC.24

**Purpose of study** Pheochromocytoma is a rare tumor originating in chromaffin cells of the adrenal gland with an incidence rate estimated at 0.8 per 100,000 individuals per year. There have been few documented cases of the tumor and its consequences when not recognized in time.

**Methods used** Retrospective case report.

**Summary of results** A 45-year-old male with unknown past medical history presented via emergency medical services (EMS) to the emergency department (ED) after patient was found down by the railroad with reported right facial droop, dysarthria, and weakness. EMS reported that a friend on scene disclosed that patient had recently smoked methamphetamine. On arrival to the ED, patient was noted to have a blood pressure of 265/131, with a National Institutes of Health Stroke Scale (NIHSS) of 10 and a Glasgow Coma Scale (GCS) 14. He was started on intravenous blood pressure medications and later switched to oral regimen. CT brain found hypodensities in basal ganglia, periventricular centrum semiovale, regions worse on left, suggestive of lacunar infarctions. Hospital course was complicated by uncontrolled hypertension, right sided paresis, aphasia and dysphagia. Given high risk for aspiration, the decision was made to place a percutaneous gastrostomy tube for nutrition and medication

management. CT abdomen and pelvis performed prior to procedure revealed an incidental finding of a 6 cm heterogeneous adrenal mass likely pheochromocytoma confirmed by serum metanephrine assays greater than 1000 pg/mL. The patient was treated with appropriate antihypertensive medication based on guidelines set forth by Endocrine Society, with planned laparoscopic resection of adrenal mass scheduled for two weeks later.

**Conclusions** Given how rare the diagnosis of pheochromocytoma is, the differences in presentation and the need for early diagnosis and management, a clinician's index of suspicion should be higher in individuals with no risk factors presenting with neurological manifestations and uncontrolled hypertension.

## 25 INTRAUTERINE GROWTH RESTRICTION AND SUPPLEMENTAL DHA ALTER RAT HEPATIC HISTONE METHYLATION

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10.1136/jim-2019-WMRC.25

**Purpose of study** Intrauterine growth restriction (IUGR) dysregulates circulating docosahexaenoic acid (DHA) in the fetus and neonate. Low DHA is associated with the development of postnatal morbidities including increased hepatic lipid accumulation. Recent studies suggest that sequestration of methyl groups for hepatic histone methylation, particularly H3K36me3 and H3K79me3, contributes to increased hepatic lipid accumulation. We previously demonstrated that IUGR increases hepatic dysfunction in male, but not female, rat pups. However, the effects of IUGR and DHA supplementation on hepatic histone methylation and associated lipid droplet accumulation are unknown. We hypothesize that IUGR and DHA supplementation cause sex-divergent changes in hepatic histone methylation and hepatic lipid droplet accumulation in the rat.

**Methods used** IUGR was induced by uterine artery ligation in the rat. Control and IUGR rats received a regular diet or DHA diet (0.01%-Low or 0.1%-High) throughout pregnancy and lactation. At postnatal day 21 (d21) rat pup liver was collected. Global levels of histone modifications (H3K36me3, H3K79me3) were measured using western blotting of acid-extracted histones. Lipid droplet accumulation was detected using Oil-Red-O staining.

**Summary of results** In female rats, IUGR with and without DHA increased H3K36me3 (209±11%-no DHA, 154±10%-low; 136±6%-high), and H3K79me3 (159±9%-no DHA, 212±15%-high). In male rats, IUGR without DHA did not affect H3K26me3. The combination of IUGR and High DHA decreased H3K36me3 (80±8%). In male rats, IUGR with and without DHA increased H3K79me3 (153±3%-no DHA, 156±6%-low; 144±16%-high). Qualitative assessment of hepatic lipid droplet accumulation suggests that IUGR increases lipid droplet accumulation in both male and female IUGR liver, while DHA supplementation normalizes lipid droplets dependent on dose and sex with improved resolution in female liver.

**Conclusions** We conclude that IUGR and DHA supplementation cause sex-divergent changes in hepatic histone methylation in the rat and normalization with DHA depends on DHA dose and fetal sex at day 21 of development. We speculate that IUGR affects the capacity for hepatic histone methylation in male rat pups, thus potentially increasing hepatic lipid droplet accumulation. Ongoing studies are identifying specific H3K36me3 and H3K79me3 hepatic target genes.

## 26 LOW K IS NOT OKAY

M Cai\*, R Hashemzadeh-Gargari, R Vohra. *UCSF Fresno, Fresno, CA*

10.1136/jim-2019-WMRC.26

**Case report** A 15 year old hispanic male was in his usual state of health until morning of presentation. He awoke to go to the bathroom, but found himself unable to move his extremities well. He then proceeded to crawl to the bathroom where he vomited twelve times. In ED, vitals were normal, but exam remarkable for flaccid weakness of upper and lower extremities, and mild proptosis. Pertinent labs revealed potassium 1.4, glucose 169, magnesium 1.6, pH 7.41. EKG illustrated prolonged QT interval, ST depression and U waves. He was given IV potassium over four hours with repeat potassium 4.8. Repeat EKG normalized with paralysis slightly improved. Toxicology initially consulted for possible ingestion cause, but no substance found in urine or blood. Thyroid studies revealed TSH of <0.01, and elevated free T4 of 3.83, confirming the diagnosis of thyrotoxic periodic paralysis (TPP). Propranolol was started, along with supplemental magnesium and potassium. Within 24 hours of presentation, patient's paralysis completely resolved. Patient was found to have Graves' disease with elevated TSI at 133, and diffuse uptake in radionuclide thyroid scan. He was subsequently started on methimazole. The pathophysiology of TPP is unclear but is theorized to rapid intracellular shifts of potassium via the Na/K ATPase. Thyroid hormone increases the activity of Na/K ATPase at the level of skeletal muscle and is increasingly stimulated in the thyrotoxic state. The underlying increased activity of Na/K ATPase in skeletal muscle are hit by a further insult such as large, carbohydrate rich meals (which signals for insulin release and further intracellular shift of potassium), or catecholamine release from stress, exercise, or alkalosis as the case in our patient from the vomiting.

**Conclusion** The patient in this case demonstrates a departure from the usual cases of TPP. He was a Hispanic male, whereas there is normally a higher incidence amongst Asians. The patient was also 15 years old, which is younger than the cited peak ages of 20–40. Sometimes there can be a genetic predisposition, as paternal grandmother possibly had the same symptoms. More often, these children have no preceding disease, as in this case. It is important for ED providers and pediatricians alike to keep this in mind as it can be easily remedied, but fatal if not recognized.

## Healthcare delivery research I

## Concurrent session

12:45 PM

Thursday, January 23, 2020

27 LIGHTS, CAMERA, SURGERY: VIDEO RESOURCES  
ENHANCING HEALTHCARE COMMUNICATION

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10.1136/jim-2019-WMRC.27

**Purpose of study** Effectively communicating medical information to patients and their caregivers can help improve patient understanding, adherence to treatment and health outcomes. Despite the importance of communication, physicians often do not communicate satisfactorily with their patients. Our purpose is to create interdisciplinary educational video resources for caregivers who are accessing surgical services at BC Children's Hospital (BCCH). These videos, supplementing regular clinical practice, will help patients and caregivers understand their child's condition, improve surgical outcomes, reduce stress as well as the financial burden of unnecessary emergency room visits.

**Methods used** Surgical team members and research staff from three departments, orthopaedics, urology and general surgery at BCCH, identified suitable video topics and learning objectives. Existing patient resources were combined with further research and expert opinion to draft video scripts. Patients and caregivers were voluntarily asked for their participation and consented through signing a media release form. Videos were then created and edited using software such as Powtoons, WireWax and Adobe After Effects. Completed videos were made available on the Office of Paediatric Surgery Evaluation and Innovation (OPSEI) YouTube channel and on clinic websites. URLs and QR codes were also used to connect viewers to the video resources.

**Summary of results** 62 videos were created in collaboration with 31 families, 7 surgeons, 3 physiotherapists, 2 occupational therapists, 5 nurses, and 5 researchers. Video topics for each series included hip dysplasia, clubfoot, limb reconstructions, ACL reconstructions, ostomies, circumcisions and hypospadias repairs. Within each series, videos ranged from pre and post-operative care instructions, screening methods, caregiver testimonials, treatment options to post-operative exercise tutorials.

**Conclusions** Video educational resources show promise as a tool that may enhance the exchange of knowledge from healthcare providers to their patients. The creation of video resources engages interdisciplinary team members, patients and caregivers in patient centric communication.

## 28 IMPACT ASSESSMENT OF THE TRANSITION OF A CO-MANAGEMENT PERIOPERATIVE HOSPITALISTS MODEL TO A CONSULTATION MODEL TOWARDS PATIENT OUTCOME MARKERS

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10.1136/jim-2019-WMRC.28

**Purpose of study** Perioperative care has wide variability in quality with conflicting models. In 2015, the Departments of Anesthesiology and Urology implemented a perioperative hospitalist service (PHS), consisting of anesthesiology-trained physicians, to co-manage patients during their perioperative period. From 2015 to 2016, the PHS team demonstrated improvements in patient recovery markers, decrease in hospital length of stay, and a reduction in total patient costs. In 2017, the PHS was phased out, but the patient care protocols remained active for the urology service. This study sought to evaluate if the improvement in patient care remained with the transition of PHS from a daily rounding co-management structure to a consultation service.

**Methods used** PHS was formed of selected anesthesiologists who received training on the core competencies for hospitalist medicine and were to medically manage patients undergoing major urologic procedures (prostatectomy, cystectomy, and nephrectomy). Impact was assessed by comparisons of patient outcome markers between the last year of the co-management structure service to the year of the consultation only service. The primary outcome marker was a reduction in length of stay. Secondary outcome markers included complication rate, return of bowel function, number of consultations, reduction in total direct patient costs, and bed days saved.

**Summary of results** Patient outcome markers showed no negative results from the transition of co-management to a consultation service. Reductions in length of stay were seen for cystectomy cases, along with reductions in complication rates and ileus for nephrectomy cases over the year of the consultation service.

**Conclusions** Our previous study showed that anesthesiologists can function as perioperative hospitalists who provide appropriate medical management while improving patient recovery. With this study, the impact of PHS remained up to one year after the transition of the co-management daily rounding service to a consultation only service. Infact, some patient categories showed further improvement in post-operative outcomes. These findings suggest that the transition of a daily rounding co-management PHS to a consultation only service is feasible without negatively impacting patient care.

## 29 BENEFITS OF A COMMUNITY HOSPITAL – ACADEMIC UNIVERSITY PEDIATRIC PARTNERSHIP

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10.1136/jim-2019-WMRC.29

**Purpose of study** Academic children's hospitals increasingly partner with community hospitals to provide inpatient neonatal and pediatric care in the patient's own community. Although some academic hospitals are hesitant to form these partnerships due to concern for decreasing incoming transfers, few studies report the true effect of such collaboration. We hypothesized that such partnership would increase community inpatient pediatric volume and reduce transfers but increase case mix index (CMI) of transferred patients.

**Methods used** In July 2018, we established a partnership between an urban tertiary care academic medical center and a not-for-profit 194-bed community hospital, located 37 miles away. The partnership involved 1) staffing the

Abstract 29 Table 1

	Pre	Post	Change	p-value
Community Hospital – Annual Admissions	887	1278	+44%	-
Community Hospital – Average Daily Census	5.6	6.9	+23%	p<0.0001
Community Hospital – Average LOS, in days	2.31	1.97	-15%	p<0.0001
Transfers to Academic Medical Center (% of admissions)	208 (23%)	223 (17%)	+7%	-
Transferred Patients – Weighted Average CMI	1.19	1.61	+35%	p<0.0001
Transferred Patients – Average% Commercially Insured (n)	19% (40)	23% (52)	+30%	p<0.0001

community inpatient unit with academic-affiliated pediatric hospitalists, 2) obtaining level-II NICU certification and initiating neonatal rounds via telemedicine, 3) providing training for existing nurses and staff at the community site, and 4) developing pediatric protocols and policies. We utilized two-sample t-tests to compare one-year pre- and post-partnership time periods (July 2017-June 2018 versus July 2018-June 2019) to analyze the community hospital's pediatric average daily census, average length of stay (LOS), CMI of patient transfers, and payor mix.

**Summary of results** Data regarding the community hospital inpatient pediatric population and pediatric transfers to the academic medical center are shown below. The academic center's contribution margin increased by 123% from pre- to post-partnership. The partnership was cost-neutral at the departmental level.

**Conclusions** Our data suggest that the community-academic partnership successfully increased admissions and reduced LOS and inter-facility transfers while increasing acuity of transfers. These partnerships promote appropriate pediatric patient care and are cost-effective to both partners.

### 30 FREQUENT FLYERS: STELLAR STRATEGIES FOR EMERGENCY DEPARTMENT SUPERUTILIZERS

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10.1136/jim-2019-WMRC.30

**Purpose of study** Determine cost avoidance and utilization rates (Emergency department (ED) visits and hospital admissions) of a group of highest utilizers post-intervention by a Community Care Coordination Team (CCCT).

**Methods used** Superutilizers comprise a small portion of patients who account for a high percentage of costs. They have social determinants that prevent successful outpatient management of chronic conditions. Less than 5% of our patients accounted for more than 50% of healthcare costs. We subsequently developed the 5/50 Program to reduce reliance on the ED for non-emergent care and saved our institution \$2.5 million. Candidates were identified through lists of 3+ ED visits/90 days, EMR alerts for multiple visits, and physician referrals. Our CCCT consisted of 2 nurses, 2 social workers, 2 bilingual team members, and 1 nurse practitioner that followed patients up to 6 months post-discharge to address social and medical needs. The CCCT worked with community partners, homeless outreach teams, mental health services, paramedics, nursing homes, low-cost clinics, food

banks, and the health department. Interventions included extensive outreach and frequent face-to-face communication with patients to assist with primary care and medication management. The CCCT reassessed patients, established care plans, and provided education for self-management of chronic conditions.

**Summary of results** Our program shows successful outcomes with decreased acute-care service utilization. ED visits were reduced over a 3.5-year period by 58%, from 1510 visits pre-enrollment to 882 post-enrollment. Total admissions decreased by 58% from 986 admissions pre-enrollment to 573 post-enrollment. Participants averaged 6.3 ED visits pre-enrollment, reduced to 2.7 visits with a mean difference of -3.6 (95% CI -4.9 to -2.4, p<0.0001). Participants averaged 1.6 admissions pre-enrollment, reduced to 0.6 admissions with a mean difference of -1.1 (95% CI -1.4 to -0.7, p<0.0001). Cost-benefit estimation showed our institution spent \$5,418,628 to manage superutilizers. The program cost \$1,294,500 over a 3-year period, reduced to \$1,615,2289 post-enrollment, yielding a cost avoidance of \$2,508,899 (46% reduction).

**Conclusions** Our program reduced resource-intensive services and provides information to fix the national burden superutilizers imposes on the healthcare system.

### 31 PATIENT AND PROVIDER PERSPECTIVES ON ACCESS TO MEDICAL NUTRITION THERAPY FOR PATIENTS WITH NON-DIALYSIS DEPENDENT (NDD) CHRONIC KIDNEY DISEASE (CKD)

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10.1136/jim-2019-WMRC.31

**Purpose of study** CKD affects approximately 30 million U.S. adults. Nutrition management can slow CKD progression and delay or prevent end-stage renal disease, but only 10% of patients with CKD receive any medical nutrition therapy (MNT) before initiating dialysis. This study aimed to identify factors that influence timely access to MNT for patients with NDD CKD from the perspective of patients and providers.

**Methods used** Three anonymous surveys were distributed to adults with NDD CKD, registered dietitian nutritionists (RDNs) and medical providers via REDCap. Surveys were distributed via the NKF 2019 Spring Clinical Meeting app, via Academy email listservs for RDNs and NKF email listservs for patients and medical providers. Descriptive analyses and Fisher's exact tests were conducted with R (version 3.5.3).

**Summary of results** 348 patients, 66 RDNs and 30 medical providers responded. Patients were more optimistic than providers that they could make lifestyle changes to reduce CKD complications, with 44% of patients strongly agreeing with this statement vs. 29% of RDNs and 13% of medical providers. There was strong concordance regarding patient interest, with about two-thirds of medical providers, RDNs and patients feeling that patients would be interested in an RDN referral. However, there were feasibility concerns. Two-thirds of RDNs and medical providers felt that there are not

enough RDNs with expertise in renal nutrition available for referrals. Around 40–50% of RDNs and medical providers felt that the EMR was not set-up to make RDNs referrals easy, and that there was not adequate insurance coverage. About half of RDNs were aware of Medicare coverage for MNT, but few medical providers or patients were familiar with the coverage.

**Conclusions** Many patients with NDD CKD are interested in MNT and confident that it can help them with disease management. Perceived referral and reimbursement barriers should be further explored.

### 32 IPACK BLOCK ASSOCIATED WITH SIMILAR LENGTH OF STAY AND OPIOID CONSUMPTION IN TOTAL KNEE ARTHROPLASTY

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10.1136/jim-2019-WMRC.32

**Purpose of study** Effective analgesic modalities improve outcomes in patients undergoing total knee arthroplasty (TKA). We hypothesized implementation of a relatively new nerve block method, the iPACK block would be associated with decreased length of stay and 24-hour opioid consumption in TKA.

**Methods used** This retrospective cohort studies outcomes of interest were postoperative length of stay (LOS) and postoperative 24-hour oral morphine equivalent (OME) consumption. All patients received a single shot adductor canal block (ACB) and local infiltration analgesia (LIA) and were grouped based on whether they received an iPACK block. Potentially confounding variables such as age, gender, BMI, presence of comorbid conditions, operation room time, and current chronic steroid or opioid medication therapy were recorded. Descriptive statistics characterized patients in our sample. Categorical demographic and clinical group differences were examined using Chi-square analysis. Continuous group differences were explored using 2 sample t-tests for symmetrical distributions and Mann-Whitney U for skewed distributions. Linear regression models were performed to detect differences in study outcomes between the two groups, controlling for confounding variables.

**Summary of results** Incorporation of the iPACK block was not associated with reduced LOS unadjusted ( $p=0.11$ ) or in fully controlled models ( $p=0.21$ ). Potentially modifiable factors that were found to increase length of stay included chronic opioid consumption ( $p=0.04$ ) and case duration ( $p=0.01$ ). Use of the iPACK block was not associated with a change in 24-hour OME consumption unadjusted ( $p=0.52$ ) or in fully controlled models ( $p=0.34$ ). Potentially modifiable factors that significantly increased opioid consumption were a history of chronic opioid therapy ( $p=0.002$ ) or corticosteroid therapy ( $p=0.003$ ).

**Conclusions** As only the second study performed investigating incorporation of an iPACK into a pathway already including LIA and ACB we have contributed to a small body of evidence suggesting the iPACK block may not add significant benefit alongside these methods. To date no prospective study has investigated outcomes associated with lone addition of iPACK block into a pathway including ACB and LIA. Further randomized research is warranted.

### 33 IMPROVING MEDICAL STUDENT DOCUMENTATION: CAN THE RED CHECKLIST ASSIST WITH TEACHING DOCUMENTATION?

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10.1136/jim-2019-WMRC.33

**Purpose of study** With the new CMS guidelines and a desire by many medical educators to better prepare medical trainees for residency, we sought to determine if using the Responsible Electronic Documentation Checklist (RED Checklist) would improve the quality of medical student inpatient progress notes.

**Methods used** At Week 5 of the 10-week Internal Medicine Clerkship, 163 third year medical students had progress notes scored using the RED checklist by a core group of faculty members. Students then received 15–20 minutes of targeted note feedback. At Week 10, students had a new set of progress notes scored by note evaluators without any in-person feedback. Data was analyzed using Paired-sample t-tests and Cohen's  $d$  to evaluate change in the quality of notes as measured by the RED checklist after the intervention. Hierarchical linear regressions analysis was performed to determine whether changes in RED Checklist scores could predict subjective clinical performance, NBME, and OSCE scores.

**Summary of results** We found significantly higher objective note score ( $t=5.64$ ,  $p<0.001$ ), assessment/plan (A/P) score ( $t=5.75$ ,  $p<0.001$ ), and total note score ( $t=7.67$ ,  $p<0.001$ ) post-intervention compared to at baseline. Post-intervention A/P scores significantly predicted OSCE scores, such that a one standard deviation increase in post-intervention RED A/P scores was associated with a 0.24 standard deviation increase in OSCE scores ( $\beta=0.24$ ,  $sr^2=0.04$ ,  $p=0.015$ ). Our model also indicated that baseline RED Objective scores significantly predicted OSCE scores, such that a one standard deviation increase in baseline RED Objective scores was associated with a 0.24 standard deviation increase in OSCE scores ( $\beta=0.24$ ,  $sr^2=0.04$ ,  $p=0.015$ ). The changes in Objective and A/P Scores were not associated with NBME and Clinical evaluation scores.

**Conclusions** After implementation of the RED Checklist with structured feedback, student note quality improved. Our study also found that an improved A/P score and baseline Objective scores correlated with higher OSCE scores. As many physicians struggle to find enough time and lack the tools to provide structured quality feedback to trainees, physicians can implement the RED Checklist, a time efficient tool, to improve quality of student note writing and prepare students for residency.

### 34 DEVELOPMENT AND EVALUATION OF A FREE ONLINE POINT OF CARE ULTRASOUND TRAINING CURRICULUM

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10.1136/jim-2019-WMRC.34

**Purpose of study** Point-of-care ultrasound (POCUS) has rapidly emerged as a modality to improve bedside assessment. The driving force for this adoption is that clinical decision-making

can be improved over traditional physical examination with the application of POCUS. Since the limiting factor for the adoption of POCUS is education, the authors launched a free open access educational platform. We present our initial data from our online users on improving content knowledge.

**Methods used** Over a two-year period a validated educational POCUS curriculum, the FORESIGHT Examination, was transitioned to an online platform ([www.foresightultrasound.com](http://www.foresightultrasound.com)). The curriculum was developed to educate and evaluate: cardiovascular function, volume status, pulmonary function, presence of abdominal fluid, gastric content, position of the endotracheal tube, and presence of increased intracranial pressure. Performance of the website was evaluated via surveys on the content and content multiple choice testing. The primary outcome marker was improvement in content testing scores after reviewing the online curriculum. Analysis was performed via student t-test, a p value of significance equal to 0.05.

**Summary of results** To date 530 users have accessed the website. Survey results on the website content to improve POCUS knowledge showed that 83% reported to strongly agree, 10% to agree, and 7% were neutral. Review of content testing showed a statistically significant ( $p < 0.05$ ) improvement in scores from pre to post training for each testing category: 1. ultrasound physics, 2. mechanisms of hypotension/volume status, 3. cardiac, 4. pulmonary, and 5. abdominal/vascular access/neuro.

**Conclusions** While there is still much to be developed, the concept of P-POCUS (perioperative POCUS) has shown dramatic growth in recent years. Further innovation and integration of this tool have tremendous potential for impacting the quality of care we can provide at the bedside. This study highlights one successful platform to improve knowledge on this topic.

### 35 WHAT MATTERS MOST: AN INTERVENTION FOR LEARNERS

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10.1136/jim-2019-WMRC.35

**Purpose of study** Inquiring about what matters most has been deemed a powerful tool to support greater patient wellbeing. The purpose of this study was to better equip junior medical students to offer whole person care (WPC). We expect that perceived value, confidence and frequency of students asking patients what matters most to them will increase after the intervention. We hope as a result of students being more engaged with their patients, they will feel more involved on the team.

**Methods used** A pre-baseline survey was administered to junior medical students at the beginning of their Internal Medicine clerkship. A workshop was conducted early in the clerkship. Students were given a pocket guide with questions aiding connection with patients. Students were told to ask each patient they saw about what matters to them and present this information on rounds. Attendings and residents were encouraged by email to encourage students to present. A post-baseline survey was issued to each group at the end of the clerkship. At the end of the academic year, a survey will be issued to the entire junior class to assess potential long-term impact.

**Summary of results** Perceived importance of, and confidence in providing WPC was rated on the following scale; 1=not at

all, 2=slightly, 3=moderately, 4=very, 5=extremely. The average perceived value increased from 3.64 to 4.21 ( $p < 0.05$ ) and perceived confidence from 2.85 to 3.07 ( $p = 0.3491$ ). The post-baseline survey of the first clerkship found that 80% of students asked patients about what matters most at least weekly. 57% reported this to faculty weekly. The main barriers selected by students were time constraints, workload, and lack of support. Students reported that the intervention increased sense of meaning. Students perceived a need for more role models and earlier training in their pre-clinical years to enhance the effectiveness of this intervention.

**Conclusions** Preliminary results show that students express a significant increase in the value they place on WPC after undergoing the intervention. We anticipate that as the study's power increases with more student responses, we will see a statistically significant difference in student confidence in ability to provide WPC. As students engage on this level with their patients we expect they will find more meaning in their practice.

## Immunology and rheumatology I

### Concurrent session

12:45 PM

Thursday, January 23, 2020

### 36 SECUKINUMAB AND INCIDENT INFLAMMATORY BOWEL DISEASE IN ANKYLOSING SPONDYLITIS

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10.1136/jim-2019-WMRC.36

**Purpose of study** Secukinumab is a fully human monoclonal antibody against interleukin-17A for use in treating active ankylosing spondylitis (AS). Inflammatory bowel disease (IBD) is increased in AS and subclinical gut inflammation is found in 50–60 percent of AS patients. Incident IBD and exacerbation of established IBD was reported as an adverse event in secukinumab clinical trials, though these were rare events ( $< 1\%$ ) and not significantly different compared to the placebo population. There have been 60 reported cases of IBD, including ulcerative colitis, and Crohn's disease in the FDA Adverse Events Reporting System (FAERS) in AS patients treated with secukinumab, with 2 cases listed as exacerbation of preexisting disease. We evaluated the incidence of IBD in AS patients after initiation of secukinumab.

**Methods used** Data was extracted from a prospective axial spondyloarthritis (axSpA) cohort followed by a tertiary care center in a subspecialty spondyloarthritis clinic at the University of California, San Francisco. We describe a case-series of three AS patients who developed incident IBD after treatment with secukinumab. The patient demographics, treatment exposures, medication use and disease course since initial presentation at the clinic are reported.

**Summary of results** In our axSpA cohort, 22 patients with AS were treated with secukinumab. Three patients (13.6%) developed incident IBD (2 Crohn's disease and 1 ulcerative colitis). The patients experienced symptoms of IBD within seven months (1.5–7) after starting secukinumab and were

referred to a gastroenterologist in the setting of new diarrhea. IBD diagnoses were confirmed by a gastroenterologist in the setting of a clinical evaluation, colonoscopy and histopathology.

**Conclusions** Our findings suggest that IBD incidence may occur more frequently with secukinumab exposure than has been reported. There are limitations to this study as it is uncontrolled, and the patient population may have more severe disease at a tertiary care center. We recommend that providers treating AS patients with secukinumab take a detailed gastrointestinal history and have a low threshold for further evaluation in those with new gastrointestinal symptoms.

### 37 SECONDARY EFFICACY FAILURE IS THE PREDOMINANT ETIOLOGY FOR DISCONTINUATION OF TUMOR NECROSIS FACTOR INHIBITOR IN PSORIASIS/PSORIATIC ARTHRITIS

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10.1136/jim-2019-WMRC.37

**Purpose of study** Psoriatic arthritis is a chronic inflammatory disease of the joints and skin that affects 1/1000 people in the US. Tumor necrosis factor inhibitors (TNFi) are used when symptoms are severe. However, current research describing TNFi persistence rates, defined as time from initiation to discontinuation of the drug, is inconsistent and incomplete. This study examined characteristics associated with persistence of TNFi (adalimumab, certolizumab pegol, etanercept, golimumab, and infliximab) and reasons for discontinuation.

**Methods used** US veterans enrolled in the Program to Understand the Longterm Outcomes in Spondyloarthritis (PULSAR) from 2007 – 2017 who 1) were diagnosed with psoriatic arthritis or psoriasis and 2) had been treated with a TNFi were included in the study. Stata was used to conduct Student's t-tests, Pearson Chi<sup>2</sup> tests, time-to-event analyses, and multivariate analyses.

**Summary of results** 321 individuals with 931 TNFi courses were included in the study. The mean age was 55.4 years, and 83.8% of the cohort continued at least one TNFi course at one year. Course order was correlated with persistence on a TNFi at one year (HR 1.09,  $p < 0.01$ ). Baseline Bath Ankylosing Spondylitis Functional Index (BASFI) and baseline pain scores were correlated with response to a TNFi (HR 1.12,  $p = 0.018$  and HR 0.689,  $p < 0.01$ , respectively). Other demographics were not independent predictors of response or persistence. Infliximab (79.31%) was associated with improved persistence at 24 months when compared to adalimumab (66.40%,  $p = 0.019$ ) and certolizumab (54.17%,  $p = 0.013$ ). The most commonly cited reason for discontinuing TNFi treatment was secondary failure (33%), defined as a loss of prior efficacy after >6 months of treatment, followed by adverse events (25%).

**Conclusions** This study found that most clinical characteristics, other than course order, did not affect persistence on a TNFi, suggesting that persistence is difficult to anticipate. Since persistence is suboptimal, further research should study possible mechanisms to explain loss of efficacy, including the immunogenicity of TNFi, in an effort to increase persistence and improve treatment outcomes.

### 38 CORRELATION BETWEEN CLINICAL AND IN VITRO RESPONSE TO METHOTREXATE IN RHEUMATOID ARTHRITIS

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10.1136/jim-2019-WMRC.38

**Purpose of study** Rheumatoid arthritis (RA) is a systemic autoimmune disease that decreases quality of life and can lead to disability. Methotrexate (MTX), which targets activated T cells, is the first-line of therapy for RA. Unfortunately, 30 to 50% of RA patients do not experience adequate reduction of symptoms while on MTX. Predicting MTX response would be helpful for guiding treatment decisions and improving the lives of RA patients. The purpose of this pilot study was to explore a possible association between clinical response to MTX and in vitro effects of MTX on leukocyte secretion of IL-17 and IFN-g, pro-inflammatory cytokines associated with the activated Th17 and Th1 cells.

**Methods used** Peripheral blood samples were collected from 16 RA patients prescribed MTX but prior to initiation of MTX treatment. Leukocytes were isolated from the blood samples, activated with anti-CD3 and anti-CD28 antibodies, and treated with several concentrations of MTX (0 to 1  $\mu$ M). Supernatant was harvested at 72 hours, and concentrations of IL-17 and IFN-g were assessed by ELISA. The RA patients' charts were reviewed to assess the clinical effects of MTX after 3 months of MTX treatment, as described by changes in clinical disease activity index (CDAI) and any side effects.

**Summary of results** In most blood samples, 1  $\mu$ M of MTX decreased secretion of IL-17 and IFN-g. Maximal decrease was -28 - 87% for IL-17, and 15 - 92% for IFN-g. The concentration of MTX required to achieve half-maximal decrease (IC50) also varied for both IL-17 (0.02 - 0.3  $\mu$ M) and IFN-g (0.01 - 0.3  $\mu$ M). Based on samples from 9 patients, there is greater variation in the IL17 IC50s of those with side effects vs those without ( $p < 0.05$ ), with absence of side effects associated with IL17 IC50 0.03 - 0.05  $\mu$ M.

**Conclusions** There is large person-to-person variation in the in vitro effects of MTX on IL-17. Increased sample size is needed to assess whether this variation could be of clinical significance.

### 39 ABSTRACT WITHDRAWN

### 40 HAIR REPIGMENTATION AFTER RITUXIMAB USE IN A PATIENT WITH SYSTEMIC SCLEROSIS

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10.1136/jim-2019-WMRC.40

**Purpose of study** Repigmentation of gray/white hair is rarely reported in the literature. There are several etiologies contributing to this, and autoimmune diseases have been considered one of them. An overactive immune response could result in sudden graying of hair in mouse models through inducible expression of melanogenesis associated transcription factor (MITF), which controls the production and life cycle of melanocytes and acts as an off-switch to innate immune target



genes at the same time. Similarly, change of hair color have been associated with a multitude of drugs including corticosteroids, cyclosporine and most recently targeted anticancer therapies targeting immune system. However, very little is known of the effects of biologics used in autoimmune diseases and their role in hair repigmentation.

**Methods used** A 70 year old male with systemic sclerosis was started on Rituximab therapy in 09/2017, now s/p 5 cycles of Rituximab given every 6 months. Initially presented with Reynaud's, shortness of breath, weight loss, arthralgias and skin findings. On presentation, physical examination revealed achromotrichia (silver hair) of normal aging, without hair loss or thinning. After 6–9 months into Rituximab therapy, patient had repigmentation of hair to black. Now he has over 60% of repigmentation and is into third year of rituximab therapy with stable disease.

**Summary of results** Graying of hair usually begins in the third and fourth decade of life after melanocyte depletion unless there are other causes including nutritional deficiencies, stress, and smoking among others. In those instances, hair changes can be seen earlier. Rituximab among other biologics has been used in several autoimmune conditions including SLE, rheumatoid arthritis and systemic sclerosis. Alopecia is considered a side effect commonly seen, but hair repigmentation is not reported. To our knowledge this is the first ever reported case of repigmentation in a patient on Rituximab for systemic sclerosis. Hair darkening after use of biologics might be reversible but the exact mechanism remains elusive.

**Conclusions** To our knowledge this is the first ever reported case of repigmentation in a patient on Rituximab for systemic sclerosis. Hair darkening after use of biologics might be reversible but the exact mechanism remains elusive.

#### 41 IDENTIFICATION OF UNIQUE MOLECULAR MARKERS OF DIABETOGENIC T-CELLS

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10.1136/jim-2019-WMRC.41

**Purpose of study** Type 1 diabetes is a complex autoimmune disorder in which the pancreas's insulin-producing-cells are destroyed. Previous research has indicated that pancreatic -cells autoantigen recognition both initiates and perpetuates the disease and that CD4+ and CD8+ T cells play a major role in those processes. Yet, the unique markers of these T cells and how they overcome tolerance to B-cell autoantigens remains unclear. Using single-cell RNA sequencing, we have identified significant changes in gene expression values in diabetic mouse models. Here we seek to validate the RNA sequencing data using qPCR and flow cytometry.

**Methods used** Flow Cytometry: Single cell suspension of mouse splenocytes was achieved by physical disruption of spleen and filtering through 100 mm nylon cell strainer. Cells were enriched for CD8+ T cells using the MACS CD8a+ T Cell Isolation kit according to manufacturer's instructions. Antibodies for CD127, CX3CR1, CD44, CD4, CD3, CD8a, CD11b, CD11c, CD19, 7AAD, TCR b, KLRG1, and PD-1 were purchased from Bio-legend.

qPCR: Splenocytes from prediabetic and diabetic non-obese diabetic (NOD) mice and G9 were harvested and enriched for CD8+ T-cells using the MACS CD8a+ T Cell Isolation Kit according to manufacturer's instructions. Total RNA was

extracted using the QIAGEN RNeasy kit (with optional on-column DNase digestion) and reverse transcribed using Quantabio's qScript cDNA SuperMix following manufactures instructions.

*Klrk1, CCL5, Gzmb, Ctla2a, Cx3cr1, Lgals1, Myo1F-1, HopX, CXCR6, Gimap7, Ahnak, S100a6, Rgs1, Anxa2, Itgb1, Gzma, Gzmk, FasL, and Tbx21, and B-actin* primers were ordered from Sigma-Aldrich. The sequences of primers are available upon request. PCR product with the PowerUp SYBR Green Master Mix.

**Summary of results** There is an increased mRNA expression in expression of CCL5, Ctla2a, Cx3cr1, HopX, Anxa2, FasL, and Gzmk transcripts in diabetic mice. We also find there is a unique subpopulation of CD8+ T-cells in splenocytes that co-express Cx3cr1 and Klrk1 in diabetic mice.

**Conclusions** Ultimately, our goal is to identify molecular markers specific to diabetogenic T-cells that can predict changes in T-cell functionality as can be detected by the Evalvol lab's ultrasensitive two-dimensional affinity and force-based single cell assays. This project is the first step in identifying those potential molecular markers.

#### 42 AN UNUSUAL CASE OF SYSTEMIC LUPUS ERYTHEMATOSUS INDUCED PERICARDITIS IN A YOUNG HISPANIC MALE

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10.1136/jim-2019-WMRC.42

**Purpose of study** Emphasize to the medical community the importance of keeping a broad differential and eliminating bias when evaluating patients to reduce the chance of misdiagnosis in males who present with SLE symptoms.

**Methods used** Evaluation of patient.

**Summary of results** Systemic Lupus Erythematosus, SLE, is an autoimmune disease of an unknown and multifactorial etiology. There is a higher prevalence among females in particular African-American and Hispanic women. Cardiovascular diseases, such as, thrombosis, HTN and heart failure have become the leading causes of mortality and morbidity among SLE patients. Cardiovascular manifestations develop in the majority of SLE patients at some time during their illnesses, the most common being acute pericarditis and pericardial effusion. However, pericarditis as the first manifestation of SLE is less common.

An 22-year-old Hispanic male with no prior significant medical history presented to the emergency department with 48 hours of progressive dyspnea and constant sharp substernal chest pain exacerbated by lying flat. He also had a bilateral wrist pain and swelling that had led to limited range of motion. On examination, patient was febrile, tachycardic, tachypneic with normal oxygen saturation. EKG revealed diffuse concave upward ST segment elevation with PR depression in leads I & II. CXR demonstrated a left sided pleural effusion. Patient's initial laboratory tests results were significant for leukocytosis without bands, elevated C-reactive protein, and erythrocyte sedimentation rate. IV fluids and broad spectrum antibiotics were started. Blood cultures and infectious workup was unremarkable for viral or bacterial sources of infection; however, following autoimmune workup lead to the diagnosis of SLE. The patient was subsequently started on oral Colchicine, Indomethacin, and Prednisone. patient's vital signs, pleuritic chest pain, bilateral wrist pain resolved.

**Conclusions** Medical bias can increase the difficulty in distinguishing between sepsis and an acute episode of SLE can be challenging in a patient without prior history of medical illness. Therefore, clinicians should have a high degree of suspicion for autoimmune diseases (i.e. SLE) when a patient presents with a life-threatening and multiorgan condition.

## Infectious diseases I

### Concurrent session

12:45 PM

Thursday, January 23, 2020

#### 43 EFFECT OF EXTRACORPOREAL SHOCKWAVE ON RHIZOPUS ORYZAE BIOFILM

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10.1136/jim-2019-WMRC.43

**Purpose of study** Fungal biofilms are communities of adherent cells surrounded by an extracellular matrix. Clinically, biofilm associated infections can be extremely difficult to eradicate due to their resistance to antifungals and host defense mechanisms. In this study we investigate the effect of extracorporeal shock wave treatment (ESWT) on *Rhizopus oryzae* biofilm. ESWT is an effective treatment for soft tissue wounds including severe burns and vascular ulcers. ESWT acts through mechanotransduction and complex biological pathways. However, the exact biological effects of ESWT on human, fungal and bacterial cells is not completely understood. While many reports suggest that extracorporeal shock wave is effective at inducing neovascularization and tissue regeneration in the host and causing damage to bacterial biofilm *in vitro* the effect of shock waves on fungal biofilm has been largely ignored. Our study focuses on fungal extracellular matrix production, cellular respiration and morphological hyphal alteration following the application of ESWT.

**Methods used** Biofilms were treated under four main conditions: Shock only, Shock + Amp B, Amp B control and Biofilm control. Shocks were applied to pre-biofilm, 12, and 24 hours post plating (mature biofilm). Tubes were exposed to 300 pulses using an energy density of 0.55 mJ/mm<sup>2</sup> at 3 Hz. Shock wave treatment was performed using a water bath setup.

**Summary of results** Results indicate that shockwave application in combination with antifungal treatment increases fungal cellular respiration, extracellular matrix production and hyphal width compared to antifungal treatment alone. Shockwave when applied in isolation, (without antifungal treatment) revealed no difference in respiration or matrix production.

**Conclusions** It is suggested that shockwaves disrupt biofilm structure allowing antifungal drugs to penetrate and interact with the underlying cells causing an increase in cellular respiration, hyphal growth and extracellular matrix production. This could allow the host system to recognize pathogen proteins and increase pathogen clearing by the immune system. However, further research will need to be done to confirm this hypothesis.

#### 44 CONGENITAL SYPHILIS: A QUALITATIVE RETROSPECTIVE LONGITUDINAL STUDY ON CHARACTERISTICS OF MOTHERS AND NEWBORNS IN A TERTIARY CARE HOSPITAL

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10.1136/jim-2019-WMRC.44

##### Purpose of study

1. To determine maternal factors leading to increased prevalence of congenital syphilis in our community and state.
2. To study the effects in newborns of in utero exposure to untreated or partially treated maternal syphilis.

**Methods used** ICD-9 and 10 codes were used to identify newborns born to mothers with a diagnosis of syphilis at the time of delivery at a tertiary care hospital in Fresno, California from 01/2010 -12/2018. 231 newborns and mother dyads were included in analysis.

##### Summary of results

**Maternal characteristics:** The mean age was 27 years old (range 16–42 years). 57(24.7%) were Caucasian and 167 (75.3%) were ethnic minorities. 205(88.7%) were unmarried, 207(89.6%) were unemployed. 17 (7.4%) were incarcerated, 18 (7.8%) moms were homeless, 11 (4.8%) were victims of domestic violence. 136(58.9%) admitted to drug use, of which 112 (48.5%) used methamphetamines, 57(24.7%) used marijuana, and 15(6.5%) used opiates. 78(33.8%) smoked tobacco, 14 (6.1%) drank alcohol during pregnancy. 61(26.4%) positive for HSV by serology. 35(15.2%) positive for Chlamydia, 11(4.8%) positive for Gonorrhea, 6(2.6%) positive for HIV. 75(32.5%) were treated adequately for syphilis during pregnancy, 119(51.5%) treated inadequately, and 34(14.7%) received no treatment.

**Newborn characteristics:** Of 231, 67 were born from 2010–14 (20.4%) and 184 born from 2015–18(79.6%). At delivery, 19 (8.2%) newborns were a gestational age ≤32 weeks, 57 (24.7%) 33–37 weeks, and 155(67.1%) >37 weeks. 15(6.5%) had a positive CSF VDRL, 36(15.6%) had an abnormal bone survey, 5(2.2%) had an abnormal eye examination. 220 (95.2%) received treatment for syphilis, and 7(3.0%) did not receive treatment. Of those treated, 56(24.2%) received IM Penicillin, 139(60.2%) received IV Penicillin, and 28(12.1%) received both IM and IV Penicillin.

**Conclusions** We identified that ethnic minorities, unemployment, illicit drug use, STDs were prevalent among pregnant women with syphilis. High rates of inadequate/no treatment during pregnancy is concerning and have led to prolonged hospitalization of newborns for IV therapy. Strengthening public health infrastructures to test and care for these high-risk pregnant women is urgently needed.

#### 45 COMPARISON OF PROCALCITONIN AND C-REACTIVE PROTEIN (CRP) IN NEONATAL BACTERIAL SEPSIS

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10.1136/jim-2019-WMRC.45

**Purpose of study** Blood culture, the gold standard for the confirmation of bacterial sepsis, has significant limitations including time delay in obtaining results. Biomarkers such as serum

**Abstract 45 Table 1** Comparison of PCT & CRP in early-onset neonatal sepsis

First Author, Year	Study Subgroups	Test Threshold	Test Sensitivity	Test Specificity
Guibourdenche 2002	21/120 confirmed sepsis or probable infection, 88/120 bacterial culture-negative, 11/120 discordant clinical and bacteriological findings	PCT 2.5 µg/L	PCT 87%	PCT 90%
		CRP 7.5 mg/L	CRP 68%	CRP 80%
Grosej-Grenc 2009	17/46 SIRS with bacterial sepsis, 29/46 SIRS without bacterial sepsis	PCT 2.28 µg/L	PCT 82%	PCT 48%
		CRP 11 mg/L	CRP 59%	CRP 100%
Altunhan 2011	171/260 positive culture and clinical signs of sepsis, 89/260 no clinical signs of sepsis or risk factors	PCT 0.59 ng/mL	PCT 48.7%	PCT 68.6%
		CRP 5.9 mg/L	CRP 44.5%	CRP 59.4%
Mohsen 2015	35/70 positive blood culture and clinical sepsis, 35/70 healthy controls	PCT 1.1 pg/mL	PCT 80.0%	PCT 85.7%
		CRP 12.0 mg/L	CRP 72.9%	CRP 100%
Al-Zahrani 2015	34/100 positive blood culture and/or positive bacterial 16S rDNA PCR, 37/100 negative blood culture and positive sepsis clinical symptoms and screen, 29/100 negative blood culture and screen	PCT 1.7 ng/mL	PCT 72.5%	PCT 90%
		CRP 2.5 mg/L	CRP 91.1%	CRP 72.4%
Elmoutaleb 2016	50/80 clinical sepsis and positive blood culture, 30/80 healthy controls	PCT 2.0 ng/mL	PCT 76.3%	PCT 78.2%
		CRP 6.0 mg/dL	CRP 51.6%	CRP 70.7%

Early onset=within 3 days of life, SIRS=systemic inflammatory response syndrome

procalcitonin (PCT) and CRP are commonly used to predict sepsis in adult patients. The purpose of this study is to evaluate the use of PCT and CRP in predicting early-onset bacterial sepsis in neonates.

**Methods used** A comprehensive literature review was utilized through multiple search engines, such as PubMed, Google Scholar, and Cochrane using keywords, ‘neonate’, ‘sepsis’, ‘procalcitonin’ and ‘CRP’. Studies in our final analysis have included measurement of both PCT and CPR. Only studies of term and premature neonates which included bacteriologically proven early onset sepsis with control groups were included in the analysis.

**Summary of results** Of 20 studies, 6 satisfied our inclusion criteria. The main reasons for excluding studies were lack of a control group (no sepsis) or late onset sepsis (>3 days of life). Sensitivity of PCT ranged from 48.7% to 87% and CRP ranged from 44.5% to 91.1%. The specificity of PCT ranged from 48% to 90% and CRP ranged from 59.4% to 100%. Although most studies took into account the confounding variables such as gestational age, maternal factors and intrapartum complications, it was difficult to make firm conclusions when comparing PCT and CRP in predicting neonatal sepsis. Among different studies, there was heterogeneity of cut-off values, variable times to differentiate early onset sepsis, lack of uniformity in the control groups and differing sampling times.

**Conclusions** Our review suggests that the sensitivities and specificities of PCT and CRP are comparable in predicting bacterial infection in premature and term neonates. More data are needed to determine the optimal cut-off values. Interpretation of test results has to be individualized based on clinical circumstances.

46

#### CHARACTERIZATION OF HIV QUASISPECIES VIA PARTICLE-TEMPLATED EMULSIFICATION

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10.1136/jim-2019-WMRC.46

**Purpose of study** RNA retroviruses can form ‘similar-but-different’ variants (quasispecies). These variants are found through next-generation sequencing to track shifts in quasispecies during early infection. A disadvantage is that it may be expensive

to sequence a long stretch of RNA if needed. Droplet microfluidic devices create micron size water-in-oil droplets, where rare cells or novel genes can be trapped into one droplet and analyzed. The advantages are that it is high-throughput and uses less reagents. Barriers to microfluidics are the hardware, expertise, and cost needed to fabricate the devices. The goal of this project is to see whether the method particle templated emulsification (PTE) can be used to track rare HIV RNA variants. This method creates droplets simply by vortexing polyacrylamide beads with your sample. We also want to show that we can do Splicing by Overlap Extension (SOE) PCR in PTE, which fuses two separate pieces of DNA to reduce the size of the amplicon.

**Methods used** Droplet microfluidic devices are made via standard photolithography. Polyacrylamide beads for PTE are made via an air-triggering device that splits the flow of acrylamide into micron size beads. We mix the PCR reagents with the polyacrylamide beads and allow them to incubate. For PTE, we vortex the mixed beads in a solution of surfactant. This process creates an emulsion encapsulating each bead with the PCR reagents. The beads are transferred to PCR tubes and run through a standard PCR program. The amplified products in the beads are viewed under a microscope.

**Summary of results** After PCR amplification, we see that the control group and SOE PCR reaction have amplified product. However, we get the incorrect size product for the SOE PCR reaction, meaning SOE PCR did not work in PTE.

**Conclusions** Further optimization is needed for SOE PCR to work in PTE. We will use a different test plasmid that encodes the HIV gag gene. We would repeat the PTE experiments again with the new plasmid and further optimize the protocols. If there is no progress, one alternative to the project is to use primer studded beads as the template for PTE with unique molecular identifiers.



**Abstract 46 Figure 1**

#### 47 INTERFERON BETA INCREASED SIGLEC-1 EXPRESSION ON HUMAN GUT MACROPHAGES

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10.1136/jim-2019-WMRC.47

**Purpose of study** A breakdown in gut homeostasis is a key feature of HIV-1 infection, in part due to the high levels of HIV-1 replication that occur in early in the gut. Type 1 Interferons (IFN-1s) are innate cytokines that play critical roles in controlling viral replication. Siglec-1 (CD169) expression, induced by IFN-1s on myeloid dendritic cells (mDC) and macrophages (MΦ), binds HIV and has been implicated in HIV trans-infection of CD4 T cells. Increased CD169 in response to gram-negative (GN) bacterial cell wall component lipopolysaccharide (LPS) has also been reported. We previously showed elevated levels of the IFN-1 interferon beta (IFNβ) as well as LPS in gut tissue of people living HIV. CD169 is expressed on murine gut MΦ, but few studies have investigated expression in human gut tissues or its regulation. We hypothesized that exposure to IFNβ or GN bacterial products would increase CD169 expression on human gut MΦ.

**Methods used** Human jejunum lamina propria mononuclear cells (LPMC), obtained from healthy discarded surgical tissue (N=4), were cultured for 18 hrs with IFNβ (1000–1 pg/mL; 10-fold dilutions), enteric commensal GN *Escherichia coli* lysate (10μg/mL), or were unstimulated. Flow cytometry was used to evaluate expression of CD169 on MΦ or mDC pre (baseline) and post *in vitro* culture.

**Summary of results** MΦ were identified as HLA-DR+CD64+CD11c± cells within viable CD45+CD3-CD19- LPMC. At baseline MΦ constituted 0.16±0.03% (Mean±SEM); of these MΦ 7.95±4.1% expressed CD169. HLA-DR+CD64-CD11c+mDC within viable CD45+CD3-CD19- LPMC, constituted 0.11±0.02% of baseline; there were few mDC expressing CD169 0.95±0.59%. In the presence of 1000 pg/mL IFNβ, 27±4% of MΦ expressed CD169, a 6.2-fold increase over unstimulated. With 100 pg/mL IFNβ, 20±5% of MΦ were CD169+, a 4.2-fold increase over unstimulated. At lower doses of IFNβ, CD169 expression by MΦ only increased by 1.5-fold versus unstimulated. Exposure to *E. coli* lysates increased CD169 expression on MΦ by 2.3-fold.

**Conclusions** IFNβ induced CD169 expression on human gut MΦ *in vitro* in a dose dependent manner. Additionally, GN commensal bacteria lysates increased expression, although to a lesser degree than high doses of IFNβ. Future studies will investigate the role of CD169+ gut MΦ in T cell HIV infection.

#### 48 IMPLEMENTING A PEDIATRIC ANTIBIOTIC STEWARDSHIP PROGRAM IN A MULTIDISCIPLINARY PRIMARY CARE CLINIC

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10.1136/jim-2019-WMRC.48

**Purpose of study** Family practitioners, nurse practitioners, and physician assistants prescribe higher rates of antibiotics for acute respiratory infections (Agiro 2018). We established a

pediatric resident teaching clinic within a local primary care center where pediatric care had previously been delivered by clinicians without pediatric training. Guided by the CDC's 'Core elements of outpatient antibiotic stewardship,' we identified guideline-based pediatric antibiotic prescribing as an area for quality improvement (QI). We aimed to reduce unnecessary antibiotic prescriptions (Rx's) for viral diagnoses by 15% and inappropriate Rx's (based on drug choice, dose, or duration) by 25% for patients ≤11 years old over an 18-month intervention period.

**Methods used** We implemented regular feedback sessions on Rx rates, as well as treatment guideline review sessions. We used 3-month PDSA cycles to identify ongoing opportunities for improvement. Pediatric residents performed chart reviews for systemic antibiotic Rx's identified in the EMR. We determined the proportion of antibiotic Rx's that were unnecessary or inappropriate. We compared data from the intervention period to a 10-month baseline period.

**Summary of results** During the first 8 months thus far, compared to baseline, the proportion of unnecessary Rx's decreased by 10% (27% vs 17%) and inappropriate Rx's by 47% (82% vs 35%). Interventions performed included a baseline session at month 0, review of acute otitis media guidelines at month 1, and feedback session and review of streptococcal pharyngitis guidelines at month 4. From month 5 through month 8, an EMR change led to a delay in obtaining charts for abstraction, inability to provide feedback, and a rise in inappropriate Rx's (24% mo. 4 vs 35% mo. 8), though unnecessary Rx's continued to decline during this period (21% mo. 4 vs 17% mo. 8).

**Conclusions** Utilizing QI techniques in the outpatient setting to improve adherence to pediatric antibiotic prescribing guidelines has yielded promising early results, though technical challenges have reinforced that ongoing interventions are needed to sustain these results. We identified streamlining of data collection and providing individualized, real-time feedback with behavioral nudges (Meeker 2016, Linder 2017) to clinicians as areas for future improvement.

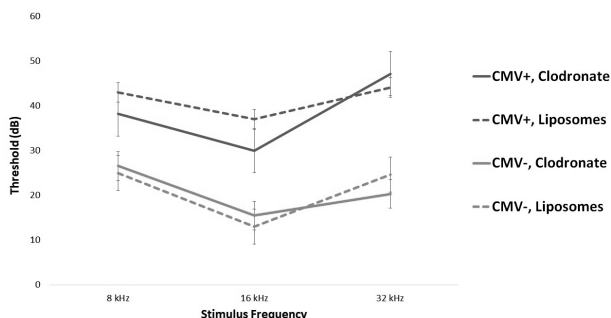
#### 49 MACROPHAGE SUPPRESSION DURING THE ACUTE PHASE OF CONGENITAL CYTOMEGALOVIRUS INFECTION DOES NOT CHANGE HEARING OUTCOMES IN A MOUSE MODEL

C Nielson\*, K Shi, M Firpo, A Park. *University of Utah, Salt Lake City, UT*

10.1136/jim-2019-WMRC.49

**Purpose of study** To determine whether treatment with clodronate-containing liposomes reduces sensorineural hearing loss (SNHL) in cytomegalovirus-infected mice and to evaluate the effect of clodronate-containing liposomes on systemic macrophage count.

**Methods used** BALB/c mice were inoculated intracranially with murine-CMV (mCMV) or saline on postnatal day 3. The mice were treated with intraperitoneal injections of clodronate-containing or control liposomes over 14 days. Auditory thresholds were assessed using Distortion Product Otoacoustic Emission (DPOAE) and Auditory Brainstem Response (ABR) testing at three weeks of age. Spleens were harvested at 9 days post-infection and evaluated using flow cytometry to confirm global knockdown of monocyte macrophages by clodronate-containing liposomes.



Abstract 49 Figure 1 ABR Hearing thresholds

**Summary of results** MCMV-infected mice treated with clodronate-containing liposomes did not show significant reduction in ABR ( $P>0.5$  by Kruskal-Wallis test) and DPOAE ( $P>0.5$ ) thresholds compared to mCMV-infected mice treated with control liposomes. Significant differences were observed in ABR and DPOAE thresholds of mCMV-infected mice compared to non-infected mice ( $P<0.001$ ). MCMV-infected mice treated with clodronate-containing liposomes showed significant reduction of splenic monocyte macrophages compared to mCMV-infected mice treated with control liposomes ( $P<0.01$  by t-test).

**Conclusions** Treatment with clodronate-containing liposomes did not change hearing thresholds in mCMV-infected mice at three weeks of age although clodronate treatment did cause a global knockdown of monocyte macrophages. These results warrant further investigation into the role of specific subpopulations of cochlear macrophages in the development of progressive SNHL in congenital CMV infection.

50 TYROSINE KINASE INHIBITION TO REDUCE THE HIV-1 RESERVOIR

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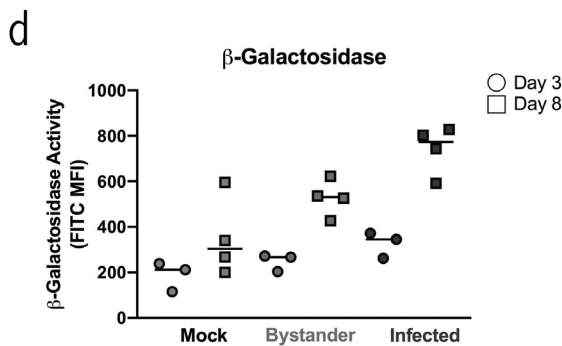
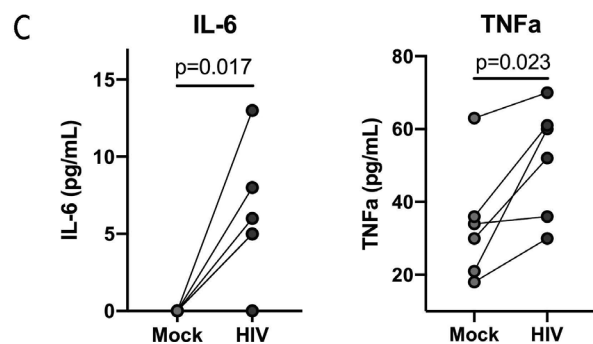
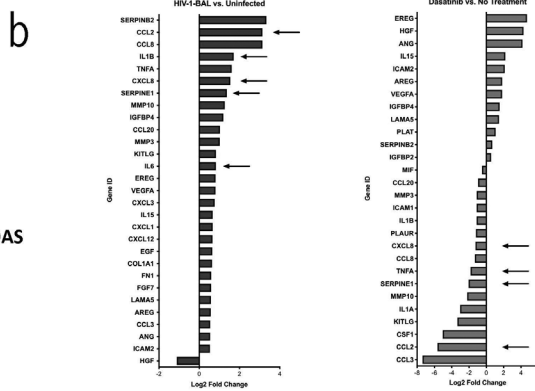
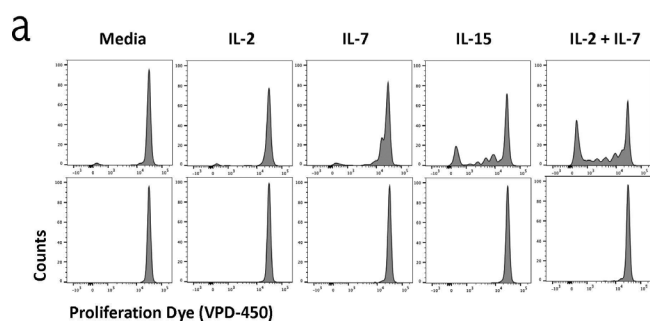
10.1136/jim-2019-WMRC.50

**Purpose of study** To validate the efficacy of tyrosine kinase inhibitors (TKI) as anti-proliferative and anti-HIV-1 agents in CD4+ T cells and myeloid cells, respectively. Ultimately, these data will inform the design of a clinical trial focused on the use of TKI as an HIV-1 cure strategy.

**Methods used** Whole blood was obtained by peripheral phlebotomy from healthy donors, and peripheral blood mononuclear cells (PBMC) were isolated followed by purification of CD14+ monocytes and CD4+ memory T cells. Monocytes were differentiated over 7 days in autologous serum to generate monocyte-derived macrophages (MDM).

**Summary of results** TKIs inhibit proliferation induced by IL-2, IL-7, or IL-15 in memory CD4+T cells in vitro, preventing the major mechanism responsible for expansion and persistence of the viral reservoir. We find that HIV-1 infection induces a senescent phenotype in macrophages, which is further counteracted by the use of dasatinib. Finally, TKIs are potent inhibitors of HIV-1 in myeloid cells through activation of the host restriction factor SAMHD1, which prevents new infection through direct inhibition of reverse transcription.

**Conclusions** We conclude that dasatinib possess two major immunomodulatory qualities that make them attractive candidates for HIV-1 cure. As an anti-proliferative, dasatinib interrupts homeostatic proliferation, the major mechanism underlying HIV-1 persistence in CD4+ T cells. In macrophages, dasatinib both directly inhibits HIV-1 reverse



Abstract 50 Figure 1 Dasatinib counteracts homeostatic proliferation induced by g-c cytokines in CD4+ T cells and pro-inflammatory cytokine release in macrophages.

transcription through the activation of SAMHD1 and counteracts the pro-inflammatory effect of HIV-1 infection in myeloid cells, a process that may underlie HIV-1 comorbidities including cardiovascular disease (CVD) and HIV-associated neurocognitive disease (HAND).

**51 PATHOGEN AND ANTIMICROBIAL RESISTANCE SURVEILLANCE IN UGANDAN HIV POSITIVE ADULTS WITH PNEUMONIA**

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10.1136/jim-2019-WMRC.51

**Purpose of study** Preliminary analyses using machine learning algorithms developed to predict phenotypic antimicrobial resistance from high dimensional genomic data demonstrate 85–100% concordance between culture-determined resistance and detection of antimicrobial-specific resistance genes from cultured isolates. To further evaluate the algorithms, Next Generation Sequencing (NGS) data from Ugandan HIV positive adults with pneumonia was analyzed to identify the type of infection- bacterial pneumonia, viral pneumonia, presence of TB, and disease correlations with CD4 count.

**Methods used** We implemented the Rules-Based Method to identify individual or multiple pathogens implicated in each pneumonia case for 218 patients. Using RNA-seq analysis of patient samples, we first analyzed the landscape of the patient virome and determined which patients had active CMV or EBV infections. Next we evaluated for the presence of Pneumocystis jirovecii infection. Subsequently we identified patients with Mycobacterium tuberculosis infections by finding an optimal threshold of sequencing reads that maximized sensitivity.

**Summary of results** Preliminary bacterial results show that the most common pathogen were Haemophilus influenzae, Pseudomonas aeruginosa, and Pneumocystis jirovecii. Preliminary viral results show that the most common secondary viruses were Rhinovirus and Influenza. While all 8 patients positive for Pneumocystis jirovecii bronchoalveolar Giemsa stain were positive by NGS, 2 patients had high read numbers by NGS.

**Conclusions** The RBM showed high sensitivity for detection of bacterial, viral, and fungal pathogens in pneumonia patients. NGS showed high sensitivity for Pneumocystis jirovecii in particular. Preliminary correlations between infection with CMV, and other viruses, with CD4 count <200 suggest that there could be a potential connection between immunosuppression due to AIDS and certain viruses that has not been previously appreciated. The potentially high prevalence of Pseudomonas aeruginosa could have important consequences for clinical care. Current empirical treatment at the hospital is Ceftriaxone, which does not cover Pseudomonas aeruginosa.

## Neonatology general I

### Concurrent session

12:45 PM

Thursday, January 23, 2020

**52 EFFECT OF CONTACT PRECAUTIONS ON STAPHYLOCOCCUS AUREUS AND CLINICAL OUTCOMES OF COLONIZED PATIENTS IN THE NEONATAL INTENSIVE CARE UNIT**

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10.1136/jim-2019-WMRC.52

**Purpose of study** The primary objective is to assess the incidence of *S. aureus* colonization and invasive disease during and after contact precautions. The secondary objective is to evaluate clinical outcomes of colonized patients versus non-colonized controls.

**Methods used** A retrospective chart review of all infants at two UCLA NICUs who screened positive for *S. aureus* (n=83). Information was also collected for controls with negative screens (n=151). Of note, from Aug 2014 to Aug 2016 contact precautions were mandated; they were universally discontinued from Sept 2016 to November 2018.

**Summary of results** There was a lower incidence of *S. aureus* colonization when contact precautions were utilized (28.6% vs 44.6%, p=0.01). Of the positively colonized patients, 20.5% were colonized with MRSA and 79.5% with MSSA. There were twice as many positive invasive MSSA cultures than MRSA. Most invasive cultures occurred in previously colonized infants (100% for MRSA, 73.9% for MSSA). There was a higher rate of invasion with MRSA (41.2%) than MSSA (16.7%). There were no differences in measured clinical outcomes in colonized patients before and after contact precautions (e.g., duration invasive mechanical ventilation, incidence of chronic lung disease and necrotizing enterocolitis, NICU length of stay and in-hospital mortality). Colonized patients were 38.5 more likely to be associated with a soft tissue infection (p=0.0005) and have an average 27 day longer NICU length of stay (p<0.0001) when compared to noncolonized patients (when controlling for gestational age and surgical status).

**Conclusions** There was a lower incidence of *S. aureus* colonization when contact precautions were utilized. Most invasive cultures occurred in colonized patients, with a higher rate of invasion for MRSA. There was a higher incidence of MSSA colonization and invasive cultures. There were no differences in clinical outcomes among colonized patients during and after contact precautions. Colonization was more likely to be associated with soft tissue infection and longer NICU length of stay.

### 53 ASSOCIATIONS BETWEEN MATERNAL PRE-PREGNANCY OBESITY AND NEONATAL NEUROBEHAVIOR IN INFANTS BORN BEFORE 30 WEEKS GESTATION

N Nosavan\*, L Smith, J Hofheimer, E McGowan, T O'Shea, S Pastyrnak, C Neal, B Carter, J Helderman, J Check, A Soliman, M Roberts, L Dansereau, S DellaGrotta, B Lester. *The NOVI Research Network, Providence, RI*

10.1136/jim-2019-WMRC.53

**Purpose of study** The rate of pre-pregnancy obesity has steadily increased, increasing the risk for preterm delivery, gestational diabetes, pregnancy-induced hypertension, and cesarean sections. Elevated pre-pregnancy weight has also been linked to poor long-term child neurodevelopmental outcomes such as decreased cognitive performance, behavioral and emotional difficulties, and ADHD symptoms. The purpose of our study is to examine the relationship between maternal pre-pregnancy obesity and short-term neonatal neurobehavior in infants born <30 weeks post-menstrual age.

**Methods used** The Neonatal Neurobehavior and Outcomes in Very Preterm Infants (NOVI) study recruited at 9 NICUs affiliated with 6 universities participating in the Vermont-Oxford Network. The NICU Network Neurobehavioral Scale (NNS) was used to assess neurobehavior at discharge.

**Summary of results** 709 infants enrolled in NOVI and 664 had completed neurobehavioral assessments and medical data. Of those 227 (34.2%) infants were born to mothers with pre-pregnancy obesity (BMI >30). In unadjusted analyses, stress abstinence and non-optimal reflexes on the NNS were higher in infants born to mother with pre-pregnancy obesity. Generalized estimating equations examined the associations of pre-pregnancy obesity with NNS summary scores adjusting for maternal minority race or ethnicity, gestational diabetes, maternal hypertension (chronic or pregnancy-induced), pregnancy weight change, PMA at birth, and PMA at NNS exam. Pre-pregnancy obesity was associated with an increase in non-optimal reflexes (B=0.41, SE=0.17, Adjusted Means: Pre-pregnancy obesity=5.64, No pre-pregnancy obesity=5.23).

**Conclusions** Infants of mothers who were obese prior to pregnancy showed an increase in non-optimal reflexes on the NNS. The association between maternal pre-pregnancy obesity and atypical child neurodevelopment may be ascertained as early as infancy.

### 54 LONG-TERM NEURODEVELOPMENTAL OUTCOMES AMONG PRETERM INFANTS EXPOSED TO GESTATIONAL DIABETES MELLITUS

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10.1136/jim-2019-WMRC.54

**Purpose of study** Gestational Diabetes Mellitus (GDM) is associated with adverse pregnancy outcomes. Current evidence suggests the potential adverse effects GDM has on fetal brain development and neurodevelopmental delays. The purpose of this study is to investigate the relationship between infants born to mothers diagnosed with GDM and neurodevelopmental outcomes at two-year follow-ups.

**Methods used** This is a retrospective, multicenter cohort study from May 2007 to July 2019 of preterm infants. Infants were

assessed using the Bayley Scales of Infant and Toddler Development (Bayley-III), which screens for cognitive, language, and motor delays in early childhood. Multivariable regression analyses were used to determine an association between GDM exposure and Bayley scores. Independent variables considered for inclusion in multivariable modeling included gestational age, maternal age, length of stay in the NICU, Apgar score at 5 minutes, days of ventilation, birth weight, intraventricular hemorrhage, retinopathy of prematurity, and bronchopulmonary dysplasia.

**Summary of results** 748 infants with 130 (17%) born to mothers diagnosed with GDM were assessed. Multivariable regression analysis showed a significant decrease in two-year cognitive, language, and motor composite scores when infants were exposed to GDM (unstandardized- $\beta$  [95% CI]: -4.312[-7.587 to -1.036], P=0.01; -6.347 [-10.693 to -2.0], P=0.004; -3.582 [-7.084 to -0.079], P=0.045, respectively).

**Conclusions** This study found infants exposed to GDM during pregnancy had an increased risk of poorer cognitive, language, and motor outcomes at two-year follow-ups. Larger prospective studies are needed to confirm this association and ascertain whether neurodevelopmental delays persist from two years of age into later childhood.

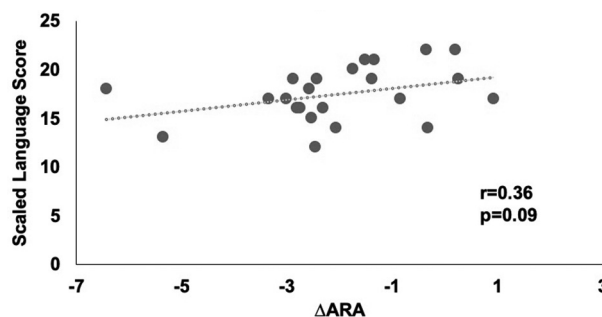
### 55 FATTY ACIDS AND GROWTH AND DEVELOPMENT IN CRITICALLY ILL NEONATES

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10.1136/jim-2019-WMRC.55

**Purpose of study** Docosahexaenoic acid (DHA) and arachidonic acid (ARA) are essential for development. Infants in the neonatal intensive care unit (NICU) are at risk for ARA and DHA deficiencies secondary to premature delivery and prolonged parenteral nutrition (PN). This study's purpose is to determine the correlation between DHA and ARA and growth and neurodevelopment.

**Methods used** Inclusion criteria for this prospective study 1) <14 days of age, 2) PN-dependence and 3) follow-up in the High-Risk Infant Follow-Up (FU) Clinic. Blood samples were collected at enrollment and weekly on PN. Gas chromatography/mass spectrometry was used to measure DHA and ARA % in the red blood cell membrane. Neurodevelopment was assessed using the Bayley Scales of Infant Development (BSID-III).



**Abstract 55 Figure 1** ARA Changes Correlate with language development

**Summary of results** In this cohort (n=42), the mean ( $\pm$ SD) gestational age was  $29\pm 4$  weeks, and 17% had an intestinal disorder. Subjects received  $27\pm 22$  days of PN. Length of stay was  $71\pm 29$  days, and the mean corrected gestational age at follow-up was  $7\pm 2$  months. When compared to birth, weight z-scores were significantly less at 1 week and 30 days of age, discharge and FU ( $p<0.001$  for all). When compared to birth, length z-scores were significantly less at 30 days and discharge ( $p<0.01$  for both). Both ARA and DHA were significantly less at study weeks 2 and 3 when compared to study week 1 ( $p<0.0001$  for all). The ARA change (week 2 – week 1) demonstrated a non-significant correlation with language BSID-III scores (figure 1).

**Conclusions** In this study, ARA and DHA decreased after birth, and a larger postnatal ARA decline was associated with a lower language BSID-III score. Studies are needed to determine how fatty acids alter development, and how clinicians can mitigate this deficiency.

### 56 ASSOCIATIONS BETWEEN CHRONIC LUNG DISEASE, CRY ACOUSTICS, AND NEONATAL NEUROBEHAVIOR IN INFANTS BORN BEFORE 30 WEEKS GESTATION

M Martin\*, L Smith, S Sheinkopf, J Hofheimer, E McGowan, T O'Shea, S Pastyrnak, C Neal, B Carter, J Helderman, J Check, A Soliman, M Roberts, L Dansereau, S DellaGrotta, B Lester. *The NOVI Research Network, Providence, RI*

10.1136/jim-2019-WMRC.56

**Purpose of study** Chronic lung disease (CLD) is a known risk factor for developmental delays in infants born preterm. Most studies have focused on neurodevelopmental exams performed at or after 12 months of age, with no known studies in patients prior to discharge from the NICU. Our aim is to examine whether the presence of CLD at or near the time of hospital discharge is associated with short-term neurobehavioral outcomes.

**Methods used** The Neonatal Neurobehavior and Outcomes in Very Preterm Infants (NOVI) study recruited from 9 NICUs affiliated with 6 universities participating in the Vermont-Oxford Network. The NICU Network Neurobehavioral Scale (NNNS) and cry acoustics were used to assess neurobehavior at discharge. Maximum likelihood factor analysis was performed on cry acoustics. Generalized estimating equations examined the associations of CLD with NNNS summary scores and cry factors adjusting for maternal medical risks, severe ROP, brain injuries, infant sepsis, outborn status, antenatal steroid use, post menstrual age (PMA) at birth and PMA at NNNS exam.

**Summary of results** 709 infants enrolled in NOVI; 418 had complete medical, NNNS, and cry data and were analyzed. Of those, 197 (47.1%) infants had CLD. Factor analysis of cry data revealed two factors that explained the greatest proportion of variation: frequency/energy (loudness) and hyperphonation (high pitch). Cry factors were not associated with CLD. CLD was associated with a decrease in the NNNS attention summary score ( $B=-0.34$ ,  $SE=0.16$ , Adjusted Means:  $CLD=4.63$ ,  $No\ CLD=4.98$ ).

**Conclusions** The presence of CLD at the time of NICU discharge was associated with a decrease in attention scores on the NNNS. CLD has been shown to have long-term adverse effects on behavior including attentional skills. Earlier identification of these at risk infants may lead to earlier initiation of therapeutic interventions.

### 57 PROCALCITONIN IN NEONATES UNDERGOING EARLY ONSET SEPSIS WORK UP

A Zepeda-Tiscareno\*, MG Dominguez Garcia, FB Wertheimer, A Chambliss, M Cielo, R Ramanathan, M Durand. *LAC + USC Medical Center, Keck School of Medicine, University of Southern California, Los Angeles, CA*

10.1136/jim-2019-WMRC.57

**Purpose of study** Obtain serum procalcitonin (PCT) reference values for neonates undergoing early onset sepsis (EOS) work up at LAC+USC Medical Center. Evaluate the utility of PCT when compared to high sensitivity C-reactive protein (hsCRP) in those who are pending blood culture results.

**Methods used** Demographic and laboratory values (blood culture, CBC, PCT, hsCRP) of neonates undergoing EOS work up admitted to the nursery over a 6 month period were analyzed. Data were retrospectively collected from our electronic medical records. PCT values were obtained by electrochemiluminescence immunoassay and hsCRP by immunoturbidimetric assay.

**Summary of results** There were 50 patients  $\geq 35$  weeks (gestational age  $38.5\pm 1.8$  weeks, birth weight  $3313\pm 614$  g, mean  $\pm$  SD). Paired hsCRP and PCT values were obtained prior to 6 hours, 6 to 24 hours, and greater than 24 hours of life. There were 44 healthy infants (negative work up) and 6 treated with antibiotics for presumed sepsis (one positive blood culture). The median (IQR) reference values for the healthy infants are shown in table 1; their hsCRP and PCT values are correlated with each other at  $<6$  hours (Pearson correlation coefficient,  $r=0.36$ ,  $P=0.04$ ), but are more highly correlated at 6–24 hours ( $r=0.60$ ,  $P=0.0001$ ) and at  $>24$  hours ( $r=0.47$ ,  $P=0.0036$ ). The hsCRP median values for the 6 infected newborns were 2.40, 17.30, and 20.60 mg/L and the PCT median values were 1.47, 24.59, and 17.89 ng/mL, respectively.

**Abstract 57 Table 1** Biomarker values in healthy newborns—median IQR)

		6 to 24 Hrs (n=36)	>24 Hrs (n=37)
hsCRP (mg/L)	0.20 (0.20 – 0.40)	1.75 (0.83 – 4.05)	2.90 (0.85 – 5.50)
Procalcitonin (ng/mL)	0.17 (0.13 – 0.28)	1.53 (0.81 – 4.47)	1.38 (0.81 – 3.57)

**Conclusions** PCT reference values for healthy newborns with negative EOS work up are presented. PCT and hsCRP values are highly correlated at 6–24 hours and at greater than 24 hours. Studies with a larger number of healthy and sick newborns are needed, especially in very preterm infants.

### 58 EFFECTS OF CLINICAL AND HISTOLOGIC CHORIOAMNIONITIS ON OUTCOMES OF VERY LOW BIRTH WEIGHT PRETERM INFANTS

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10.1136/jim-2019-WMRC.58

**Purpose of study** Clinical and histologic chorioamnionitis complicate many preterm births with preterm labor or premature rupture of membranes, and has been shown to be a risk



factor of adverse neonatal outcomes, including earlier gestational age at delivery and neonatal brain and lung injuries. The goal of this study is to evaluate clinical and histologic chorioamnionitis as risk factors for short and long term neonatal morbidities.

**Methods used** This is a retrospective observational study with data gathered for very low birth weight (VLBW) infants, defined as less than 1500 grams, born at LAC+USC Medical Center between 2009–2018. Clinical chorioamnionitis data was obtained based on maternal clinical symptoms diagnosed by the obstetrician. Histologic chorioamnionitis was derived from certified placenta pathology reports. Delivery resuscitation efforts and the most common neonatal morbidities and mortality were collected.

**Summary of results** Of the 308 infants, 95.1% had clinical chorioamnionitis and 64% had histologic chorioamnionitis. Infants with histologic chorioamnionitis had increased risk for intubation at the time of delivery (61.5% vs. 42.5%,  $P=0.003$ ) and were likely to remain intubated at 24 hours of age (54.7% vs. 39.3%,  $P=0.020$ ). There was also an increased risk of intraventricular hemorrhage (IVH) in this group (47.3% vs. 32.5%,  $P=0.021$ ). The infants with clinical chorioamnionitis had a significant risk of having severe IVH (14.1% vs. 2.5%,  $P=0.001$ ). Finally, those with histologic chorioamnionitis had a higher risk of mortality (17.6% vs. 7.7%,  $P=0.024$ ).

**Conclusions** VLBW infants with exposure to either clinical or histologic chorioamnionitis are at a higher risk for intraventricular hemorrhage. In addition, infants with histologic chorioamnionitis require increased intubations and are at an increased risk for mortality.

### 59 PRACTICES & ATTITUDES TOWARD COMPASSIONATE EXTUBATION IN THE NEONATAL INTENSIVE CARE UNIT

<sup>1,2</sup>KE Goodman\*, <sup>3</sup>M Fossa, <sup>3</sup>S Dabagh, <sup>3</sup>M Caliboso, <sup>2</sup>S Nair, <sup>3</sup>D Lotstein. <sup>1</sup>LAC+USC Medical Center, Keck School of Medicine of USC, LA, CA; <sup>2</sup>Fetal and Neonatal Institute, Children's Hospital Los Angeles, Keck School of Medicine of USC, LA, CA; <sup>3</sup>Children's Hospital Los Angeles, Keck School of Medicine of USC, LA, CA

10.1136/jim-2019-WMRC.59

**Purpose of study** Compassionate Extubation (CE) in the Neonatal Intensive Care Unit (NICU) may be pursued when long-term survival with acceptable quality of life is not possible, yet little medical literature exists to guide best practice. A multidisciplinary quality improvement (QI) project assessed baseline practices and attitudes among NICU providers and created an intervention to improve quality and standardization of CE in a Level 4 freestanding children's hospital.

**Methods used** 12 months of retrospective analysis and chart review assessed practices, attitudes and symptom management among NICU providers towards CE. Staff who cared for a patient who underwent CE were surveyed on their comfort and team communication. A standardized CE checklist and debrief were then created to address common factors in CE management. After provider education, this intervention is being prospectively evaluated.

**Summary of results** In our NICU, 60% (30 of 50) of deaths in a 12 month period occurred after CE. Provider survey analysis found consistency in choices for PRN and standing

pain medications, but high variability in other symptom management. Nursing survey analysis found 80% of nurses who cared for a patient who underwent CE ( $n=44$ ) found the medical plan for CE adequate. 79% ( $n=28$ ) found it easy to maintain the patient's comfort. Only 12% of nurses debriefed with the medical team after CE, and 57% rated the communication with the medical team as 'good'. Analysis after checklist and debrief implementation is ongoing, with 8 CE events pending chart review and post-implementation survey.

**Conclusions** While retrospective analysis found consistency regarding pain management, there was variation in other management aspects of CE. A notable minority of nurses showed concern over maintenance of patients' comfort, and debriefings were not routine. We will use feedback from checklist and debrief testing to modify tools for NICU practice.

### 60 EXPERIENCES WITHDRAWING ARTIFICIAL NUTRITION AND HYDRATION: A SURVEY OF REGIONAL CHILDREN'S HOSPITAL NEONATAL INTENSIVE CARE UNITS

<sup>1,2</sup>RE Williams\*, <sup>3</sup>D Locke, <sup>4,5</sup>KM Sullivan, <sup>2,6</sup>A Shah. <sup>1</sup>Harbor UCLA Medical Center, Torrance, CA; <sup>2</sup>Children's Hospital Orange County, Orange, CA; <sup>3</sup>Thomas Jefferson/Al DuPont Hospital for Children, Philadelphia, PA; <sup>4</sup>Nemours/Al duPont Hospital for Children, Wilmington, DE; <sup>5</sup>Sidney Kimmel College of Medicine at Thomas Jefferson University, Philadelphia, PA; <sup>6</sup>University of California Irvine, Orange, CA

10.1136/jim-2019-WMRC.60

**Purpose of study** To explore the practice of withdrawal of artificial nutrition and hydration (ANH) occurring in level IV NICUs within the Children's Hospital Neonatal Consortium (CHNC).

**Methods used** A survey of nine questions was created using REDCap to investigate the withdrawal of ANH for neonates not requiring intensive respiratory support (i.e. mechanical ventilation). This survey was sent to each site within the CHNC, with subsequent quantitative analysis of the data. Open-ended questions were not qualitatively analyzed but will be used to inform further research.

**Summary of results** From 34 CHNC sites, there was a 76% response rate. 14 of 26 (54%) respondents defined the withdrawal of ANH as the 'removal of total parenteral nutrition (TPN), gavage feeds, and nutritive oral (PO) feeds with continuation of non-nutritive suckling for those unsafe to PO feed.' 16 of the 26 responding sites offered withdrawal of ANH in the last 5 years for a total of 41 infants, with 15 of those ultimately dying at home with hospice care. Common care practices included the continuation of colostrum for oral care (16/23, 70%) and comfort breastfeeding (17/23, 74%), as well as the discontinuation of an IV for sedation assistance (15/22, 68%). Most units did not engage an ethics consultant in the withdrawal of ANH (18/24, 75%); however most did involve a Palliative Care consultant (22/24, 92%).

**Conclusions** Withdrawal of ANH is rare in level IV NICUs, increasing the value of collaborative survey work. Across the US, the withdrawal of ANH is primarily characterized by the removal of TPN, gavage and PO feeding with comfort feeding being continued. Survey responses generally reflected that this rare and difficult process is individualized, often with the help of palliative care consultations.

## Neonatology pulmonary I

## Concurrent session

12:45 PM

Thursday, January 23, 2020

**61 POTENTIAL ROLE OF FOX FAMILY TRANSCRIPTION FACTORS IN THE PATHOGENESIS OF BRONCHOPULMONARY DYSPLASIA**

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10.1136/jim-2019-WMRC.61

**Purpose of study** Bronchopulmonary dysplasia (BPD) is a chronic lung disease most commonly seen in preterm infants as a result of long-term mechanical ventilation and oxygen exposure. The pathogenesis resulting in BPD is not completely understood. Studies using postmortem BPD lung tissue have shown that there is altered expression of a number of developmentally important genes.

**Methods used** We generated three independent genetic models of BPD-like phenotype by disrupting the signaling pathways of TGF $\beta$ , PDGF $\alpha$ , and IGF-1 in neonatal lung in mice. The mutations to disrupt the pathways were induced in secondary crest myofibroblasts (SCMF) whose role is critical for normal alveologenesis. RNAseq analysis was performed which identified a cluster of differentially expressed genes that were common amongst the three BPD-like phenotypes. To assess the physiologic relevance of a specific subset of the identified genes, we examined their expression in a well-established hyperoxia-induced hypoalveolization mouse model. We analyzed gene expression using a total of ten mice exposed to hyperoxia compared to eight combined controls at three different points during neonatal life. mRNA expression was assessed by quantitative RT-PCR.

**Summary of results** Expression of Foxq1, Foxd1, Foxc2 were decreased in the mouse BPD lungs suggesting a role for the selected genes in the pathogenesis of BPD. We further demonstrate that Foxd1 is expressed in SCMF and ablation of SCMF during alveologenesis via Foxd1-cre arrests alveolar formation leading to a BPD-like phenotype. To validate our findings in the mouse model, we show that Foxd1 is also reduced in human BPD lung tissue.

**Conclusions** Collectively, these observations support the notion that disruption of Foxd1 and FOX family transcription factors may play a major role in the pathogenesis of BPD in preterm infants. This study was supported by NHLBI and The Hastings Foundation.

**62 ANTENATAL EXOSOME TREATMENT PRESERVES LUNG STRUCTURE AND VASCULAR GROWTH IN AN EXPERIMENTAL MODEL OF BRONCHOPULMONARY DYSPLASIA DUE TO CHORIOAMNIONITIS**

<sup>1</sup>AN Abele\*, <sup>2</sup>N Wilson, <sup>2</sup>A Abikoye, <sup>1</sup>G Seedorf, <sup>1</sup>A Brooks, <sup>3</sup>S Kourembanas, <sup>1</sup>SH Abman. *<sup>1</sup>Pediatric Heart Lung Center, University of Colorado School of Medicine, Aurora, CO; <sup>2</sup>University of Notre Dame, Notre Dame, IN; <sup>3</sup>Boston Children's Hospital, Harvard University, Cambridge, MA*

10.1136/jim-2019-WMRC.62

**Purpose of study** Bronchopulmonary dysplasia (BPD), the chronic lung disease of prematurity, results in many complications that significantly alter quality of life and decrease life expectancy. Prenatal stresses such as chorioamnionitis (CA) increase the risk for BPD in infants independent of postnatal lung injury. Past studies have shown that antenatal endotoxin (ETX) exposure as a model of CA causes sustained disruption of lung alveolar and vascular growth, hallmark findings in BPD. Recent research has shown promising results for postnatal treatment of BPD with mesenchymal stem cell-derived exosomes (MEx), however, the antenatal efficacy of MEx for the prevention of BPD is unknown. Thus, we hypothesized that antenatal treatment with MEx in an experimental rat model of CA will be sufficient to prevent the development of BPD.

**Methods used** Effects of antenatal MEx injections were studied using an established rat model of CA as induced by ETX. At E20, rat litters were treated with intra-amniotic injections of saline control, ETX only (100 $\mu$ L/sac), or ETX plus MEx. Pups were delivered near term (E22) via cesarean section. Morphometric studies to assess airspace growth (by mean linear intercept; MLI), vascular growth (vessel density; VD), and lung function (FlexiVent) were performed at 2 weeks postnatal age.

**Summary of results** When compared with controls, intra-amniotic injections of ETX reduced alveolar growth as reflected by increased MLI by 23.2% and reduced vascular growth (decreased VD) by 44.4% at 2 weeks postnatal age ( $p < 0.05$ ). In infant rats treated with antenatal MEx and ETX, MLI and VD were not different from control rats. Lung resistance and compliance also improved with antenatal MEx treatment in comparison with the effects of ETX alone.

**Conclusions** Antenatal treatment with MEx preserves lung structure and function in rats with experimental BPD induced by ETX. We speculate that early MEx treatment may be sufficient to prevent the development of BPD in premature infants, especially in the clinical setting of CA.

**63 INTRANASAL AND INTRAPERITONEAL LIPOPOLYSACCHARIDE ADMINISTRATION ACTIVATES DISTINCT GENE NETWORKS IN LUNG MACROPHAGE SUBSETS**

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10.1136/jim-2019-WMRC.63

**Purpose of study** Microbial pathogens attack the lung via the airspace or pulmonary circulation. The lung immune system contains distinct myeloid cell populations resident in the alveolar space, interstitium, and pulmonary capillary bed. How the anatomic site of the initial inflammatory signal might lead to differences in immune response is not fully understood.

**Methods used** We administered LPS intraperitoneally (i.p) or intranasally (i.n.) to C57BL/6J mice and examined transcriptomic changes in lung macrophages and monocytes. Alveolar macrophages (AM), interstitial macrophages (IM), and inflammatory Ly6c+ monocytes (iMo) were sorted by FACS 2 h, 6 h and 22 h after LPS. Gene expression was measured in sorted cells by RNA-seq and chromatin accessibility by ATAC-seq. Informatic analysis included ingenuity

pathway analysis (IPA) and HOMER for transcription factor binding prediction.

**Summary of results** Following i.p. LPS, IM and iMo showed robust, largely overlapping changes in gene expression. AM showed modest changes. IPA of enriched pathways for iMo and IM showed substantial quantitative differences. After i.n. LPS, AM were most responsive, with few changes in gene expression in IM and iMo. Comparing genes induced at the time of maximal response in IM (2h, i.p. LPS) to genes in AM (6h, i.n. LPS) we found minimal overlap. Remarkably, LPS caused opposite changes in the most enriched gene expression pathways in AM and IM. For example, LPS stimulated expression of oxidative phosphorylation genes in AM but repressed them in IM. ATAC-seq analysis identified a distinct group of genes whose genomic accessibility correlated with cell-specific transcriptional responses.

**Conclusions** Different routes of LPS administration *in vivo* lead to very distinct transcriptional responses within lung myeloid populations. Remarkably, the direct responses of IM to i.p. LPS and AM to i.n. LPS are mostly divergent, in many cases leading to predictions of opposite biological outcomes. Differences in the chromatin landscapes of genes with divergent responses may lead to distinct enhancers available for binding signal dependent transcription factors, including NF- $\kappa$ B.

#### 64 ANTENATAL VITAMIN D ATTENUATES LUNG INJURY IN A PREECLAMPSIA MODEL OF BRONCHOPULMONARY DYSPLASIA

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10.1136/jim-2019-WMRC.64

**Purpose of study** Preeclampsia (PE) is a major risk factor for preterm birth and is strongly associated with the subsequent development of bronchopulmonary dysplasia (BPD), the chronic lung disease of prematurity. We have previously shown that antenatal (AN) exposure to soluble fms-like tyrosine kinase 1 (s-FLT), an endogenous VEGF antagonist that is markedly increased in maternal blood and amniotic fluid in PE, causes abnormal lung structure and function in infant rats. Clinical studies suggest that maternal vitamin D deficiency is a risk factor for severe PE, however, whether AN vitamin D (VD) treatment can restore lung structure and function after exposure to AN s-Flt is unknown. We aimed to determine if early VD (1,25-(OH)<sub>2</sub>D<sub>3</sub>) treatment will preserve lung structure and function in infant rats after antenatal exposure to s-Flt.

**Methods used** Fetal rats were exposed to recombinant human sFlt-1 (1 $\mu$ g), recombinant human s-Flt (1 $\mu$ g) + 1,25-(OH)<sub>2</sub>D<sub>3</sub> (1ng/ml), or saline via intra-amniotic (IA) injection at E20 and delivered two days later. At 14 days of age, lung function including total respiratory system compliance (Cr) and resistance (Rr) was determined by Flexivent and lung structure was assessed for radial alveolar counts (RAC) and pulmonary vessel density (PVD) by standard morphometric analysis. Infant hearts were assessed for right ventricle hypertrophy (RVH) by the ratio of RV/LV+S (Fulton's Index).

**Summary of results** IA s-Flt decreased RAC and PVD by 28% and 43%, respectively, and increased RVH by 32% as compared to controls ( $p < 0.001$ ). IA s-Flt increased lung resistance by 30% and decreased compliance by 30% compared to controls ( $p < 0.01$ ). IA 1,25-(OH)<sub>2</sub>D<sub>3</sub> treatment in s-Flt exposed animals restored lung structure, function, and prevented RVH when compared to controls ( $p = ns$ ).

**Conclusions** IA VD improved infant lung structure and function and prevented right ventricular hypertrophy after s-Flt exposure *in vivo*. We speculate that 1,25-(OH)<sub>2</sub>D<sub>3</sub> may preserve lung growth and function through enhanced angiogenesis in experimental PE.

#### 65 PERINATAL VITAMIN D DEFICIENCY ALTERS EXPRESSION OF ASTHMA-RELATED GENES IN RAT LUNG MESENCHYMAL STROMAL STEM CELLS: A PROTEOMIC ANALYSIS

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10.1136/jim-2019-WMRC.65

**Purpose of study** Genome Wide Association Studies (GWAS) have identified several asthma-related genes. High variability in the expression of the asthma phenotype in families implies a significant effect of environmental exposures, including vitamin D (VD) status during lung development. Although the effects of perinatal VD deficiency on alveolar type II cells and lipofibroblasts are well-characterized, its effect on lung mesenchymal stromal cells (LMSCs), critical regulators of lung injury repair, is largely unknown. Here in a rat model of perinatal VD deficiency associated asthma, we study the expression of asthma-related genes identified by GWAS.

**Methods used** 4 weeks before pregnancy, Sprague-Dawley rats were put on no cholecalciferol (D<sub>3</sub>) or 250, 500, or 1000 IU/kg D<sub>3</sub> added diet, which was continued through pregnancy and lactation. At postnatal day 21, pups were sacrificed, and lungs collected for LMSC isolation using standard methods. Cells were characterized based on surface characteristics (expression of CD90, CD105, CD45, CD31, Stro1) and their multi-lineage potential. Cell lysates were processed for proteomics analysis using Easy nLC Q-Exactive orbitrap, and quantified by mass spectrometry on the basis of the peak area metric. Gene homology information was derived from the Ensembl Compara database, and resultant data was analyzed using the Python programming language.

**Summary of results** Mass spectrometry of LMSC identified 3965 proteins. 21 proteins of homologous genes identified

**Abstract 65 Table 1**

Expression in VD deficiency	Gene
Upregulated	ACTR1A, LRP1, PHF5A, CELF2, EFEMP2, GLB1, IQGAP1, PRRC2A, PMM1
Downregulated	ARL3, SMAD3, PA2G4, NHP2L1, RAD50, IL1RL1, PHB, ATG5, AAGAB, TNFAIP8, GSAP, STAT6

from GWAS were found to have differential expression in accordance with VD status. The up- or down- regulation of these genes in VD deficient rats (no dietary D<sub>3</sub>) in comparison to their expression in VD supplemented groups is as shown in the table 1.

**Conclusions** Perinatal VD status determines the expression of several asthma-related genes as identified by GWAS. Functional network data mining places VD as a key determinant of several lung development pathways that determine lung homeostatic vs. asthmatic phenotypes.

### 66 VITAMIN D STIMULATES PULMONARY ENDOTHELIAL CELL GROWTH THROUGH ENHANCED PPAR $\gamma$ SIGNALING

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10.1136/jim-2019-WMRC.66

**Purpose of study** Maternal vitamin D deficiency (VDD) in pregnancy increases risk for childhood lung disease. Past studies have shown offspring of VDD dams have impaired lung function, airway hyperreactivity, and decreased lung vascular growth at two weeks. We further found vitamin D (VD) stimulates fetal pulmonary artery endothelial cell (PAEC) growth and distal lung structure in vivo, but mechanisms through which VD enhances angiogenesis are uncertain. Peroxisome proliferator-activated receptor (PPAR $\gamma$ ) regulates alveolar development and PPAR $\gamma$  expression is decreased in lungs of rats with VDD. The purpose of this study is to determine whether VD stimulates PAEC growth through enhanced PPAR $\gamma$  signaling or upregulation of vascular endothelial cell growth factor (VEGF), a pro-angiogenic agonist.

**Methods used** PAEC were isolated from proximal pulmonary arteries of late gestation fetal sheep. Three-day growth assays were performed on PAEC treated with either VEGF or VD (1,25-(OH) D) in the presence or absence of T007 (a specific PPAR $\gamma$  antagonist), Pioglitazone (Pio; a PPAR $\gamma$  agonist), or Axitinib (Ax; a VEGF receptor inhibitor). PAEC lysates from these experiments were collected for assays of VEGF and PPAR $\gamma$  protein.

**Summary of results** Treatment with either VD, VEGF or Pio alone increased cell growth above basal conditions by over 30% ( $p < 0.0001$ ). PAEC exposed to either T007 or Ax

alone did not change cell growth compared to controls. PPAR $\gamma$  inhibition of PAEC prevented VD and Pio enhancement of PAEC growth. Conversely, PAEC exposed to T007 and treated with VEGF demonstrated a 20% increase in cell growth ( $p < 0.001$ ). However, VD stimulated PAEC growth during VEGF inhibition by 20% growth compared to controls ( $p < 0.0001$ ). VD treatment of PAEC increased PPAR $\gamma$  and VEGF expression by 80% compared to controls ( $p < 0.001$ ).

**Conclusions** We conclude that the mechanism of VD treatment on PAEC growth cannot be explained by increased VEGF expression alone; this VEGF-independent component of VD induced PAEC growth is likely due to the independent effects of VD on PPAR $\gamma$  signaling.

### 67 DHA SUPPLEMENTATION OF GROWTH RESTRICTED RATS INCREASES AIRWAY HYPERRESPONSIVENESS IN ASSOCIATION WITH DECREASED NUCLEAR FABP4

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10.1136/jim-2019-WMRC.67

**Purpose of study** Preterm infants often experience postnatal growth restriction (PGR). PGR increases the severity and incidence of sex-divergent lung outcomes including bronchopulmonary dysplasia (BPD) and airway hyperresponsiveness (AHR). Docosahexaenoic acid (DHA) is important for lung development and inflammation control. A molecular mediator of DHA in the lung is fatty acid binding protein 4 (FABP4). FABP4 and DHA are decreased in BPD and in AHR. However, outcomes from clinical studies examining the effects of DHA supplementation on lung outcomes are conflicting. As a result, consensus on dose and sex effects of DHA supplementation in human PGR infants is lacking. We previously showed in a rat model, that PGR causes sex-divergent 1) baseline deficits in lung function, 2) changes in whole cell FABP4 protein, and 3) altered circulating DHA. We hypothesize that in PGR rats, postnatal DHA supplementation causes dose and sex-dependent changes in response to methacholine challenge in association with changes in nuclear FABP4.

**Methods used** We induced PGR by randomizing newborn rat pups into litters of 8 (control) or litters of 16 (PGR). Each litter was randomized to receive diets with DHA at 0%, 0.01%, or 0.1%. At d24 of life, methacholine challenge was performed using the FlexiVent. Lung nuclear and cytoplasmic FABP4 protein levels were determined using western blot.

**Summary of results** Rat pups in the PGR group weighed less than control through d21 on all DHA diets. In male PGR rats, DHA at 0.1% worsened response to methacholine (increased airway resistance and decreased lung compliance) relative to male control and male PGR rats not receiving DHA. In addition, nuclear FABP4 was reduced in male PGR rats receiving the 0.1% DHA diet. Female PGR rats with or without DHA did not differ in response to methacholine or in nuclear FABP4.

**Conclusions** We conclude that in PGR rats, postnatal DHA supplementation causes dose and sex-dependent changes in response to methacholine challenge in association with

Abstract 66 Table 1 Results

Treatment	Outcome (vs CTL)	Significance
VEGF	41% increase in cell growth	$p < 0.0001$
VD	38% increase in cell growth	$p < 0.0001$
Pio	30% increase in cell growth	$p < 0.0001$
T007	No change in cell growth	ns $p < 0.001$
T007 + VEGF	20% increase in cell growth	ns ns
T007 + VD	No change in cell growth	
T007 + Pio	No change in cell growth	
Ax	No change in cell growth	ns ns $p < 0.0001$
Ax + VEGF	No change in cell growth	
Ax + VD	20% increase in cell growth	

decreased nuclear localization of FABP4. These data highlight the importance of dose and sex considerations in DHA supplementation. We speculate that sex-divergent fatty acid metabolism in the lung may contribute to sex-divergent effects of DHA supplementation.

## Surgery I

### Concurrent session

12:45 PM

Thursday, January 23, 2020

#### 68 CASTILE SOAP, CHLORHEXIDINE AND TRI-ANTIBIOTIC AS A PROPHYLACTIC RINSE TO REDUCE BREAST IMPLANT INFECTIONS IN THE SETTING OF BIOFILMS

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10.1136/jim-2019-WMRC.68

**Purpose of study** Infection is a major complication estimated to affect 2% of breast implant procedures. The best established prophylactic method is the use of an antibiotic rinse of cefazolin, bacitracin, and gentamicin in saline. The implant and surgical field are rinsed in this solution of antibiotics prior to implantation. Recently, orthopaedic surgeons have used castile soap as an irrigation solution in knee and hip replacement surgeries and endodontics have used chlorhexidine solution for root canal irrigation. The replacement of the antibiotic rinse with these irrigants or addition of these irrigants to the antibiotic rinse may better protect from bacterial infection in the setting of biofilms. This study aims to evaluate the efficacy of castile soap, chlorhexidine, and tri-antibiotic as pre-operative rinses for prevention of biofilm growth on tissue expanders and breast implants.

**Methods used** Two experiments were carried out: Kerby-Bauer disc diffusion assay to establish antibiotic efficacy by zone of inhibition and trypticase soy broth (TSB) incubation to simulate efficacy against biofilm growth. Each type of implant or tissue expander was rinsed in the corresponding solution and then plated on lawn streaked Mueller Hinton agar plates in the case of the Kerby-Bauer disc diffusion assay or incubated in a 0.5 McFarland standard TSB broth.

**Summary of results** Disc diffusion assay supported that castile soap, chlorhexidine, and tri-antibiotic significantly inhibited bacterial growth on all tissue expanders and breast implants used in comparison to saline. Trypticase soy broth incubation demonstrated that chlorhexidine and tri-antibiotic solutions inhibited biofilm growth on all breast implants and Allergan tissue expanders significantly more than saline. Mentor tissue expanders rinsed in chlorhexidine did not significantly inhibit biofilm growth although significant inhibition was found when rinsed in tri-antibiotic. Castile soap, did not inhibit the growth of biofilm significantly more than saline.

**Conclusions** Chlorhexidine shows promise as a prophylactic measure against biofilm growth on breast implants and expanders. Tri-antibiotic did prevent against bacterial growth and biofilm growth in these in vitro studies. Dosing and toxicity studies will now need to be performed.

#### 69 USE OF FULL-COVERAGE DRESSING WITH CLOSED INCISION NEGATIVE PRESSURE THERAPY FOR BILATERAL MASTECTOMY IN BREAST CANCER PATIENTS

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10.1136/jim-2019-WMRC.69

**Purpose of study** Bilateral mastectomy with immediate reconstruction, a complex surgery undertaken to prevent or treat breast cancer, results in incisions at risk for post-surgical complications. Incisions created during mastectomy often face challenges with wound healing due to well-documented negative impacts of certain cancer therapies. These incisions may benefit from closed incision negative pressure therapy (ciNPT)—a wound dressing that holds incisions together, facilitates removal of fluid and infectious materials, and creates a barrier to external contaminants, supporting tissue healing and repair. A two-piece, full-coverage dressing designed to give negative pressure to incisions and surrounding tissues is available for use with commercial ciNPT systems. This case series reports our initial experience using this dressing with ciNPT in 3 breast cancer patients who underwent bilateral mastectomies with immediate reconstruction.

**Methods used** Full-coverage dressings were placed over the breast once bilateral mastectomy, reconstruction, and closure was complete. ciNPT was initiated on postoperative day (POD) 0 and left in place for 5–6 days. Oral antibiotics were administered post-surgery per best practice.

**Summary of results** The 3 patients in our case series underwent bilateral mastectomy with immediate reconstruction. Patient 1, a 59-year-old female with type 2 diabetes, hypertension, and obesity, had bilateral vertical incisions. Patient 2 and 3 were 58- and 50-year-old females with no notable medical histories. Patient 2 had bilateral inverted 'T' incisions. Patient 3 had bilateral inframammary incisions. After application of ciNPT, all patients were discharged POD 1 and returned POD 5–6 to remove dressings. Follow-up at POD 30 showed closed incisions in all patients. There were no incidences of seromas, dehiscences, or site infections. At follow-up 4–5 weeks post-surgery no adverse events were reported.

**Conclusions** In this patient group at risk for poor wound healing due to cancer therapy, full-coverage dressings with ciNPT supported incision healing and soft tissue repair after bilateral mastectomy and reconstruction for breast cancer.

#### 70 ANALYSIS OF DIFFERENTIAL ENIGMA GENE EXPRESSION IN THYROID CANCER VS BENIGN NODULES

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10.1136/jim-2019-WMRC.70

**Purpose of study** Thyroid cancer incidence is rising worldwide. Although fine-needle aspiration biopsy (FNAB) is an accurate modality for evaluating thyroid nodules, up to 25% of FNABs still yield indeterminate results. There is an increasing number

of thyroidectomies due to indeterminate nodules by FNAB alone. Therefore, there is a need for a more accurate and time-efficient diagnostic approach for analyzing indeterminate thyroid nodules. Recently, the osteogenic protein Enigma has been associated with different cancer types, including thyroid cancer progression and calcification through its interaction with bone morphogenic protein-1 (BMP-1), and tyrosine kinases linked to mitogenic signaling pathways. Our published data on Enigma protein analysis with immunohistochemistry showed promising results in discriminating between malignant versus benign thyroid nodules, and demonstrated correlation with thyroid cancer staging. In this study, we are investigating Enigma at a gene expression level by RT-qPCR, which is a quantitative and more time-efficient method that requires smaller samples (FNA) than immunohistochemistry.

**Methods used** We extracted mRNA/DNA/proteins from fresh malignant and benign thyroid nodules using a QIAGEN DNA/RNA/Protein Kit. We prepared cDNA from isolated pure mRNA and ran through Enigma-qPCR assay using primers.

**Summary of results** The results showed that the Enigma-mRNA expression level was 3-fold higher in malignant as compared to benign thyroid tissue, which is statistically significant. This finding supports our previous Enigma immunohistochemistry data and shows a relative quantitative difference in Enigma-mRNA expression level between malignant and benign thyroid nodules.

**Conclusions** We conclude that Enigma-RT-qPCR can be used to effectively determine malignancies in FNAB samples derived from thyroid nodules. This method could potentially enhance the diagnostic accuracy of indeterminate nodules and decrease diagnostic thyroidectomies and subsequent morbidity.

## 71 PERIPAPILLARY RETINAL NERVE FIBER LAYER MICROCIRCULATION IN GLAUCOMA PATIENTS OF AFRICAN AND EUROPEAN DESCENT USING OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY

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10.1136/jim-2019-WMRC.71

**Purpose of study** To investigate the differences in peripapillary retinal nerve fiber layer (RNFL) microcirculation in open angle glaucoma (OAG) patients of African descent (AD) and European descent (ED) using optical coherence tomography-angiography (OCTA).

**Methods used** Twenty-three OAG eyes of AD and 27 OAG eyes of ED were scanned using AngioPlex OCTA system (Zeiss Meditec Inc., Dublin, CA) covering a 6 × 6 mm scanning area centered at the optic nerve head (ONH). Peripapillary RNFL microcirculation was measured by calculating the overall blood flux (BF) and vessel area density (VAD) within an annulus centered at the ONH (2.5-mm and 3.7-mm as inner and outer diameters) with the exclusion of big retinal vessels. Two-sample, independent t-tests were used to compare the peripapillary RNFL blood flow metrics between AD and ED eyes. Linear regression models were used to investigate the correlation between peripapillary RNFL blood flow metrics and structural and functional parameters.

**Summary of results** There was no significant difference in age, sex, systolic blood pressure (BP), diastolic BP, mean ocular perfusion pressure, RNFL thickness, visual field (VF) mean

deviation (MD) and VF pattern standard deviation (PSD) between AD and ED glaucomatous eyes included ( $p \geq 0.062$ ). Eyes of AD and ED had similar peripapillary RNFL blood flow metrics ( $p \geq 0.380$ ). Peripapillary RNFL blood flow metrics were significantly correlated with VF MD, VF PSD and RNFL thickness ( $p \leq 0.026$ ).

**Conclusions** Peripapillary RNFL blood flow metrics were significantly correlated with disease severity in AD and ED glaucomatous eyes. Peripapillary RNFL microcirculation detected by OCTA was similar between AD and ED glaucomatous eyes.

## 72 TISSUE PLASMINOGEN ACTIVATOR PROTOCOL FOR FROSTBITE IN ALASKA: IMPROVED ACCESS IN RURAL AND REMOTE AREAS

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10.1136/jim-2019-WMRC.72

**Purpose of study** Use of tissue plasminogen activator (tPA) for treatment of severe frostbite has facilitated limb salvage when previously amputation was inevitable. To address Alaska's rural and remote areas, a protocol for systemic tPA in patients with grade 3 or 4 frostbite extremity injuries was adopted. This study evaluated the efficacy of this protocol and identified barriers to its success.

**Methods used** We compiled all patients treated for frostbite at this institution from October 2012 – May 2019 using data from inpatient admissions, outpatient clinic visits, Emergency Department consult notes, and pharmacy records of tPA infusions. This established a pre-treatment cohort from October 2012 – September 2017 and a tPA eligible cohort from October 2017 – May 2019. Chart review determined key variables including injury grade, timing and location (of injury, first evaluation, and tPA administration), distance from treating facility, amputation level, and tPA candidacy. Descriptive statistics were gathered, and chi squared test was used to compare the two groups.

**Summary of results** Clinical characteristics were similar in both groups. A pre-protocol group who were retrospectively determined to be tPA candidates consisted of 13 men (76%) with an average age of 36.3 [25 (26–51)]. Post-protocol tPA recipients consisted of 7 men (78%) with an average age of 37.2 [20 (25–45)]. Amputation of grade 3 and 4 frostbite injuries decreased from 82% (pre-treatment) to 22% (post-treatment). Average time from rewarming to tPA administration was 5.1 hours [3.9 (3.4–7.3)]. There were no adverse events of tPA treatment. Of the two amputations after tPA, one was complicated by infection, and one received amputation after a second re-freezing injury. Many patients were not considered for tPA based on time from rewarming to evaluation.

Abstract 72 Table 1

	Frostbite Cases	tPA candidates (pre); tPA recipients (post)	Amputations (%)	p value
Pre-protocol (2012–17)	57	17	14 (82)	0.048
Post-protocol (2017–19)	44	9	2 (22)	

**Conclusions** Systemic tPA administration is shown to be effective in decreasing amputation among patients with grade 3 and 4 frostbite injuries while providing means of accessible treatment in rural and remote settings. Education of frostbite as a time-critical injury may increase patient identification for treatment and improve outcomes.

### 73 NECROTIZING ENTEROCOLITIS IN A RAT ANIMAL MODEL

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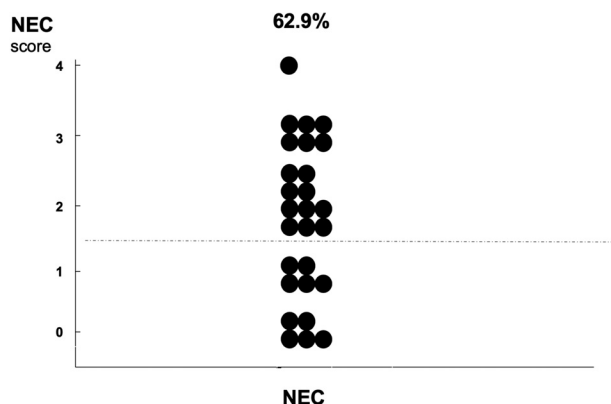
10.1136/jim-2019-WMRC.73

**Purpose of study** Necrotizing Enterocolitis (NEC) is one of the leading causes of death in premature infants. The purpose of this research endeavor was to reproduce and develop an animal model of NEC that can be used for possible therapeutic interventions.

**Methods used** Sprague Dawley rat pups were delivered prematurely by C-section at 21 days gestation. Newborn rat pups were fed by an orogastric tube with 15 g Similac & 75cc of Esbilac 200kcal/kg every 4 h, receiving 0.1 ml on day 1 of life advancing to 0.4 ml by day 4 of life. Pups were exposed to 100% N x 60 sec followed by 40C x 10 min beginning 10 min after birth three times a day. The pups received LPS (2 mg/kg) via OG tube 8h after birth. Pups were monitored closely for clinical signs of NEC (bloody stools, abdominal distention, lethargy, respiratory distress) and were sacrificed if any above symptoms were observed. On day 5, all surviving pups were sacrificed and intestines were harvested. Samples of duodenum, jejunum, ileum and colon were fixed in 10% formalin. Histological changes in the intestines were graded: grade 0, normal, no damage; grade 1, epithelial cell lifting or separation; grade 2, sloughing of epithelial cells to mid villus level; grade 3, necrosis of entire villus; and grade 4, transmural necrosis. Tissues with histological scores 2 or higher were designated as positive for NEC.

**Summary of results** The incidence of NEC found in our experiment using preterm rat pups was 62.9%.

**Conclusions** The rat animal model of NEC is a useful tool in the study of NEC as well as in developing therapeutic interventions. Currently, our laboratory is investigating the role of Heparin-binding EGF-like growth factor (HB-EGF) in prevention and treatment of NEC using this animal model.



Abstract 73 Figure 1

### 74 SURGICAL CAPACITY AND TRAUMA SYSTEM FUNCTIONALITY IN RURAL UGANDA

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10.1136/jim-2019-WMRC.74

**Purpose of study** Surgical capacity assessment in combination with an evaluation of the trauma system and services at Soroti Regional Referral Hospital (SRRH), Soroti, Uganda, are key factors to identifying priorities in care and growth in partnership together with BC Children's Hospital. As such, study objectives include assessing surgical capacity at SRRH and evaluating functionality of the Soroti trauma system and services.

**Methods used** The Global Assessment in Pediatric Surgery (GAPS) checklist, a novel capacity assessment tool, was implemented at SRRH, administered via interview with a senior surgical faculty member. To evaluate the trauma system, a 26-item environmental scan was implemented via three structured interviews with a general surgeon, medical officer, and intern, in addition to a focus group with four interns. This project took place during July 2019.

**Summary of results** GAPS highlights strengths in surgical capacity at SRRH, including ability to perform surgery 24-hr/day; consistent access to 2 equipped operating rooms; and availability of a surgical and anesthesia team with experience in pediatric care. Over 50% of health care practitioners involved in pediatric care attend 1–2 CME sessions annually. Areas for growth in capacity include improving timely access to surgical care (currently, <50% of patients reach definitive care in <2 hrs) and formalized tracking of patient outcomes. Key identifications of the environmental scan include the need for establishment of EMS in the community, and significant trainee interest (consensus amongst 2/2 trainee interviewees, and 4/4 trainees in focus group) in the development of trauma care provider education during internship, such as ATLS and simulation training.

**Conclusions** This study demonstrates insight into the current scope of surgical capacity and trauma services at SRRH. Potential partnership priorities include a focus on integrated pre-hospital care and educational resources for trainees at the institution.

### 75 COMPARISON OF SVF VIABILITY FROM FAT HARVESTED VIA ULTRASOUND ASSISTED LIPOSUCTION VERSUS STANDARD ASSISTED LIPOSUCTION: A PRELIMINARY VOLUMETRIC ANALYSIS

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10.1136/jim-2019-WMRC.75

**Purpose of study** Interest in the stromal vascular fraction (SVF) of adipose tissue has grown because of its potential to be a source of therapeutic progenitor cells due to its multipotency and ease of harvest via liposuction. The gold standard method of suction-assisted liposuction (SAL) has been established but alternative methods are gaining popularity such as ultrasound-assisted liposuction (UAL). Studies have not yet directly compared these two methods regarding the quantity of adipose-derived mesenchymal stem cells preserved. This study evaluated if ultrasound collection of fat allows for larger amounts

**Abstract 75 Table 1** Summarizes the findings of this experiment

Patient	Age	Harvest Site	Method	SVF Mass (per 10 ml)	Viable cells per HPF
1	52	abdomen	SAL	0.62g	16
2	49	outer thighs	SAL	0.91g	22
3	59	abdomen	UAL	1.94g	32
4	61	abdomen	SAL	0.72g	31
5	43	flanks	UAL	1.49g	44
6	48	abdomen	UAL	1.66g	38
7	54	abdomen	UAL	1.19g	51
8	31	abdomen	UAL	1.90g	36

of viable stromal vascular fraction after the isolation process compared to standard suction technique of fat collection in patients undergoing autologous fat transfer.

**Methods used** Autologous lipoaspirates were harvested from a total of eight female patients. In our study, our UAL was specifically Vibration Amplification of Sound Energy at Resonance (VASER). Lipoaspirates were cooled and stored in a freezer until processing, centrifuged in 10 mL tubes at 3000 revolutions per minute. Then, SVF was preserved by extracting and discarding the fat and plasma layer and measured for viability using trypan blue solution staining and microscopic high power field counts to determine the number of cells preserved from each method.

**Summary of results** Table 1 summarizes the findings of this experiment. The average mass of SVF harvested via SAL was 0.75 g versus an average of 1.64 g for the SVF harvested via UAL. A two tailed t-test revealed a p value of <0.002. Viable cell counts per high power field yielded a value of 23.2 for SAL versus 40.2 for UAL. The p value for the two tailed t-test was 0.03.

**Conclusions** The fat collected by the VASER method resulted in a higher volume of SVF with a greater density of viable cells. This suggests that UAL is a more efficient method of collection which also was reported to be less physically taxing for surgeons.

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#### THE UTILIZATION OF EXTENDED CRITERIA DONORS IN LIVER TRANSPLANTATION DOES NOT AFFECT PATIENT AND GRAFT SURVIVAL

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10.1136/jim-2019-WMRC.76

**Purpose of study** Increasing organ scarcity has motivated transplant centers to relax restrictions to donation creating the term “extended-criteria donor” (ECD). ECD include organs that carry increased risk of impaired allograft function and/or donor-transmitted disease. Due to a better understanding in the utilization of these grafts, we hypothesize that both patient and graft survival associated with utilization of liver grafts from ECD will be similar to standard criteria donors (SCD).

**Methods used** Retrospective cohort analysis of adult patients who received a liver transplant at the University of Washington (UW) between January 1, 2014 and December 31, 2016. Clinical data was obtained from transplant database at UW. Analysis was limited to transplant recipients who received primary liver transplant. Patients with re-transplantation, multi-organ transplants and living donor liver recipients were excluded. Demographic data was analyzed using a t-test for continuous variables and a Fischer’s Exact test for categorical

variables. Survival curves were calculated with Kaplan-Meier analyses and compared with a log-rank test. Cox proportional hazards model was performed to determine the contribution of the recipient and donor variables on allograft and patient survival.

**Summary of results** We identified 104 ECD and 135 SCD recipients. Mean age for ECD donor is 37.6±14.2 years old and SCD donor is 32.5±13.5 years old (p=0.002). ECD livers have shorter cold ischemia time (7.1±2.0 hours vs. 8.0±2.5; p=0.003). The rate of primary non-function, re-transplantation, length of hospital stay and liver enzymes post-op are not different between groups. Kaplan Meier patient and graft survival show no difference between recipient groups. Cox proportional hazards model showed no statistical significance between graft or patient outcomes.

**Conclusions** The utilization of ECD in liver transplantation does not have any impact in both patient and graft survival. These findings suggest that ECD should be considered more in an era of scarce organ availability and high wait list mortality.

## Cardiovascular II

### Concurrent session

3:15 PM

Thursday, January 23, 2020

77

#### USE OF HEPATITIS B DONORS IN HEART TRANSPLANTATION: ARE THERE CONSEQUENCES?

T Megerdichian\*, K Nishihara, A Shen, R Levine, M Hamilton, J Kobashigawa. Cedars-Sinai Medical Center, Los Angeles, CA

10.1136/jim-2019-WMRC.77

**Purpose of study** In the past, Hepatitis B donors have been declined in patients who have not been vaccinated by the Hepatitis B vaccine. There is concern that these donors would transmit Hepatitis B to the recipient if they are not vaccinated. There is treatment available for these Hepatitis B infections, however, it has not been established as to its efficacy in patients on immunosuppression. In addition, hepatitis viruses have been reported to affect the endothelium of vital organs. Hepatitis B may injure the endothelium of the coronary vascular tree and could potentially result in a greater development of cardiac allograft vasculopathy (CAV) after heart transplantation. Therefore, we sought to assess this possibility by examining our patients who received Hepatitis B donors.

**Methods used** Between 2010 and 2016 we assessed 24 heart transplant patients who received a Hepatitis B donor. All of the recipients had received a Hepatitis B vaccine prior to transplantation. Endpoints include 3-year survival, 3-year freedom from CAV, 3-year freedom from non-fatal major adverse cardiac events (NF-MACE), and freedom from first year rejection, including any treated rejection, acute cellular rejection (ACR), and antibody-mediated rejection (AMR). These study patients were compared with 600[KJ1] [SA2] [SA3] patients without Hepatitis B donors in a contemporaneous era.



Abstract 77 Table 1

Endpoints	H Tx Patients with a Hepatitis B donor (n=24)	H Tx Patients without a Hepatitis B donor (n=600)	P-Value
3-Year Survival	87.5%	86.7%	0.941
3-Year Freedom from CAV	79.2%	88.2%	0.111
3-Year Freedom from NF-MACE	79.2%	81.8%	0.699
1-Year Freedom from ATR	87.5%	85.2%	0.863
1-Year Freedom from ACR	95.8%	93.3%	0.695
1-Year Freedom from AMR	95.8%	94.7%	0.847

**Summary of results** 3-year survival, freedom from NF-MACE, and freedom from first year rejection were similar between the Hepatitis B and Control groups. There is numerically a lower incidence of freedom from CAV in the Hepatitis B group compared to the control, but this was not statistically significant.

**Conclusions** Hepatitis B donors appear to have acceptable outcome compared to non-Hepatitis B donors after heart transplantation. Larger numbers of Hepatitis B donors will be needed to confirm these findings.

#### 78 FAMILY ATTITUDES TOWARD GENOMIC SEQUENCING IN CHILDREN WITH CARDIAC DISEASE

<sup>1</sup>D Gal\*, <sup>2</sup>N Deutch, <sup>1</sup>R Tang, <sup>2</sup>D Magnus, <sup>1</sup>D Char. <sup>1</sup>Stanford Medicine, Palo Alto, CA; <sup>2</sup>Stanford Center for Biomedical Ethics, Palo Alto, CA

10.1136/jim-2019-WMRC.78

**Purpose of study** Care for children with cardiac disease often involves difficult decisions and clinical uncertainty. Genomic Sequencing (GS) promises to improve clinical prognostics and could impact how difficult decisions are made. We sought to determine how GS results might alter family attitudes towards bedside care choices.

**Methods used** We conducted semi-structured interviews of 35 families at a high-volume pediatric heart center. We discussed previous experience with and understanding of GS, perceptions toward GS in real and hypothetical scenarios, and support needed for implementing GS in clinical care. Responses were analyzed using grounded theory and a codebook was developed. Researchers discussed interpretation of codes and identified and described emerging themes. Interrater reliability was 0.91.

**Summary of results** Three themes emerged: 1) Is knowledge beneficial? Families saw benefits in GS—the ability to provide specific and/or earlier diagnoses, clarify prognosis, change family planning, and avoid unnecessary/additional testing—but also struggled with the sense that GS results did not translate into meaningful changes in clinical care. 2) Should GS guide life limiting decisions and resource allocation? Some parents felt using GS to justify withdrawal of care or allocation of scarce resources (like organs for transplantation) could represent genetic discrimination; other parents felt GS should be used when allocating resources, even if it meant limitation of treatment options for their child. 3) Is giving GS results to the healthcare system safe? All families indicated mistrust of at least one facet of the medical system including insurance

companies, maintenance of confidentiality, and the incentive structure in healthcare. Some also expressed distrust of direct to consumer GS testing.

**Conclusions** In families of children with cardiac disease, trust is lacking in perceptions of the clinical utility of GS results, in using GS results to inform difficult decisions and in clinical protections for privacy or handling of GS results. Further efforts to improve the trustworthiness of clinical GS are needed to engage family support in implementation of GS to clinical care.

#### 79 ENGINEERED CARDIAC GRAFT REDUCES HEART FAILURE-MEDIATED VENTRICULAR TACHYCARDIA

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10.1136/jim-2019-WMRC.79

**Purpose of study** Patients with Heart Failure with reduced Ejection Fraction (HFrEF) have a high incidence of ventricular tachycardia (VT). Though pharmacologic and invasive therapies exist for HFrEF-mediated VT, none restore the electrical stability of the infarcted myocardium. Fibroblasts are the principle component of cardiac stroma and we hypothesize that they can be utilized surgically to modulate susceptibility to ventricular tachyarrhythmia.

**Methods used** We performed a proof-of-concept study by surgically implanting engineered cardiac grafts epicardially in a rodent model of chronic ischemic heart failure (HF). A single graft formulation was utilized as the experimental therapy: human dermal fibroblasts cultured into a bioabsorbable polyglactin-910 woven scaffold. The specific aims of this study were to 1) compare susceptibility to induced VT via programmed electrical stimulation in SHAM, HF, and HF+graft rats and 2) to compare two-dimensional epicardial electroanatomic map findings between the three groups.

**Summary of results** HF rats (n=29) exhibited no change ( $1.0 \pm 0.1$  versus  $0.7 \pm 0.2$ ,  $p=0.1430$ ) in capture threshold, a prolongation ( $68 \pm 3$  versus  $53 \pm 4$ ,  $p=0.0191$ ) of effective refractory period (ERP), and an increase (72% versus 0%,  $p=0.0394$ ) in the incidence of inducible VT compared to SHAM rats (n=7). Graft-treated rats (n=12) exhibited no change ( $0.8 \pm 0.1$  versus  $1.0 \pm 0.1$ ,  $p=0.3220$ ) in capture threshold, a prolongation ( $88 \pm 7$  versus  $68 \pm 3$ ,  $p=0.0029$ ) of ERP and a non-significant decrease (42% versus 72%,  $p=0.08$ ) in the incidence of inducible VT compared to HF rats. Epicardial electroanatomic mapping revealed lower ( $p<0.05$ ) monophasic action potential amplitudes in the left ventricle of HF and graft-treated HF rats compared to SHAM rats.

**Conclusions** An engineered cardiac graft composed of human dermal fibroblasts on a scaffold was implanted onto the epicardium of rodents with HFrEF and altered the effective refractory period of the infarcted left ventricle. This graft may also influence susceptibility to HFrEF-mediated VT via impeding the successful conversion of R-on-T phenomena to ventricular tachyarrhythmia. This proof-of-concept study confirmed the model and methods necessary to evaluate the therapeutic potential of this cell-based therapy and other novel cell-based therapies for HFrEF.

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### DOES THE TYPE OF EXPLOSIVE BRAIN-DEATH CORRELATE WITH OUTCOME AFTER HEART TRANSPLANTATION?

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10.1136/jim-2019-WMRC.80

**Purpose of study** In heart transplantation, the origin of brain death may have an impact on outcome after heart transplantation. It has been reported that explosive brain death, including head trauma, gunshot to the head, and subarachnoid hemorrhage (SAH), may lead to increased catecholamine surge with damage to the donor heart as well as upregulation of inflammatory markers. Other forms of brain death such as hanging, drowning, and drug overdose may also impact outcome, but this has not been firmly established. Therefore, we sought to evaluate explosive brain death and its relationship to outcomes in the current era.

**Methods used** Between 2010 and 2018, we assessed 823 heart transplant patients and divided them into two groups based on whether the heart donor underwent explosive or non-explosive brain death. Endpoints included 1-year survival, freedom from the development of cardiac allograft vasculopathy (CAV, as defined by stenosis  $\geq 30\%$  by angiography), non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke), any treated rejection (ATR), acute cellular rejection (ACR), antibody-mediated rejection (AMR), donor specific antibodies (DSA), and severe primary graft dysfunction (PGD).

Abstract 80 Table 1

Endpoints	Explosive Brain Death (n=573)	Non-Explosive Brain Death (n=250)	P-value
1-Year Survival	91.1%	90.4%	0.812
1-Year Freedom from CAV	95.1%	94.4%	0.707
1-Year Freedom from NF-MACE	87.8%	86.6%	0.653
1-Year Freedom from ATR	87.3%	84.8%	0.349
1-Year Freedom from ACR	93.6%	93.2%	0.840
1-Year Freedom from AMR	94.5%	94.0%	0.792
1-Year Freedom from Severe PGD	96.2%	96.4%	0.848

**Summary of results** Patients from both explosive and non-explosive brain death mechanisms have comparable outcomes in terms of survival and freedom from severe PGD, CAV, NF-MACE, and rejection.

**Conclusions** Explosive brain death does not appear to be associated with less than optimal outcomes after heart transplantation.

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### PRE-TRANSPLANT COLLAGEN VASCULAR DISEASE IS ASSOCIATED WITH AN INCREASE IN CARDIAC ALLOGRAFT VASCULOPATHY AFTER HEART TRANSPLANTATION

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10.1136/jim-2019-WMRC.81

**Purpose of study** Collagen vascular disease, including disease states such as systemic lupus erythematosus, rheumatoid arthritis, and scleroderma, have auto-antibodies in common as their etiology. These patients (pts) develop an inflammatory disease state and are known to be triggered by IgG and IgM antibodies against self. It is not clear whether pts with underlying collagen vascular disease face an increased risk of developing donor specific antibodies (DSA), rejection, and cardiac allograft vasculopathy (CAV).

**Methods used** Between 2010–2018, we assessed 22 heart transplant pts who had pre-transplant diagnoses of collagen vascular disease specified as lupus (n=7), rheumatoid arthritis (n=9), scleroderma (n=3), and mixed connective tissue disease (n=3). Pre-transplant immunotherapy, first-year post-transplant survival, and freedom from CAV (as defined by stenosis  $\geq 30\%$  by angiography), non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke), acute cellular rejection (ACR), antibody-mediated rejection (AMR), DSA, and left ventricular dysfunction (as defined by left ventricular ejection fraction  $< 40\%$ ) were recorded.

**Summary of results** Pts with pre-transplant underlying collagen vascular disease have significantly lower freedom from CAV. First year freedom from NF-MACE, rejection, and DSA appear to be similar between study and control groups. Collagen vascular disease pts who were treated with pre-transplant disease-modifying agents were then compared as a subgroup to those pts who did not have a disease-modifying agent.

**Conclusions** Pts with pre-transplant collagen vascular disease appear to have increased risk of CAV. Heightened immunosuppression may be warranted in this group of patients undergoing heart transplantation.

Abstract 81 Table 1

Endpoints	Patients with Collagen Vascular Disease (n=22)	Patients without Collagen Vascular Disease (n=772)	P-Value
1-Year Survival	95.5%	90.8%	0.450
1-Year Freedom from CAV	77.3%	95.4%	<0.001
1-Year Freedom from NF-MACE	77.3%	87.5%	0.190
1-Year Freedom from AMR	100.0%	94.6%	0.268
1-Year Freedom from ACR	95.2%	93.3%	0.641
1-Year Freedom from DSA	95.5%	81.9%	0.450
1-Year Freedom from LV Dysfunction (LVEF $< 40\%$ )	90.9%	89.7%	0.736

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### THE OUTCOME OF RIGHT VENTRICULAR PRIMARY GRAFT DYSFUNCTION AFTER HEART TRANSPLANTATION: IS IT BAD?

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10.1136/jim-2019-WMRC.82

**Purpose of study** Primary graft dysfunction (PGD) is observed in approximately 7% of all heart transplant (HTx) patients (pts). According to the International Society for Heart and Lung Transplantation (ISHLT), a new PGD scale includes left ventricular (PGD-LV), or right ventricular (PGD-RV) PGD.

PGD-LV when severe is noted to have increased mortality. PGD-RV has been described as hemodynamics with RAP >15 mmHg, PCWP <15 mmHg, CI <2.0 L/min/m<sup>2</sup>, or need for RV temporary support. PGD-RV has not been well studied.

**Methods used** Between 2013 and 2018, we assessed 13 HTx pts who developed PGD-RV within 24 hours after HTx and compared them to pts without PGD. Endpoints included 1-year survival, need for temporary kidney dialysis, need for RV unloading with sildenafil, first-year any treated rejection (ATR), 1-year freedom from cardiac allograft vasculopathy (CAV, as defined by stenosis  $\geq$ 30% by angiography), and 1-year freedom from non-fatal major adverse cardiac events (NF-MACE, defined as myocardial infarction, percutaneous coronary intervention/angioplasty, new congestive heart failure, pacemaker/implantable cardioverter-defibrillator placement, and stroke).

Abstract 82 Table 1

Endpoints	HTx Patients with RV-PGD (n=13)	HTx Patients without PGD (n=407)	P-Value
1-Year Survival	92.3%	92.9%	0.824
1-Year Freedom from CAV	100.0%	96.8%	0.532
1-Year Freedom from NF-MACE	84.6%	88.7%	0.543
1-Year Freedom from ATR	92.3%	88.7%	0.780
1-Year Freedom from RV Unloading	46.2%	90.9%	<0.001
1-Year Freedom from Temporary Kidney Dialysis	76.9%	91.6%	0.053

**Summary of results** Pts with PGD-RV appear to have comparable outcomes to pts without PGD for survival, freedom from CAV, freedom from NF-MACE, and rejection. Pts with PGD-RV required RV unloading therapy which may have affected outcome. There was a trend for decrease in the freedom from temporary kidney dialysis in the PGD-RV group.

**Conclusions** Right ventricular primary graft dysfunction after HTx appears to have comparable outcome with good recovery. RV unloading therapy may be helpful. However, there was an associated increased need for temporary kidney dialysis within the first year after HTx. Larger numbers are warranted to confirm these findings.

### 83 THE USE OF CARDIAC MAGNETIC RESONANCE IMAGING (MRI) TO PREDICT OUTCOME AFTER HEART TRANSPLANTATION

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10.1136/jim-2019-WMRC.83

**Purpose of study** Heart transplant patients are known to develop cardiac rejection and cardiac allograft vasculopathy (CAV) after heart surgery. The severity of these rejection episodes and the detection of rejection has not been adequate with the endomyocardial biopsy. In fact, biopsy negative rejection is seen in approximately 5% of this patient population. The use of cardiac MRI has been increasing to demonstrate myocardial edema or fibrosis. However, it has not been established what these cardiac MRI abnormalities represent and

Abstract 83 Table 1

Endpoints	Abnormal Cardiac MRI findings of myocardial edema or fibrosis (n=12)	Normal Cardiac MRI findings (n=14)
1-Year Subsequent Survival	75.0%	92.9%
1-Year Subsequent Freedom from CAV	100.0%	92.9%
1-Year Subsequent Freedom from NF-MACE	75.0%	78.6%
LV dysfunction with LVEF	75.0%	21.4%

whether they can predict the development of CAV by angiography or clinical outcomes.

**Methods used** Between 2011 and 2018, we assessed 26 heart transplant patients who underwent clinically indicated cardiac MRI imaging. In most cases, cardiac function was decreased or endomyocardial biopsy was either negative or ambiguous for rejection. Patients with abnormal cardiac MRI findings of myocardial edema or fibrosis were compared to patients without findings of myocardial edema or fibrosis. These patients were followed for 1 year after the imaging study was performed. Patients from each group were assessed for 1-year subsequent (from MRI scan) survival, 1-year subsequent freedom from CAV, 1-year subsequent freedom from NF-MACE, and the presence of left ventricular dysfunction defined as left ventricular ejection fraction (LVEF) <40%.

**Summary of results** Although the numbers are small (no p-values done), there is a numerically lower survival in patients with myocardial edema or fibrosis on cardiac MRI. Cardiac dysfunction with LVEF <40% was more prevalent in the abnormal cardiac MRI group compared to the control.

**Conclusions** Cardiac MRI findings of myocardial edema or fibrosis appear to be associated with lower outcome compared to controls. Larger studies are needed to confirm the use of cardiac MRI in this patient population.

### 84 DOES THE DOSE OF MYCOPHENOLATE MOFETIL IMPACT OUTCOME AFTER HEART TRANSPLANTATION?

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10.1136/jim-2019-WMRC.84

**Purpose of study** Mycophenolate mofetil (MMF) is an anti-proliferative agent that is used in heart transplantation (HTx). The multicenter randomized trial of mycophenolate published in *Transplantation* in 1998 demonstrated that MMF conferred a survival benefit. The average dose of MMF was 2.8 g/day. It is not clear whether lower doses of MMF also have benefit in terms of control of rejection as well as other outcomes.

**Methods used** Between 2010 and 2018, we assessed 240 HTx patients and divided them into categories of MMF dosing in the first year after HTx. The average daily dose of MMF was obtained for all patients in the first year, with an average of 10 MMF dose levels over the first year. Patients were divided into groups based on receiving an average daily dose of <500 mg MMF/day, 500–1000 mg/day, 1001–1500 mg/day, 1501–2000 mg/day, and >2000 mg/day. Endpoints included 1-year survival, 1-year freedom from cardiac allograft vasculopathy (CAV, as defined by stenosis  $\geq$ 30% by angiography), 1-year freedom from

Abstract 84 Table 1

Endpoints	HTx Patients with	HTx Patients with 500–1000 mg MMF/day (n=102)	HTx Patients with 1001–1500 mg MMF/day (n=50)	HTx Patients with 1501–2000 mg MMF/day (n=46)	HTx Patients with >2000 mg MMF/day (n=29)	P-Value
1-Year Survival	92.3%	91.2%	100.0%	93.5%	89.7%	0.249
1-Year Freedom from CAV	100.0%	95.1%	92.0%	91.3%	100.0%	0.448
1-Year Freedom from NF-MACE	92.3%	84.3%	84.0%	82.6%	72.4%	0.353
1-Year Freedom from ATR	69.2%	86.3%	90.0%	78.3%	72.4%	0.058
1-Year Freedom from ACR	84.6%	94.1%	96.0%	93.5%	89.7%	0.543
1-Year Freedom from AMR	92.3%	97.1%	96.0%	91.3%	93.1%	0.572

non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, percutaneous coronary intervention/angioplasty, new congestive heart failure, pacemaker/implantable cardioverter-defibrillator placement, and stroke), and 1-year freedom from rejection (any treated rejection (ATR), acute cellular rejection (ACR), antibody-mediated rejection (AMR)).

**Summary of results** Patients treated with <500 mg MMF/day and >2000 mg MMF/day had a trend toward decreased freedom from ATR. There was no difference in outcome between all groups in terms of 1-year survival, freedom from CAV, freedom from NF-MACE, and freedom from ACR and AMR.

**Conclusions** The average daily dose of MMF in the first year after HTx does not appear to have an impact on outcome. Longer follow-up will be necessary to assess whether MMF dosing correlates to long-term complications such as CAV.

Endpoints included the following 5-year outcomes subsequent to the development of DSA: survival, freedom from CAV, freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, percutaneous coronary intervention/angioplasty, new congestive heart failure, pacemaker/implantable cardioverter-defibrillator placement, and stroke), and freedom from rejection (any treated rejection (ATR), acute cellular rejection (ACR), antibody-mediated rejection (AMR)).

**Summary of results** Patients with C1q+ DSA had decreased survival and freedom from NF-MACE in the 5-years following the development of DSA. These patients also had a numerical lower freedom from CAV.

**Conclusions** The development of C1q+ DSA appears to be correlated with poor clinical outcome. It is not clear if treating C1q+ DSA with desensitization therapy can improve outcomes.

85 CORRELATION OF COMPLEMENT BINDING DONOR SPECIFIC ANTIBODY AND SUBSEQUENT OUTCOME

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10.1136/jim-2019-WMRC.85

**Purpose of study** It has been reported that the development of donor specific antibody (DSA) is correlated to the subsequent development of cardiac allograft vasculopathy (CAV, as defined by stenosis  $\geq 30\%$  by angiography) following heart transplantation. We now have the ability to assess whether DSA can bind complement (C1q+ assay) which suggests that these DSA are potentially cytotoxic to the donor heart and can result in CAV. We sought to assess if C1q+ DSA leads to the development of CAV in heart transplant patients.

**Methods used** Between 2010 and 2014, we assessed 50 heart transplant patients who developed DSA after heart transplantation. Patients were divided into groups that developed C1q+ DSA (n=21) and those that did not have this ability (n=29).

Abstract 85 Table 1

Endpoints	HTx Patients with C1q+ DSA (n=21)	HTx Patients with C1q- DSA (n=29)	P-value
5-Year Subsequent Survival	52.4%	93.1%	0.001
5-Year Subsequent Freedom from CAV	81.0%	89.7%	0.189
5-Year Subsequent Freedom from NF-MACE	66.7%	89.7%	0.039
1-Year Subsequent Freedom from ATR	66.7%	72.4%	0.697
1-Year Subsequent Freedom from ACR	90.5%	86.2%	0.677
1-Year Subsequent Freedom from AMR	76.2%	82.8%	0.506

86 CARDIOVASCULAR DISEASE RISK BEGINS EARLY IN MALES WITH KLINEFELTER SYNDROME

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10.1136/jim-2019-WMRC.86

**Purpose of study** Klinefelter Syndrome (XXY) has an incidence of 1 in 600 births each year. Men with XXY have higher morbidity and mortality from cardiovascular disease (CVD). Increased carotid intima-media thickness (cIMT) is associated with CVD risk and has been shown to be higher in men with XXY. cIMT has not been assessed in adolescents with XXY. The objective of this study was to investigate CVD risk in adolescents with XXY with the hypothesis that elevated cIMT would be observed in youth with XXY.

**Methods used** This was a cross-sectional pilot study in adolescents with karyotype 47,XXY. cIMT was measured using ultrasound in the supine position by standard protocol. A one-sample t-test was used to compare cIMT in our sample to published norms for adolescent males ( $0.45 \pm 0.04$  mm). A two-sample t-test was used to compare cIMT between boys treated with testosterone to those untreated. Correlation was used to assess relations between cIMT and clinical biomarkers of metabolic function, including seated systolic and diastolic blood pressure (SBP, DBP), pulse pressure (PP), BMI percentile (BMIP), waist circumference (WC), fasting blood glucose (FBG) and lipid profile (total cholesterol, LDL, HDL, and triglycerides).

**Summary of results** cIMT in 25 males with XXY (mean age  $14.5 \pm 1.5$  yrs, BMI percentile  $55.3 \pm 32.6$ ) was  $0.55 \pm 0.07$  mm, significantly greater than expected for this age ( $p < 0.0001$ ). There was no difference in cIMT in males on testosterone

treatment ( $n=11$ ,  $0.56\pm 0.07$ ) compared to those without treatment ( $0.54\pm 0.07$  mm,  $p=0.53$ ). cIMT was correlated with FBG ( $r=0.51$ ,  $p=0.009$ ) and PP ( $r=0.61$ ,  $p=0.001$ ). cIMT was not correlated with BMI<sub>p</sub>, WC, SBP, DBP, or lipid profile components ( $p>0.1$  for all).

**Conclusions** This sample of normal-weight adolescents with XXY had a higher cIMT than would be expected for healthy males their age, suggesting their risk for CVD begins early despite the absence of obesity, hypertension, or diabetes. cIMT did not consistently correlate with common markers of cardio-metabolic health; however, this pilot study was underpowered for these analyses. Future studies with larger sample sizes, controls, and longitudinal assessments will help determine the pathogenesis and ultimately lead to earlier prevention and intervention for CVD in XXY.

## Global health I

### Concurrent session

3:15 PM

Thursday, January 23, 2020

#### 87 OUTCOMES OF LOW-BIRTHWEIGHT INFANTS FOLLOWING IMPLEMENTATION OF A COMMUNITY-BASED HEALTH SURVEILLANCE INTERVENTION IN RURAL INDIA

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10.1136/jim-2019-WMRC.87

**Purpose of study** Low birthweight (LBW) babies (<2500 g) have 20-fold higher mortality in their first year of life and account for 30% of neonatal deaths. In the Indian state of Gujarat, over 43% of infants are LBW. The purpose of this study is to determine the impact of a health surveillance intervention on growth and mortality in LBW infants in a rural area of Gujarat.

**Methods used** A pre-intervention assessment of LBW infants was conducted from January 6 to February 12, 2016. Infants were born at the Mota Fofalia Pediatric Center (MFPC) and discharged to villages in the Garudeshwar taluka. Families were not given newborn counseling or education. Assessment included weight and length.

A health surveillance intervention implemented in April 2016 provided pre-discharge counseling at the MFPC on infant warming and breastfeeding. Six follow-up household visits were made in the first year of life. Assessment included weight, length, temperature, and ECEB criteria for signs of infection. Families received counseling on infant care at each assessment.

**Summary of results** On baseline assessment, 72 of 86 identified infants were found for follow up (53% female; mean [range] age at follow-up, 4.7 [1–12] months). In the intervention phase, 330 LBW infants' families received pre-discharge counseling and 254 (77%) completed follow-up (56% female). There was no significant difference in weight gain between baseline (19.5 g/day) and intervention groups (19.0 g/day,  $t(360)=0.49$ ,  $p=0.62$ ). One-year infant mortality was lower in the intervention group ( $n=14$ , 4%) compared to baseline ( $n=8$ , 11%), as was neonatal mortality (intervention,  $n=3$ ,

#### Abstract 87 Table 1

	Baseline	Intervention
Participants (% female)	72 (53%)	254 (56%)
Weight gain (g/day)	19.5	19.0
Deceased within 28 days	3 (4%)	3 (1%)
Deceased within 1 year	8 (11%)	14 (4%)

1%, baseline,  $n=3$ , 4%), though neither were significant (intervention,  $p=0.096$ , baseline,  $p=0.097$ ).

**Conclusions** A health surveillance intervention in Garudeshwar with counseling on best feeding and care practices decreased LBW infant mortality. Future iterations of this study should address methods for increasing participant retention.

#### 88 SUSTAINABLE IMPROVEMENT IN MATERNAL-NEONATAL HEALTH SERVICES DELIVERY IN RURAL NEPAL

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10.1136/jim-2019-WMRC.88

**Purpose of study** Pregnancy and childbirth-related maternal and neonatal mortality in rural areas of Nepal remains high. The purpose of this study is to describe the features and characteristics of an effective and sustainable multifaceted maternal-neonatal health intervention in rural Nepal.

**Methods used** Between 2015–2019, a public-private-academic partnership team implemented a multifaceted MCH intervention to build care capacity in the Humla and Solukhumbu districts of Nepal. Fourteen birthing center facilities were established at health posts, engaging the local government health system, local administrators, and the ministry of health to develop a sustainable model for improved MCH services delivery in existing rural clinics. We describe administrative, educational, and management interventions which led to self-sustaining improvements in service delivery for women and children. Fifteen skilled birthing attendants were provided with training, as well as 95 community-based providers for community liaison work and 75 health facility staff for basic perinatal care. Measures of care quality were measured using a standardized WHO survey before and after intervention.

**Summary of results** Deliveries at health facilities improved from 37% (before intervention) to 49% (after), deliveries attended by trained professionals increased from 27% to 46%. Women receiving postpartum hemorrhage chemoprophylaxis increased from 31% to 43%, delivery planning increased from 76% to 95%, and newborns receiving most or all essential elements of newborn care increased from 32% to 58%.

**Conclusions** Key features of the public private academic partnership intervention included: 1) Local ownership, fingerprinting and accountability, local input into design, and local financial contributions to staff salaries and performance monitoring; 2) Improvement of case management capacity of staff through problem-focused hands on training experiences and government certification programs; 3) One-time investment in necessary equipment upgrades; 4) Integration of birthing centers within the government health system to access governmental supply chain for consumable materials; 5) Building local capacity for monitoring service delivery, care quality and outcomes through data systems and feedback loops.

89 **EDUCATING DHULIKHEL HOSPITAL EMERGENCY DEPARTMENT PATIENTS AND FAMILY MEMBERS ABOUT THE RISK FACTORS OF CARDIOVASCULAR DISEASE**

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10.1136/jim-2019-WMRC.89

**Purpose of study** The World Health Organization estimates that deaths due to noncommunicable diseases (NCDs) in Nepal have risen from 51% in 2010 to 60% in 2014, with 22% attributed to cardiovascular disease (CVD). Within the Nepali population there is limited education about CVD and its risk factors. In the absence of primary care, the first contact for patients and family members is often the Emergency Department (ED). A 2013 WHO cross-sectional study identified insufficient fruit and vegetable intake, obesity and overweight, hypertension, and hyperlipidemia as the main risk factors within the Nepali population.

**Methods used** A partnering Dhulikhel Hospital ED physician identified the need for CVD educational materials in the ED. A literature review of CVD in Nepal was conducted to identify the main risk factors locally. With the assistance of ED physicians and a research assistant, a poster was created featuring Nepali individuals and culturally relevant displays of risk factors. After feedback from ED staff and patients, the poster was revised to include common symptoms of CVD along with the Dhulikhel Emergency Medical Services (DEMS) contact information. The posters will be mounted and displayed on the walls in the ED and waiting room.

**Summary of results** Before printing, feedback from 10 ED patients or family members confirmed that the translation and grammar were correct, and the pictures depicting risk factors were clear. After printing, the poster was evaluated by the 13 ED staff for effectiveness using a short survey. On a scale of 1–5, with 5 being easy and 1 being very difficult to understand, 7 staff rated the poster at 4/5 with the remaining 6 rating it as 5/5. All 13 staff members thought a patient without a health background would be able to comprehend the poster's meaning and stated that they would use it to educate their patients about CVD.

**Conclusions** The project succeeded in creating a culturally relevant educational platform for ED patients and their family members to learn more about the risk factors for CVD in Nepal. It also provides a description of symptoms associated with CVD, a visual of the DEMS contact information, and a reminder encouraging patients to seek care immediately. More work is needed to create materials educating patients about CVD risk-reducing behaviors.

90 **ENGAGING TRADITIONAL MEXICAN MIDWIVES IN THE USE OF BAG VALVE MASKS TO TREAT ASPHYXIATED NEONATES**

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10.1136/jim-2019-WMRC.90

**Purpose of study** This project launched a collaborative partnership between an American medical school and a traditional midwifery school in Oaxaca, laying the groundwork for future neonatal health endeavors in partnership with traditional midwives (*Parteras*) in the region.

**Methods used** In March 2019, two certified Helping Babies Breath master trainers—a neonatologist and a medical student—taught an 8-hour course for eighteen *Parteras* involving didactic content and several hours of hands-on practice with neonatal mannequins and bag valve masks.

**Summary of results** Participating *Parteras* clarified their ability identify neonatal asphyxiation, gained insight into the strengths and weaknesses of their current interventions and learned to effectively utilize a bag valve mask to treat asphyxiated neonates.

**Conclusions** *Parteras* from across Oaxaca gained a tangible skill to address neonatal asphyxiation in low-resource settings. Several neonatal mannequins and bag valve masks were donated to the school to ensure ongoing training on this topic. As training is sustained by the midwifery school, traditional midwives will be equipped with the skills, resources, and confidence to identify areas of local need and implement their own training programs for other traditional birth attendants. This Training Of The Trainer model opens up long-term potential for reduced neonatal mortality due to asphyxiation in the rural communities of Oaxaca.



**Abstract 90 Figure 1** Traditional birth attendants known as *Parteras* practice using bag valve masks to resuscitate plastic neonate mannequins. Learning this new skill supplements the traditional techniques they use to treat asphyxiated neonates in the rural communities where they work

## 91 RAPID BASELINE ASSESSMENT OF EMERGENCY DEPARTMENT UTILIZATION AND TRIAGE IN RURAL INDIA

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10.1136/jim-2019-WMRC.91

**Purpose of study** Establish baseline data for a rural hospital in Gujarat, India, quantifying intake vital sign assessment and qualitative information regarding care in the Emergency Department.

**Methods used** This direct observational assessment took place at Shree Chhotubhai A. Patel Hospital, a rural hospital in Gujarat, India. In January – July of 2019, medical students trained in data collection directly observed Emergency Care delivery and triage assessment using a standardized evaluation tool. The data collected is descriptive.

**Summary of results** A total of 43 patient encounters were assessed during the data collection period. Heart rate and peripheral capillary oxygen saturation (SpO<sub>2</sub>) were the most frequently assessed vital signs, measured in 30% (13/43) and 27% (12/43) of patient encounters, respectively. Blood pressure was measured for 25% (11/43) of patients. Least frequently measured was patient temperature at 7% (3/43) and respiratory rate at 2% (1/43).

The presenting symptoms for 47% (20/43) patients seen were seen for trauma, 12% (5/43) for obstetrics care, 7% (3/43) with concern for stroke, 5% (2/43) with chest pain. In terms of Emergency room staff availability, 70% patients were seen by nursing within 5 minutes of arrival to the emergency department, with maximum wait time of 20 minutes until a nurse was able to assess the patient. 70% (30/43) patients were seen by the medical officer on duty within 30 minutes of arrival.

**Conclusions** WHO guidelines recommend triage systems based on presenting signs and vitals. Staff are available to assess patients rapidly upon arrival to the emergency department. There is a need to improve the measurement of vital signs. One key element contributing to the challenge of a triage assessment is the limited availability of equipment needed for accurate assessment. Availability of pulse oximeters and mobile blood pressure cuffs led to a relative increase of vital sign measurement. There was not a working thermometer in the hospital. This baseline analysis helps initiate an effort to understand the current practices in the ED and informs the creation of plans to improve appropriate patient care delivery.

## 92 RAPID BASELINE ASSESSMENT OF PERIPARTUM CARE DELIVERY BY SKILLED BIRTH ATTENDANTS IN RURAL INDIA

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10.1136/jim-2019-WMRC.92

**Purpose of study** Perinatal mortality remains a global public health issue. In 2015, about 303,000 women died from complications related to pregnancy and childbirth; 60% were related to untreated maternal conditions. India alone is currently responsible for 20% of global maternal deaths.

## Abstract 92 Table 1

Maternal Blood Pressure Check At Admission	44% (n=9)
Maternal Heart Rate Check At Admission	33% (n=9)
Maternal Temperature Check At Admission	0% (n=9)
Inappropriate Fundal Pressure Applied (NSVD)	69% (n=16)
Oxytocin Received	24% (n=25)
NSVD with Episiotomy Performed	82% (n=11)

Improving maternal and child health are central to the realization of National Health Goals outlined in the National Rural Health Mission (NRHM). Key interventions include increased support of deliveries by skilled birth attendants (SBAs). This study provides a descriptive assessment of current maternal care delivery by SBAs in the peripartum period.

**Methods used** This assessment took place at Shree Chhotubhai A. Patel Hospital in rural Gujarat, India. In July, 2019, medical students trained in data collection directly observed perinatal care delivery to estimate SBA proficiency. SBA competency was assessed by medical students via a standardized evaluation tool, the components of which were adapted from the World Health Organization's (WHO) top priority quality indicators.

**Summary of results** A total of 26 partial or complete care encounters were assessed during this data collection period. Of the 9 observed admissions, maternal blood pressure, temperature, and heart rate were assessed 44%, 0%, and 33% of the time, respectively. In these women, fetal heart rate was assessed 100% of the time, but was never documented. A total of 9 cesarean sections (C/S) and 16 vaginal deliveries were observed. Of the 16 vaginal deliveries, 11 (69%) women experienced inappropriate fundal pressure applied by SBAs. Of the 25 deliveries (16 vaginal, 9 C/S), 19 women (76%) received oxytocin at some point after delivery; only 6 women (24%) appropriately received oxytocin within 1 minute of birth.

**Conclusions** This evaluation found variation and deficiencies in perinatal care services provided by SBAs. There is a need to refine provider training and protocols to improve the quality of perinatal care.

## 93 SCREENING FOR DEPRESSION AND ANXIETY AMONG ADOLESCENTS IN HIMACHAL PRADESH, INDIA

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10.1136/jim-2019-WMRC.93

**Purpose of study** The WHO ranks depression and anxiety as the two largest contributors to disability globally, with over 80% of affected people living in low- and middle-income countries. However, these conditions often remain undiagnosed and undertreated in developing countries due to stigma, sociocultural variance in perceptions of mental health, and limited regionally-specific knowledge. A greater effort to describe and study mental illness beyond a Western context is much-needed. The University of British Columbia's Global Health Initiative (GHI) has a longstanding partnership with Munsel'ing Boarding School in northern India. After hearing anecdotal reports of high stress levels among students, the GHI team developed a preliminary study to screen for

depression and anxiety among adolescent students. The rationale for the study is supported by Parik *et al.*'s findings that students in Goa and Delhi experience high levels of stress due to academic pressure and other factors, and that stress is often associated with anxiety and depression (2019).

**Methods used** This cross-sectional study was carried out at Munsel'ling School in Himachal Pradesh, India. Students aged 12 or older (N=222; mean age 13.8±1.4 years and maximum age 18, 53.6% female) were assessed using the PHQ-2 and GAD-2 screening tools for depression and anxiety. PHQ-2 positive students were given the option to complete a PHQ-9.

**Summary of results** Of the 222 students screened, 12.2% (N=27) screened positive for GAD-2, and 6.3% of students (N=14) screened positive for PHQ-2. All 14 PHQ-2 positive students chose to complete the PHQ-9 questionnaire with a mean score of 9.6 (SD=4.3): 1 scored between 0–4, 6 scored between 5–9, 5 scored between 10–14, and 2 scored between 15–19. Male students reported anxiety more often than depression, and female students reported anxiety and depression equally, while the number of male and female students affected overall was even.

**Conclusions** This preliminary study suggests that depression and anxiety are experienced by students in this region. While prevalence is low, there are currently no resources available to help students manage mental health. Our team identified several areas for future research and program development, with the most important next-step being to develop more culturally-specific screening tools.

#### 94 AN ANTHROPOMETRIC ASSESSMENT OF CHILDREN UNDER 5 IN RURAL KENYA

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10.1136/jim-2019-WMRC.94

**Purpose of study** Globally, 1 in 9 people face hunger. 52 million children are wasted and 155 million have stunted growth. Pamoja, a community-based organization in the Kisumu district of rural Kenya, has programs to improve health, income and food security of its residents. In order to identify how best to design and deliver programs, Pamoja identified a need to do a baseline assessment of nutrition and food security of community households. This collaboration is a continuation of a decade-long partnership between Pamoja and the University of British Columbia Global Health Initiative.

**Methods used** Pamoja identified 434 children under age 5. Height-for-age (HAZ), weight-for-age (WAZ), and height-for-weight (HWZ) were measured to gauge stunting, underweight, and wasting, respectively. Mid-upper arm circumference (MUAC) was measured as an indicator of acute malnutrition. With written informed consent from the household head, community health workers collected anthropometric data. Supervision and the WHO training course on Child Growth Assessment were provided. Ethical approval was granted by UBC BREB and AMREF. WHO Anthro Analyzer software was utilized to calculate age-adjusted Z-scores, comparing to WHO Child Growth Reference data. Stunted, underweight, and wasted children were identified by Z-score values of ≤-2SD

(moderate) and ≤-3SD (severe) based on HAZ, WAZ, and HWZ, respectively.

**Summary of results** 62 (14.3%) children had moderately stunted growth and 40 (9.2%) had severely stunted growth. 24 (5.5%) children were moderately underweight and 24 (5.5%) were severely underweight. 20 (4.6%) children had moderately wasted growth and 13 (2.9%) had severely wasted growth. 7 children (1.6%) had MUAC measurements in the moderate to severe malnourishment range and were referred to acute medical care.

**Conclusions** The most prevalent form of malnutrition in this study population is stunting, which is typically indicative of chronic nutrient deficiency. This baseline data enables Pamoja to effectively target nutrient-deficient families and track their service delivery and impact. It is important to note that all children included in this study are beneficiaries of Pamoja. Therefore, this study population was not randomly sampled, which presents selection bias and a limitation to interpretation.

#### 95 A SURVEY-BASED METHOD OF ASSESSING FOOD INSECURITY AND DIETARY DIVERSITY IN RURAL WEST KENYA

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10.1136/jim-2019-WMRC.95

**Purpose of study** The United Nations identifies the right to food as a basic human right. However, the Kenyan government reports that 47% of their citizens are food insecure. To gain more insight into this issue, the UBC Global Health Initiative partnered with a local NGO, Pamoja, that provides community education and nutritional support to the Kisumu region of Kenya. The aim was to gather baseline assessments of household food insecurity and dietary diversity of families with children under 5 receiving nutritional support from Pamoja. The purpose was to identify families who require additional support and refer them to the appropriate Pamoja programs.

**Methods used** Community Health Workers (CHW's) identified households registered with Pamoja with children under 5 and a household head with a minimum age of 18 and fluent in Luo. Using a survey adapted from the Household Food Insecurity and Access Scale (HFIAS) and the Household Dietary Diversity Scale (HDDS), data was collected by Pamoja field officers and our team.

**Summary of results** CHW's identified and recruited 358 households. On average, household heads were 38.5 (SD 11.1) years old and 91.3% female. Analyzing the HFIAS with the Food and Agriculture Organization analysis scale indicated that 299 (83.3%) households were classified as severely food insecure in terms of food quantity. The mean score was 16.8 (±5.0) out of a maximum 27. The HDDS indicated that 15 households were severely food insecure in terms of food diversity with 15 under the score of 4 out of a maximum 15. The average score was 6.58 (±1.61).

**Conclusions** Although the HDDS suggests that many of these households are getting a decent variety of foods, the HFIAS indicates that most households are not able to access a sufficient amount of food. These results will better enable Pamoja



in the allocation of funding and programs to improve the access to sufficient nutrition, and modify the food support to vulnerable families. The study is limited due to the reporting period of the HFIAS and HDDS. HFIAS captures data from the past month and HDDS from the past day. Thus, the average longitudinal consumption of a family might not be represented. Households will be followed with surveys and growth monitoring for 5 years.

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#### THE UTILITY OF TELEDERMATOLOGY TO ENHANCE FOLLOW-UP CARE AND INFORMATION DISTRIBUTION IN LIMA, PERU

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10.1136/jim-2019-WMRC.96

**Purpose of study** With the increasing use of WhatsApp among physicians and patients, this form of communication is being adapted to improve clinical practice. The purpose of this project was to identify ways to overcome barriers to care among patients in a dermatology clinic in Lima, Peru.

**Methods used** Fifty patient interviews were conducted to better understand healthcare barriers at the Hospital Nacional Daniel Alcides Carrión in Lima, Peru. The interviews also assessed WhatsApp use and if patients would be comfortable using it to for follow-up care. In a pilot study, 10 patients were selected to receive follow-up care via WhatsApp. Over 8 weeks, patients sent in photos and concerns to a smartphone for this project. Responses were given by the chief dermatologist (EQ). To use WhatsApp for information distribution, educational materials were developed on three topics (self-medication, antibacterial soaps, and recommendations for skin products). Patients were asked about the readability and understanding of these messages. The 10 patients who completed WhatsApp follow-up care were asked about their comfort receiving dermatologic care via WhatsApp and whether they would do it again.

**Summary of results** From the patient interviews, common barriers included high cost, long travel times, and difficulty getting free time away from work or school. Seven (14%) of the 50 patients reported disabilities impacting travel. The majority (76%) of patients had smartphones capable of taking photos. From the pilot study, nine (90%) of the ten patients said they would do it again and all ranked their comfort as a 9–10 of 10. One patient did not give feedback. The response was overall positive, including comments like, ‘I want to thank you and Dr. Quijano for caring about my health. This means of communication is very useful.’

**Conclusions** In this pilot study, WhatsApp was a powerful tool that improved communication between physicians and patients, especially those who had difficulty attending in-person appointments. The hospital plans to continue using this method. In the future, we plan to compare outcomes in patients who receive follow-up via routine clinic visit or via WhatsApp. If outcomes are similar, WhatsApp could potentially provide a method to improve care for more patients.

## Global health II

### Concurrent session

3:15 PM

Thursday, January 23, 2020

97

#### IMPROVING UNDERSTANDING OF THE BURDEN OF TRAUMATIC INJURIES THROUGH TRAUMA REGISTRIES IN LIMA, PERU

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10.1136/jim-2019-WMRC.97

**Purpose of study** Trauma registries are databases that can be used to better understand the burden of trauma within a population. Data can be used to implement quality improvement projects, inform local policies, and develop targeted preventative health measures. Staff at Hospital de Vitarte in Lima have spent 13 months using a trauma registry, though much of their data is missing or incomplete. The goal of this project was to examine the process of data collection and entry and propose solutions to improve data quality.

**Methods used** Preliminary data were presented to hospital staff to illustrate current gaps. Meetings were held to gather feedback on how to improve data entry processes. Inclusion criteria were defined and will be posted on the wall of the department. A new paper intake form was created and a schedule was developed for interns to digitize intake forms. A training workshop was developed for and delivered to residents and interns. Training materials were left with staff for future workshops. Finally, a patient education pamphlet on pedestrian, bicycle, and automobile safety was developed for distribution after data analysis identified a high burden of traffic accident-related trauma.

**Summary of results** A total of 19 residents and interns were trained in the use of trauma registries and the new paper intake form. In a post-workshop survey, 90% of respondents indicated agreement that trauma registries are important tools for improving outcomes in trauma patients. Additionally, 84% of participants agreed that the new paper entry form would improve data quality and 79% thought that the new form would ease the process of online data entry. The Director of the Trauma Quality Committee of the Society of General Surgeons of Peru is seeking approval through that society and the Panamerican Trauma Society to distribute the patient education pamphlet as part of a larger public health campaign.

**Conclusions** This project led to the implementation of specific strategies for data quality improvement, including changes to the paper intake form, well-defined inclusion criteria, and weekly data upload and revisions. Additional funding and resources including dedicated administrative staff are needed to improve data entry and inform injury prevention strategies to reduce morbidity and mortality in trauma patients.

98 **IMPROVING HAND HYGIENE IN THE PEDIATRICS DEPARTMENT OF THE REGIONAL HOSPITAL OF LORETO, PERU**

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10.1136/jim-2019-WMRC.98

**Purpose of study** The pediatrics department of the Regional Hospital of Loreto has had 163 nosocomial infections reported in the last 5 years, and hand hygiene is an effective and inexpensive intervention to decrease interpersonal spread of microbes. This project aimed to improve hand hygiene through increased access to resources, reminders, and educational materials.

**Methods used** An initial assessment of the availability of hand hygiene resources and of staff and family hand hygiene compliance was performed. Together with quality control and pediatrics department staff, I worked to increase access to hand hygiene materials; place WHO reminders and education materials for hand hygiene in patient rooms, bathrooms, and sinks; and evaluate technique, compliance, and barriers to proper hand hygiene among staff and families and provide performance feedback. We provided a final written report of the department's hand hygiene compliance status and recommendations for improvement to the office of quality control.

**Summary of results** The initial assessment identified a lack of hand hygiene resources throughout the department and low sanitation standards among personnel and patient families. Barriers to hand hygiene voiced by hospital staff included lack of resources, inconvenience from washing or dislike of hand sanitizer, and preferring to simply wear gloves. By the project's end, all rooms were equipped with WHO hand hygiene educational materials and hand sanitizer, and bathrooms and sinks were equipped with soap and WHO educational materials. Most personnel demonstrated proper knowledge of technique, but few knew the WHO 5 moments when hand hygiene is indicated. Staff that were in the habit of cleaning their hands appreciated and utilized the increased access to hand hygiene materials and reported that they now more frequently clean their hands. Most families evaluated utilized the hygiene resources but there was large variability in hygiene knowledge and habits.

**Conclusions** Improving hand hygiene of personnel in the pediatrics department of HRL will be dependent on maintaining hygiene resources and overseeing hand hygiene compliance. Families of patients should be educated on proper hand hygiene (instructional posters on walls and in bathrooms or direct teaching) and provided with enough resources and functioning bathroom sinks.

99 **GROWTH ASSESSMENT OF INFANTS ADMITTED TO A GOVERNMENT HOSPITAL NEWBORN UNIT IN NAKURU, KENYA**

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10.1136/jim-2019-WMRC.99

**Purpose of study** Inadequate nutrition remains a leading cause of growth failure in neonates, especially those born

preterm or critically ill. Previously, members of this research team implemented a respiratory intervention in the newborn unit in a government hospital in Nakuru, Kenya. Infant growth failure in the unit was suspected based on clinical observation. The purpose of this study is to quantify growth velocity and weight z-score changes for infants in a Kenyan newborn unit from birth to hospital discharge.

**Methods used** After ethical approval, data was collected from the hospital charts of Kenyan infants (n=704) admitted to a newborn unit between June 2016 to December 2018. Collected information included birth gestational age (GA), birth weight, discharge weight, length of hospital stay (LOS) in days, and z-scores for weight on the INTERGROWTH 21st growth chart. Infant growth velocity was calculated as follows:  $1,000 \times \ln(\text{discharge weight}/\text{birth weight})/\text{LOS}$ . Averages are reported in means. A t-test compared growth velocity and z-score changes from birth to discharge between infants with LOS  $\leq 14$  days vs.  $> 14$  days. Regression analysis predicted weight z-score change based on LOS. A p-value  $< 0.05$  was statistically significant.

**Summary of results** 283/704 (40.1%) infants were born  $\leq 36$  weeks GA. Mean birth GA was  $36 \pm 6$  weeks with weight 2.61 kilograms (kg) (z-score -0.024). Mean LOS was 7.4 days with discharge weight 2.54 kg (z-score -0.855). Infants with LOS  $> 14$  days (mean 24 days) experienced more growth failure than infants with LOS  $\leq 14$  days (mean 4 days) with change in z-score -1.66 vs. -0.64 (p $< 0.001$ ). Growth velocity of infants with LOS  $> 14$  days was low at 4.7 grams/kg/day, with each day of hospitalization predicting a -0.044 decrease in weight z-score (p $< 0.001$ ).

**Conclusions** Infants admitted to a newborn unit in a government hospital in Nakuru, Kenya experience growth rates that are inadequate to meet recommended growth velocities by the World Health Organization. Longer lengths of hospital stay contribute to decreases in weight z-score and an increased risk of malnutrition. Additional assessment and intervention is needed to promote improved nutrition provision and growth rates of these infants.

100 **ADDRESSING PNEUMONIA MISCONCEPTIONS AND PREVENTION IN CHILDREN UNDER FIVE IN KARIGITA, KENYA**

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10.1136/jim-2019-WMRC.100

**Purpose of study** Pneumonia rates in Naivasha sub-county have doubled in the last 5 years, with a large percentage of cases admitted to Naivasha Community District Hospital (NCDH) coming from the Karigita community. Current research reports the changing nature of pneumonia to predominantly viral causes in response to effective bacterial vaccination and lack of attention placed on primary prevention. Professional Community Health Education Workers (CHEW) proposed training Community Health Volunteers (CHV) to educate households during work for ongoing projects.

**Methods used** Building on ongoing local research, public health projects, and based on Kenyan and international guidelines, a training was developed to cover pneumonia-

related misconceptions and preventative methods. Ongoing public health interventions already address immunization, indoor pollution, and hygiene to prevent diarrheal diseases, so emphasis was placed on incorporating cough hygiene, addressing misconceptions about pneumonia, educating about prompt care-seeking, avoiding antibiotic misuse, and promoting exclusive breastfeeding for 6 months. CHVs participated in a 1-hour educational session with facilitated discussion and pre/post-knowledge-based assessments. A 2-month follow up and data tracking of pneumonia cases will be used to assess the quality of the training and its impact on the community.

**Summary of results** Thirty CHVs participated in this educational session, with the assistance of the Ministry of Health Public Health Branch, NCDH, and NIH funded research. The pre to post-test knowledge assessment score increased over 80% from 4/30 to 29/30. Continued education on pneumonia prevention is ongoing within Karigita and neighboring communities as a direct result of a successful educational session. A digital media for more efficient sharing, storage, and access was suggested and a readily accepted alternative to printed educational material.

**Conclusions** Participating CHVs benefited from an increase in knowledge-base and were actively engaged in discussions to address methods of sensitizing the community and implementing change in cultural practices. The integrative scope of the project and the session's engaging atmosphere generated opportunities to collaborate with ongoing research and set-up additional workshops addressing community needs.

### 101 ASSESSING THE IMPACT OF NEWBORN CARE TRAINING IN RURAL INDIA

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10.1136/jim-2019-WMRC.101

**Purpose of study** Newborn mortality in low resource settings shows only modest improvement despite investments in newborn health programs. In India, newborn mortality is reported as 32 per 1000 live births, with the majority of deaths due to birth asphyxia, low birth weight, and infections. These conditions are treatable if identified and managed early. The purpose of this study is to report on the quality of newborn care by healthcare providers in a community hospital in rural India following educational and QI interventions and to identify barriers to care delivery.

**Methods used** The study took place at Mota Fofalia Community Health Center in rural Gujarat, India. Between 2015–2018, educational and QI interventions were provided to the staff. This study reports on changes in care quality over time. We measured the quality of healthcare delivery through direct observation of care by local providers, using a standardized, validated checklist, which was based on WHO best practice guidelines for newborn care. The checklist includes care practices for routine neonatal care, care for low birth weight infants, and the appropriate discharge of infants. We also performed a qualitative analysis of care delivery to identify barriers to the delivery of care and areas for improvement regarding personnel, equipment, and health system structure.

**Summary of results** At baseline (2014), healthcare providers did not appropriately identify neonates as low birth weight (LBW) (0%, n26) and did not regularly provide appropriate inpatient monitoring (daily check of temperature, heart rate, respiratory rate) (0%, n138).

Postintervention analysis (2019) data show that training gradually impacted obtaining and recording regular weight values. 67% of neonates (14/21) were appropriately identified as high-risk LBW infants at birth, and 48% of LBW patients were appropriately discharged (>1800 g, feeding well, 10/21); appropriateness of daily newborn assessment, including vital signs, improved to only 20% (9/44). Significant barriers to care quality include a lack of adequate personnel and the availability of functional equipment staff feels confident using.

**Conclusions** Despite educational and QI interventions, improvement in newborn care quality remains modest. Additional system strengthening interventions are needed.

### 102 IMPROVING KNOWLEDGE ACQUISITION OF RURAL HEALTHCARE PROVIDERS IN ESSENTIAL NEWBORN CARE IN NEPAL

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10.1136/jim-2019-WMRC.102

**Purpose of study** Nepal ranks 148th out of 193 countries for neonatal mortality. Limited access to birthing facilities and training for healthcare providers pose barriers to improving outcomes. Many mountain villages rely on healthcare assistants (HA's) for medical care, including child-birth. HA's are lay-people with approximately 3 months of formal education and little to no emphasis on neonatal care, providing opportunity for educational intervention. With this study we sought to measure knowledge acquisition of health providers in the mountainous Humla district of North West Nepal in core tenets of newborn care, following standardized training interventions designed for low resource settings.

**Methods used** To improve fundamental knowledge in newborn care, HA's were trained by Nepali public health workers using the AAP's Helping Babies Breathe (HBB) and Essential Care for Small Babies (ECSB) curricula in Fall, 2018. To evaluate content acquisition, knowledge tests for each curriculum (HBB and ECSB) were given before and after the 3 day training sessions. Scores from pre and post tests were compared for improvement using one-tailed paired t-test of means with alpha of 0.05.

**Summary of results** For HBB, 11 HA's and 1 physician completed training and evaluation (n=12). There was a significant improvement in average scores before (M=0.715, SD=0.247) and after (M=0.938, SD=0.064) training (paired t(11)=-3.4, p<0.003). For the ECEB and ECSB, 10 HA's completed the course and evaluations (n=10). There was a significant improvement in scores from before (M=0.676, SD=0.081) to after training (M=0.773, SD=0.088) (paired t(9)=-2.2, p=0.03).

**Conclusions** Our study demonstrates educational interventions with HBB, ECSB curricula for healthcare assistants in Nepal significantly increases knowledge acquisition of essential neonatal care. This study is limited by a small sample size from a single center and does not assess neonatal outcomes based on

the educational intervention. Further studies will be required to assess retention of knowledge and clinical translation to neonatal outcomes following educational interventions with HBB, ECSB curricula.

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### VECTOR HOST PREFERENCE OF SCHISTOSOME PARASITES IN KENYA

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10.1136/jim-2019-WMRC.103

**Purpose of study** Schistosome parasites cause a chronic inflammatory disease in humans. Past evidence suggests that these parasites can detect macromolecules of their snail vector hosts; however, it is unclear if they can differentiate among potential hosts. Understanding host seeking behavior could lead to novel control strategies to prevent human infection.

**Methods used** Using wild strains of African snails and parasites, we tested the hypothesis that parasites are attracted to the most susceptible host. We tested attraction to three snail species: *Biomphalaria sudanica* (BS), *B. choanomphala* (BC), and *B. pfeifferi* (BP) using choice chamber experiments in which parasites could orient toward a given snail stimulus. Attractiveness was assessed visually via microscopy by counting parasites that moved into each chamber toward stimuli.

**Summary of results** Analysis indicated that miracidia were significantly more attracted to snail-incubated chambers compared to empty control chambers, indicating an attraction to all three snail species. In pairwise comparisons, we found that in some cases, the parasites were significantly attracted to the more susceptible species (BC v. BS), but in others, there was no significant difference (BS v. BP). Finally, we found a significant aversion of parasites to snails already infected with a parasite that preys on schistosome larvae within the snail, suggesting that the schistosome parasites can actively detect and avoid these predators.

**Conclusions** The results of these experiments indicate that schistosomes use chemical signals to find hosts, and in some cases can differentiate signals to orient toward a host that will maximize their chance of successful establishment.

## Hematology and oncology I

### Concurrent session

3:15 PM

Thursday, January 23, 2020

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### COMPARISON OF PSEUDOPROGRESSION IN GLIOMA PATIENTS FOLLOWING PROTON VERSUS PHOTON THERAPY

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10.1136/jim-2019-WMRC.104

**Purpose of study** Following radiation for glioma, new enhancements on MRI present a challenge in differentiating recurrent tumor and radiation-induced lesions, termed pseudoprogression (Ps). Criteria have been outlined to diagnose Ps after photon radiation by the Radiologic Assessment in Neuro-Oncology (RANO) group based on time and location of occurrence. Some patients receiving protons manifest changes that seem subjectively different in appearance, location and timing from photon Ps, and would be identified as recurrence. We retrospectively review post-treatment MRI changes of proton patients and compare the Ps seen after photon radiation. We propose a criterion to characterize proton pseudoprogression (PRoPs) distinct from photon.

**Methods used** Post-treatment imaging of patients with gliomas were reviewed, along with clinical and pathological data. 74 proton patients were reviewed for the presence of PRoPs, and then 64 photon patients were reviewed for any matching imaging changes. Data collected included the location, timing, and morphology of the imaging change, tumor grade, molecular subtyping and chemotherapy received.

**Summary of results** Thirteen patients (16%) received protons and had imaging changes unique to treatment with protons, which we term PRoPs (Pronon Pseudoprogression). We established the following criteria to characterize PRoPs: located not immediately in or adjacent to the resection cavity or residual tumor; located ~ 2 cm from target opposite proton beam entry; asymptomatic (unless simultaneous disease progression is also occurring); resolves without treatment, and some combination of subjectively multifocal, patchy, small (<1 cm). In the comparison group receiving photon, 0 had changes that met our criteria for PRoPs (p=0.001). The mean time when PRoPs occurred was 16.2 months after radiation.

**Conclusions** Patients who receive protons are subject to a unique subtype of Ps that can mimic tumor progression. ProPs can possibly be explained by the increased Relative Biological Effectiveness (RBE) of protons and beam angle selection. Current RANO guidelines would inaccurately characterize ProPs as tumor progression. Using the radiation oncology treatment plan can help confirm the nature of the enhancement and prevent unnecessary treatment for mistaken tumor progression.

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### CRISPR-CAS9-BASED REACTIVATION OF A DORMANT TUMOR SUPPRESSOR GENE *CDKN2A* INHIBITS PROLIFERATION OF SKIN CANCER CELLS

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10.1136/jim-2019-WMRC.105

**Purpose of study** Cutaneous squamous cell carcinoma (cSCC) is the second most common cancer in the United States and is often lethal with no reliable treatment when metastasized. It frequently manifests with inactivation of tumor suppressor gene *CDKN2A*, which encodes key cell cycle regulator p16<sup>INK4A</sup>. In cSCC, loss of p16<sup>INK4A</sup> expression is often due to epigenetic changes rather than genetic changes and may lead to progression and metastasis of this cancer. We investigated whether p16<sup>INK4A</sup> transcriptional suppression can be reversed by CRISPR-Cas9-based methods and whether targeted

transcriptional reactivation of  $p16^{INK4A}$  can inhibit cell proliferation in cSCC.

**Methods used** We transduced cSCC cell line A431 with lentivirus containing nuclease-deactivated Cas9 (dCas9) fused to the catalytic domain of histone acetyltransferase p300 (dCas9-p300), which catalyzes acetylation of histone H3 at lysine 27 (H3K27ac). Alternatively, we transduced A431 with lentivirus containing dCas9 fused to transcriptional activator VP64 (dCas9-VP64). After drug selection to enrich transduced cells, we performed a second lentiviral transduction to introduce guide RNA (gRNA) directing dCas9 fusion proteins to the  $p16^{INK4A}$  promoter within the *CDKN2A* locus. After one week of further drug selection, we collected these cells and measured  $p16^{INK4A}$  mRNA expression (RT-qPCR) and cell proliferation (Cell Counting Kit-8).

**Summary of results** RT-qPCR revealed that dCas9-p300 and dCas9-VP64, each with gRNA targeting the  $p16^{INK4A}$  promoter within the *CDKN2A* locus, increased  $p16^{INK4A}$  mRNA expression in A431 cells ~30–40-fold relative to untransduced cells. Both dCas9-p300 and dCas9-VP64 targeting the  $p16^{INK4A}$  promoter reduced cell proliferation by ~20–30%. Increased  $p16^{INK4A}$  expression correlated with decreased cell proliferation in these modified cells.

**Conclusions** This study demonstrates that *CDKN2A* can be upregulated by targeted epigenetic modification or transcriptional activation, leading to inhibited cell proliferation. Future investigation will determine the kinetics, robustness, and off-target effects of targeted transcriptional reactivation tools. Targeted epigenome editing of cancer-relevant genes will be a versatile basis for precision anticancer therapies.

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#### IDENTIFICATION OF TARGETABLE VULNERABILITIES INDUCED BY TYPE I INTERFERON SIGNALING IN PANCREATIC DUCTAL ADENOCARCINOMA

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10.1136/jim-2019-WMRC.106

**Purpose of study** Pancreatic ductal adenocarcinoma (PDAC) is an aggressive and intractable form of pancreatic cancer, due both to poor detection strategies and resistance to available therapies. One characteristic feature of PDAC is a pro-inflammatory tumor microenvironment with high levels of type I interferons (IFN), such as IFN $\beta$ . This study aimed to determine the effects of type I IFNs on PDAC cell signaling and metabolism and also aimed to identify novel targetable vulnerabilities within these pathways.

**Methods used** Global and targeted metabolic profiling assays were performed via nLC-MS to comprehensively characterize the effects of IFN $\beta$  on PDAC cell metabolism. Targetable dependencies of IFN signaling were determined via integrated analysis of global phosphoproteomic changes and a high-throughput viability screen of protein kinase inhibitors. A panel of cell lines representative of the phenotypic heterogeneity of PDAC was used to confirm metabolomic and phosphoproteomic findings as well as the observed therapeutic synergy between high-scoring protein kinase inhibitors and IFN $\beta$ . A novel genetic PDAC model with inducible autocrine type I IFN signaling was developed for *in vivo* studies.

**Summary of results** Type I IFN signaling induced the replication stress response via activation of the kinase Ataxia Telangiectasia and Rad3-related protein (ATR) and its downstream substrate, checkpoint kinase 1 (CHEK1). Type I IFN exposure also resulted in nucleotide insufficiency, a well-established trigger for the replication stress response. PDAC cell lines with high type I IFN signaling were more sensitive to ATR inhibition (ATRi), as IFN $\beta$  and ATRi were synergistic in causing S-phase arrest, inhibition of cell proliferation, and nucleotide insufficiency. These effects were replicated *in vivo*, as ATRi was effective in reducing the growth of orthotopic PDAC tumors with high type I IFN signaling.

**Conclusions** Our findings show ATR inhibition, which is intensively studied in phase I/II clinical trials for cancer treatment, is a promising therapeutic approach for PDAC tumors with high type I IFN signaling.

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#### DELIVERY OF ADJUVANTS WITH C3-TARGETING LIPOSOMES LEADS TO MYELOID CELL ACTIVATION FOR CANCER IMMUNOTHERAPY

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10.1136/jim-2019-WMRC.107

**Purpose of study** Cancer immunotherapy treatments have gained much popularity recently, with many different pathways being targeted, including toll-like receptors (TLRs). These receptors have been implicated in tumor suppression via cytokine stimulation and as such, TLR agonists have shown promise in promoting tumor reduction in several cancer models. One such successful model is by use of liposomes to deliver these agonists. There is a lack of data, however, on what the exact mechanism is by which these TLR agonists are affecting tumors, which is important for understanding their safety and efficacy.

**Methods used** In healthy C57BL/6 mice, bone marrow cells were treated *in vitro* and then underwent qPCR to determine gene expression for specific cytokines. Treatments included PBS, naked control and C3 liposomes, and control and C3 liposomes with TLR agonists encapsulated. In BALB/c mice with breast cancer, an identical method was used for obtaining PCR data, but treatments differed. These treatments were PBS, control and C3 liposomes with free TLR agonists, and control and C3 liposomes with TLR agonists encapsulated. The TLR agonists utilized were MPLA, CpG, and R848, and the genes examined included IL-1 $\beta$ , IL-6, TGF- $\beta$ 1, IP-10, and IRF-7.

**Summary of results** In the C57BL/6 mouse, there was a significant increase in expression in the C3 with TLR agonist group for IL-1 $\beta$ , IL-6, IP-10, and IRF-7. Also, TGF- $\beta$ 1 expression was significantly reduced in TLR agonist encapsulated groups when compared to PBS. In the BALB/c mouse, the control and C3 with encapsulated agonist did show increased IL-6 expression, and these two groups along with the C3 and free agonist group showed increased IRF-7 expression. For IL-1 $\beta$  and IP-10, the four treatment groups did show increased expression compared to PBS.

**Conclusions** In the C57BL/6 mouse, delivering TLR agonists via a C3 liposome showed increased expression of anti-tumor cytokines, as well as decreased expression of TGF- $\beta$ 1, a pro-

tumor cytokine, elucidating how these agonists work. In the BALB/c mouse, each treatment group showed increased expression for anti-tumor cytokines. The C3 liposome may not have been as effective in this environment due to cytokine saturation; more research is needed.

### 108 RADIOGENOMIC MODEL FOR DETECTING PROSTATE CANCER

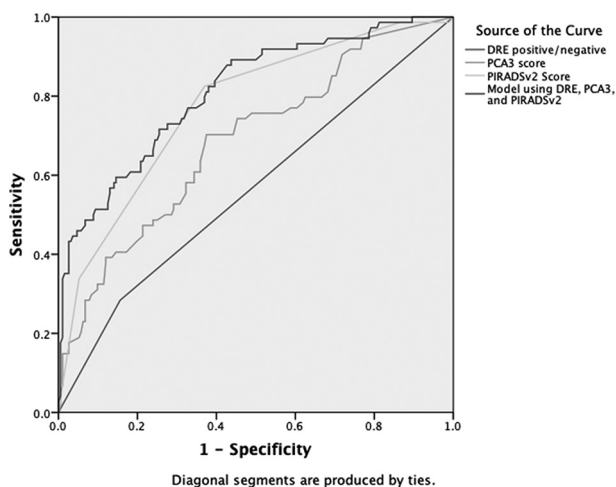
<sup>1</sup>N Oune\*, <sup>2</sup>MT Nguyentat, <sup>1</sup>A Sasani, <sup>1</sup>P Bhattar, <sup>1</sup>C Chahine, <sup>1</sup>PA Kohanteb, <sup>1</sup>J Glavis-Bloom, <sup>1</sup>E Uchio, <sup>1</sup>R Houshyar. <sup>1</sup>University of California Irvine Medical Center, Orange, CA; <sup>2</sup>University of Colorado Anschutz Medical Campus, Aurora, CO

10.1136/jim-2019-WMRC.108

**Purpose of study** Multiparametric MRI (mpMRI) utilizing Prostate Imaging Reporting and Data System version 2 (PI-RADSv2) can accurately detect prostate cancer (PCa). Genomic data shows overexpression of Prostate Cancer Gene 3 (PCA3) in patients with PCa. However, no studies integrate these 2 indices. We propose a radiogenomic model amalgamating PCA mpMRI and PCA3 to predict clinically significant PCa (csPCa).

**Methods used** 147 consecutive patients who underwent digital rectal exam, PCA3 testing, prostate mpMRI, and MRI/TRUS Fusion Biopsy were included. PI-RADSv2 criteria was utilized for mpMRI. csPCa was defined as Gleason Score  $\geq 7$ . Logistic regression, odds ratio (OR), and Area Under the Curve (AUC) were performed for correlation and accuracy.

**Summary of results** For a total of 266 lesions we included 3 independent predictors of csPCA: PIRADSv2 (OR 3.9, 95% CI 2.5–6.0), DRE (OR 2.6, 95% CI 1.2–5.5), and PCA3 (OR 1.0, 95% CI 1.0–1.0). The specificity, negative predictive value (PV), sensitivity, and positive PV achieved were 91%, 82%, 50%, and 31%, respectively. Our model's AUC (0.81, 95% CI 0.75–0.87) was greater than that of PIRADSv2 (0.77, 95% CI 0.71–0.84), PCA3 (0.69, 95% CI 0.61–0.76), and DRE (0.56, 95% CI 0.48–0.64) alone.



Abstract 108 Figure 1 ROC curve

**Conclusions** A combined PCA3 and mpMRI radiogenomic model demonstrates improved AUC for predicting csPCa. Applying this model in clinical practice may decrease unnecessary biopsies and reduce cost and morbidity.

### 109 ACTIVATION OF PROTEASOME BY INHIBITING AUTOPHAGY IN CORNEAL EPITHELIAL CELLS WITH LIMBAL STEM CELL DEFICIENCY

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10.1136/jim-2019-WMRC.109

**Purpose of study** Previously, failure of UPP (Ubiquitin Proteasome Pathway) was found associated with an activation of autophagy in corneal epithelial cells with limbal stem cell deficiency (LSCD). However, autophagy activation does not remove damaged, aggregated proteins such as keratins (K4 and K13). The present hypothesis proposes that UPP activation might increase the clearance of misfolded proteins including K4 and K13, improving corneal epithelial cell function.

**Methods used** Rabbits with surgically-induced LSCD were used to quantify the elements of both pathways in corneal epithelial cells (CEC). Rabbit oral mucosa epithelial cells (OMECS) as, similar to conjunctival epithelial cells, are rich in K4 and K13. OMECS were isolated, cultured and treated with proteasome inhibitors and chloroquine to inhibit autophagy. Morphologic analysis of corneal tissue sections showed that both pathways stained positive in normal corneal epithelium.

**Summary of results** While constitutive proteasome beta subunits B1, B2 and B5 were decreased, autophagy biomarkers – ATG5 and MAPLC3B, were significantly increased in LSCD-CEC. However, despite autophagy up regulation, modified K4 and K13 still deposited and accumulated in LSCD-CEC without clearance. Proteasome inhibition in OMECS also showed a significant increase in ATG12, ATG5 and MAPLC3, confirming our observation that when UPP is defective, autophagy is stimulated. Additionally, when autophagy was inhibited in OMECS using chloroquine, our results showed not only an increase in proteasome chymotrypsin-like activity, but also a significant decrease in unmodified K4 and K13 levels with no keratin high molecular weight deposition.

**Conclusions** Proteasome activation in the ocular surface could be used to alleviate corneal epithelial cell dysfunction associated with LSCD.

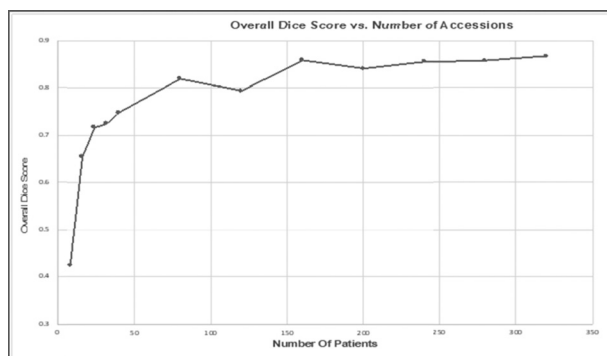
### 110 DEEP LEARNING FOR PROSTATE SEGMENTATION: CASE VOLUME AND PERFORMANCE

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10.1136/jim-2019-WMRC.110

**Purpose of study** Deep learning analysis of medical images is a data hungry challenge. However, few studies have systematically calculated the ideal number needed to balance training and performance. Here, we examine this question through quantifying the neural network (NN) performance of prostate organ segmentation against the number of samples.

**Methods used** This IRB approved retrospective review includes patients who had a prostate mpMRI between 9/2014 and 8/2018 and a MR-guided transrectal biopsy. A board-certified abdominal radiologist manually segmented each prostate organ on the T2 weighted images (T2WI). This study used our



**Abstract 110 Figure 1** Overall dice score vs. number of accessions. The overall dice score had its best performance of 0.867 at 320 patients. The biggest increase in performance occurred when increasing patient size from 10 patients to 20 patients. The performance started to plateau at 160 patients.

customized Hybrid 3D/2D U-Net architecture and kept the same hyperparameters across the different NN runs. A total of 400 patients were available for training and validation. This study only changed the number of accessions fed into the NN and overall dice score was calculated with these patient numbers: 8, 16, 24, 32, 40, 80, 120, 160, 200, 240, 280, 320. During validation, the maximum number of available patients was used for the overall dice score calculation i. e. when the NN trained in 40 patients, the validation was completed on 360 patients.

**Summary of results** This study used 400 patients' T2WI. The overall dice score varied from 0.424 with 8 patients to 0.867 with 320 patients with 0.800 reached at 80 patients (figure 1).

**Conclusions** The Hybrid 3D/2D U-Net for prostate segmentation produced the highest overall dice score of 0.867 at 320 patients. The performance improved most significantly when the patient number changed from 8 to 16, and it started to plateau at 160 patients. The performance only improved by 0.09 from 160 to 320 patients.

#### 111 VETTING THE QUALITY OF AVAILABLE ONLINE INFORMATION FOR PATIENTS WITH GLIOMA

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10.1136/jim-2019-WMRC.111

**Purpose of study** The internet has become an invaluable source of information, both easily accessible and widely used. However, the quality of information online cannot be guaranteed. Glioma is the most common of all CNS neoplasms, yet little work has been done to explore the extent and quality of information online. Physicians must be aware of available online information to identify errors and gaps to better guide their patients' self-directed glioma research.

**Methods used** The term 'glioma' was searched in Google and the meta-search engines Dogpile and Yippy, resulting in over 12.5 million hits. The top 100 websites averaged from these three search engines relating to patient information were analyzed using a structured rating tool. The websites were assessed based on affiliations, accountability, interactivity, site organization, readability, and content quality.

**Summary of results** In assessing the top 100 websites on glioma, it was found that 53% of the websites were commercial, and 7% of the websites were affiliated with an academic institute. Less than half of the websites provided authorship (40%) and cited sources (48%). About half (52%) stated the date of website creation, but only 38% of the websites identified dates of modification to content. A total of 26% of the websites had been updated within the last two years, with 66% of the websites last updated over four years ago. The majority of websites provided users with an in-site search engine as an interactive tool (86%), however, only 12% provided a discussion board or forum. In assessing readability, only 5% of the websites were readable at a level below grade 8 (elementary level). Almost all websites covered definition (91%) and treatment (92%), but very few of the websites covered prevention (4%). A total of 4% of the websites covering definition, and 4% covering treatment, provided inaccurate information.

**Conclusions** Analysis of the top 100 websites relating to glioma revealed there is a lack of current and understandable information available to patients online. A lot of the information available is not reliable due to a lack of cited author (s) and sources. Although the majority of sites covered definition and treatment of glioma, many other topics were poorly covered, including etiology/risk factors, prevention, and prognosis.

#### 112 CUTANEOUS METASTASIS OF UROTHELIAL CARCINOMA RESULTING IN VASCULAR OCCLUSION AND LIVEDO RACEMOSA

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10.1136/jim-2019-WMRC.112

**Introduction** A skin metastasis can be the first sign of an underlying visceral neoplasm and clinical presentation can be highly variable, making clinical diagnosis of these metastases challenging. Follow up investigations are often required to establish the location of the primary. Cutaneous metastases are a known but uncommon manifestation of urothelial carcinoma.

Livedo reticularis is physical sign of the skin which presents as a net-like pattern consisting of macular, violaceous rings. Livedo racemosa is a pathologic form of livedo reticularis which is often associated with vaso-occlusive disorders. Both livedo reticularis and livedo racemosa arise secondary to dilation of the skin's venous plexus which may be due to vasospasm, vasculopathy, or coagulopathy. Few cases of livedo reticularis or racemosa related to malignancy have been reported in literature and none describe vascular obstruction by tumor thrombus as the source of livedoid pattern.

**Case report** In this report, we describe an 82-year-old male with a history of urothelial carcinoma who presented to clinic with multiple, erythematous nodules in his right groin and a livedo-reticularis-like rash covering the anterior surface of his right thigh. Biopsies were taken from nodules in the right groin and livedoid patches on the right thigh. Those taken from nodules in the right groin were positive for cytokeratin 7 (CK7) and cytokeratin 20 (CK20), consistent with the original pathology report that diagnosed urothelial carcinoma and metastatic deposits in a right-groin lymph node. Biopsies taken

from livedoid patches on the right thigh were also CK7+/CK20+; but more remarkably, microscopic investigation of the tissue and staining with endothelial cell markers CD31 and CD34 showed intravascular tumor thrombus as the source of vascular occlusion causing the livedoid pattern.

**Implications** This case report discusses the rare occurrence of cutaneous metastases of urothelial carcinoma and the novel finding of intravascular occlusion by metastatic carcinoma as the cause of livedo racemosa.

### 113 TWO CASES OF LOCUS MINORIS RESISTENTIAE IN CANCER METASTASIS

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10.1136/jim-2019-WMRC.113

**Purpose of study** Locus Minoris Resistentiae is a phenomenon in which previously damaged tissue is less resistant to microorganisms. This is noted to occur in infectious processes but has not been well documented in the setting of cancer metastasis. These cases demonstrate the potential of metastatic preference in cancer to previous areas of tissue compromise with less resistance than other healthier locations in the body.

**Methods used** Retrospective case reports.

**Summary of results** Case 1: Patient is a 63-year-old female diagnosed with Stage IVA serous carcinoma of the ovary with a history significant for prior breast augmentation. Initial diagnosis was made after presenting to the emergency department complaining of shortness of breath. A CT of the chest demonstrated a 16 × 14 × 16 cm pelvic mass and right sided pleural effusion. Thoracentesis identified malignant ovarian cancer cells. The patient underwent surgical debulking and completed eight cycles of chemotherapy. On physical exam after surgical debridement, it was noted the scar on the right breast from the breast implant procedure was distorted and hard. Further evaluation showed metastatic ovarian cancer in the surgical scar. After chemotherapy completion, she was started on maintenance therapy with Avastin due to increased tracer uptake was noted.

Case 2: Patient is a 56-year-old male initially diagnosed with prostate adenocarcinoma Stage II and history significant for a previous back injury to the L4 vertebrae. Initial treatment included 15 cycles of radiation along with Lupron Depot and Casodex for 3 months. Due to the side effects on the Lupron, the patient discontinued the Lupron with close follow up of PSA levels to monitor for recurrence. Nine months after stopping the Lupron, his PSA levels began to increase and the patient began to experience worsening back pain. An MRI of the spine was obtained due to the back pain which demonstrated potential prostate cancer recurrence with metastatic lesions noted at the L4 vertebrae.

**Conclusions** Locus Minoris Resistentiae is important to understand in the setting of metastatic cancer. Identifying areas of previous tissue compromise might lead to earlier identification of metastatic disease. This could potentially lead to earlier and more effective treatment and management of such cases.

## Neonatology general II

### Concurrent session

3:15 PM

Thursday, January 23, 2020

### 114 IMPLEMENTAION OF EAT, SLEEP, CONSOLE AS PRIMARY TREATMENT FOR NEONATAL ABSTINENCE SYNDROME (NAS) IN A LEVEL IV NICU

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10.1136/jim-2019-WMRC.114

**Purpose of study** The aim of our project was to implement the Eat-Sleep-Console (ESC) approach for infants admitted with NAS to our Level 4 NICU, and improve outcomes defined as a reduction of average length of stay (LOS) by at least 50% and a reduction in morphine exposure by 50%.

**Methods used** ESC training was provided to NICU nursing staff. NAS babies were assessed for their ability to coordinate or sustain feeding, sleep for > than 1 hour, and be consoled within 10 minutes. Infants abilities to accomplish these physiologic outcomes guided pharmacologic and non-pharmacologic interventions. Non-pharmacologic interventions were prioritized and pharmacologic treatment using morphine or clonidine was provided when necessary.

Medical records for NAS babies born 2019–2020 were reviewed for type of in utero drug exposure, length of hospital stay, opioid treatment days, hours held by volunteers, discharge disposition, and readmission rates. Our NICU baseline retrospective data from 2015–2018 was obtained from the Children's Hospitals Neonatal Consortium database for comparison. Infants who were premature (<33w GA), on iNO, or on HFOV were excluded. All data was de-identified and was compared using a two-sample t test.

**Summary of results** A total of 12 infants were enrolled in our study from January to August of 2019. A total of 29 infants were used for comparison using our retrospective data from 2015–2018. The mean length of stay at our institution for babies with a primary diagnosis of NAS decreased from 29.8 days to 10.3 days, a reduction of 65%, with a p value of 0.002. Morphine exposure days, defined as a 24 hour period during which an infant received morphine, decreased from a mean of 24.2 days to 0.42 days, a reduction of 98%. We recorded an average of 27.7 hours per infant of volunteer cuddling. 11/12 of our infants were placed in foster care following discharge.

**Conclusions** Our project displays that the Eat, Sleep, Console approach is an effective option even for patients admitted to a high acuity level IV NICU without a mother present to provide care. With the use of ESC in addition to adjunctive approaches such as volunteer cuddlers and automated smart sleeper beds, we were able to significantly decrease the length of stay and morphine exposure of patients in our unit admitted with NAS.



**115 UTILIZATION OF FUNCTIONAL ECHOCARDIOGRAPHY AND NEAR-INFRARED SPECTROSCOPY TO CHARACTERIZE DUCTAL HEMODYNAMICS IN THE PREMATURE NEONATE**

M Ringle\*, VY Chock, K Stauffer, L Lopez, R Punn, S Bhombal. *Stanford University, Palo Alto, CA*

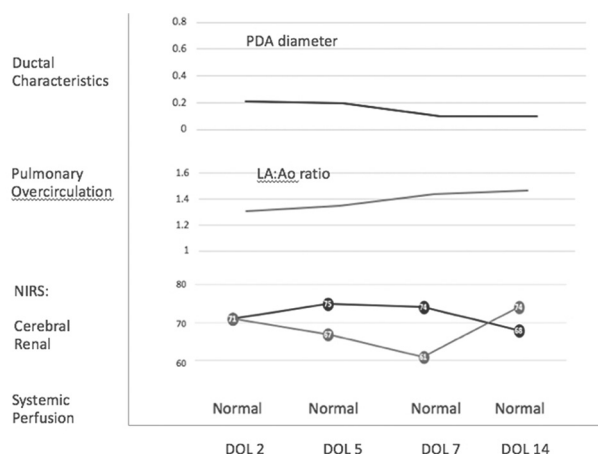
10.1136/jim-2019-WMRC.115

**Purpose of study** Echo is used for determining a hemodynamically significant duct (hsPDA) in the preterm neonate. Near-infrared-spectroscopy (NIRS), a noninvasive modality provides continuous feedback of organ perfusion. Historically, echo is used to diagnose ductal patency, and NIRS used for perfusion monitoring; rarely have they been used together to assess the duct. We aim to use the combined technology of echo and NIRS to identify patients with a hsPDA, as well as explore the possibility of solely using NIRS to identify and continuously monitor patients with a hsPDA.

**Methods used** Infants born <30 weeks at the Packard Children’s Hospital NICU are enrolled for echoes on DOL 3, 5, 7, 14, and 30. Cerebral and renal NIRS are obtained with each echo. A hsPDA is based on measurements of ductal characteristics, markers of pulmonary overcirculation, and systemic perfusion.

**Summary of results** We have 12 patients and 51 echoes with NIRS correlates; 18% show a hsPDA. The mean renal NIRS for infants with a hsPDA was 54 compared with 68 (p=0.001) for infants without a hsPDA. Cerebral NIRS for infants with a hsPDA was 60 vs 72 (p=0.0005) without. All infants with hsPDAs were born <27 weeks gestation and with a birth weight <1000 grams. We did not find any significant difference in mode of respiratory support or enteral feeding patterns.

**Conclusions** When correlated with echo, we conclude that NIRS may be an adequate surrogate for a hsPDA, with renal NIRS showing greater variability, and should be utilized in neonates who are at high risk for a hsPDA.



Abstract 115 Figure 1

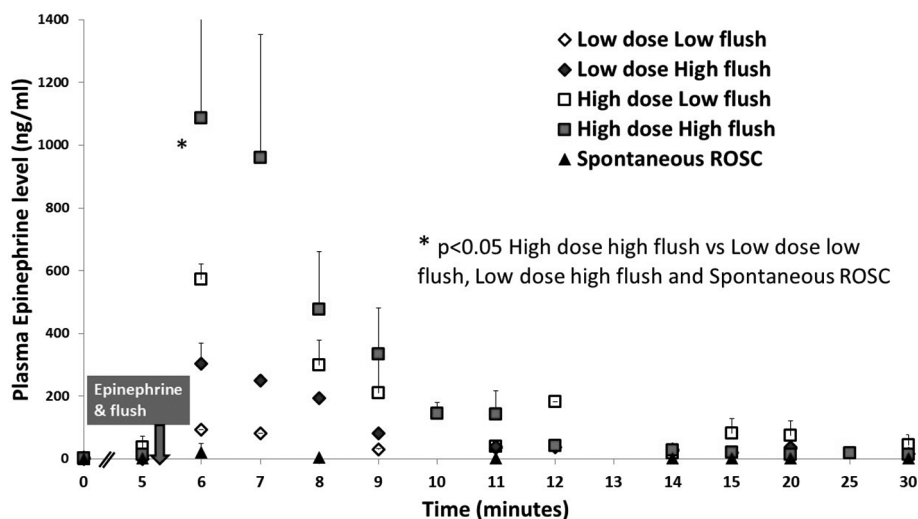
**116 RANDOMIZED TRIAL COMPARING EFFECT OF DIFFERENT EPINEPHRINE DOSES AND FLUSH VOLUMES IN A PERINATAL MODEL OF ASPHYXIAL ARREST**

<sup>1</sup>D Sankaran\*, <sup>2</sup>P Chandrasekharan, <sup>2</sup>S Gugino, <sup>2</sup>C Koenigsnecht, <sup>2</sup>J Helman, <sup>2</sup>J Nair, <sup>2</sup>B Mathew, <sup>2</sup>M Rawat, <sup>1</sup>P Vali, <sup>2</sup>L Nielsen, <sup>1</sup>S Lakshminrusimha. <sup>1</sup>UC Davis, Sacramento, CA; <sup>2</sup>University at Buffalo, Buffalo, NY

10.1136/jim-2019-WMRC.116

**Purpose of study** Current NRP guidelines recommend administration of 0.5–1 ml flush following epinephrine dose (0.01–0.03 mg/kg) via low umbilical venous catheter (UVC). This flush volume may not be adequate for epinephrine to reach right atrium and there are no pharmacokinetic/efficacy/safety studies comparing 0.01 vs. 0.03 mg/kg of epinephrine via low UVC.

**Methods used** Asystole was induced by umbilical cord occlusion and resuscitation was initiated after 5 min of asystole. After 5 min of resuscitation per NRP guidelines, lambs were randomized to receive either 0.01 mg/kg (low dose) or 0.03



Abstract 116 Figure 1

mg/kg (high dose) of epinephrine followed by either low flush (1 ml) or high flush (10 ml) of saline.

**Summary of results** Out of 37 lambs, 9 had ROSC before epinephrine administration. Among lambs that received epinephrine, 33% in low dose-low flush, 50% in low dose-high flush, 71% in high dose-low flush and 100% in high dose-high flush achieved ROSC. Time to ROSC was shorter with high dose-high flush compared to low dose-low flush ( $p=0.01$ ). Higher peak plasma epinephrine levels were achieved with high dose-high flush at 1 min after epinephrine and flush ( $1086\pm 503$  ng/ml) compared to other groups (figure 1). After ROSC, lambs that received high dose epinephrine had higher heart rates.

**Conclusions** Use of high dose-high flush led to higher peak plasma epinephrine levels resulting in higher and earlier occurrence of ROSC. Recommendation of 0.03 mg/kg of epinephrine followed by high flush of 3 ml/kg by NRP may simplify the algorithm, reduce errors and expedite ROSC.

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#### REVISION OF TRACHEAL SUCTION GUIDELINES FOR INFANTS BORN THROUGH MECONIUM STAINED AMNIOTIC FLUID (MSAF): CHANGING CLINICAL SIGNIFICANCE OF 'NON-VIGOROUS' STATE

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10.1136/jim-2019-WMRC.117

**Purpose of study** In 2016, the Neonatal Resuscitation Program (NRP) recommended that resuscitation of non-vigorous infants with MSAF follow the same principles as for those with clear fluid. Studies have shown increased respiratory morbidity among these infants after implementation of new guidelines.

**Abstract 117 Table 1** Values presented as n (% of MSAF neonates) OR median (IQR)

	Era 1	Era 2	p value
Total number of neonates born during the period	428	461	
Number of neonates with MSAF	44 (10.3%)	47 (10.2%)	
Cesarean section	9 (20.5%)	9 (19.1%)	0.92
Gestational age (weeks)	40 (39–40)	39 (38–40)	
Birth weight (grams)	3445 (3180–3670)	3420 (3120–3660)	
Male	24 (54.5%)	22 (46.8%)	0.6
1 minute Apgar $\leq 3$	8 (18.2%)	0	0.007
Endotracheal intubation for suctioning	8 (18.2%)	1 (2.1%)	0.027
Non vigorous	8 (18.2%)	4 (8.5%)	0.3
Respiratory distress requiring NICU admission	2 (4.5%)	8 (17%)	0.11
Total admission to NICU/SCN	4 (9.1%)	11 (23.4%)	0.12
Non vigorous babies (n)	8	4	0.02
Required admission <sup>o</sup>	1 (12.5%) 1	4 (100%) 2 (50%)	
Highest Resp support after admission	(12.5%)	2 (50%)	
- Mechanical Ventilation <sup>o</sup>	0		
- HFNC <sup>o</sup>			

<sup>o</sup>Percentage of non vigorous neonates

We hypothesize that babies who remain non-vigorous despite stimulation represent a sicker cohort of infants compared to non-vigorous babies immediately after birth undergoing routine tracheal suctioning.

**Methods used** Detailed review of the hospital course of all infants born with MSAF at UC Davis Medical Center between Dec 2013- Feb 2014 (Era-1) was compared to infants born between Jan-April 2014 (Era-2).

**Summary of results** Records of 428 and 461 consecutively born neonates before and after implementation of new NRP guidelines were screened. Incidence of MSAF (10.3% vs 10.2%) and characteristics were similar (table 1). In era-1, 8 babies were labeled non-vigorous and all underwent tracheal suction. Only one infant (29 week gestation) required admission and respiratory support. In era-2, 4 babies were non-vigorous despite stimulation and all required NICU admission and respiratory support.

**Conclusions** 'Non-vigorous' infants born through MSAF in the routine-suction era were less sick compared to persistently non-vigorous infants despite stimulation in era-2. Future studies should use MSAF as the denominator (and not non-vigorous) while comparing the outcomes.

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#### LACK OF UTILITY OF TRACHEAL ASPIRATES IN INTUBATED NEONATES

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10.1136/jim-2019-WMRC.118

**Purpose of study** To evaluate the utility of tracheal aspirate (TA) cultures in suspected pneumonia in intubated neonates and measure the burden of antibiotic use associated with a positive TA culture.

**Methods used** A single-site, retrospective chart review was conducted on patients in the NICU between January 2016 and December 2017. Infants who were intubated and had a tracheal aspirate culture sent for suspected infection were eligible. Exclusion criteria included infants with *ureaplasma/mycoplasma* infections or infants with a tracheostomy. Infants were identified by electronic medical record review by the UCLA Microbiology lab showing the presence of a TA culture. At the time the culture was sent and within 24 hours, clinical findings, laboratory, and radiographic study results were recorded. Patient demographic information, including gestational age (GA), sex, birth weight (BW), route of delivery, Apgar scores at 1 and 5 minutes, diagnosis of chronic lung disease (CLD), and death before hospital discharge, was collected.

**Summary of results** 84 infants were included in our analysis. 46% of infants (39/84) had a positive TA. Patients with a positive TA culture had smaller BWs ( $p<0.0001$ ) and lower GAs at birth ( $p<0.0001$ ) than their negative culture counterparts. They were more likely to require mechanical ventilation for greater than 7 days ( $p=0.002$ ) and carry a diagnosis of CLD or BPD by time of discharge from the NICU. Presence of white blood cells (WBCs) on gram stain, abnormal changes from baseline CXR, serum WBC values, or abnormal CRP were not associated with having a positive TA. A normal I:T ratio was more likely to be associated with a positive TA culture ( $p=0.005$ ). 85% of patients with

a positive TA received prolonged antibiotics (>72 hours) compared to 56% of patients with a negative TA ( $p=0.004$ ). Out of those patients with prolonged antibiotic courses, 81% received broad-spectrum antibiotics if they had a positive TA culture versus 48% that did not have a positive culture ( $p=0.001$ ).

**Conclusions** Positive TA cultures are not associated with commonly used laboratory or radiographic biomarkers of infection or the need for increased respiratory requirements, yet do increase risk of exposure to prolonged antibiotic courses with broad-spectrum agents.

### 119 FACTORS ASSOCIATED WITH ADVERSE EVENTS AND SUCCESS DURING NEONATAL ENDOTRACHEAL INTUBATION

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10.1136/jim-2019-WMRC.119

**Purpose of study** Endotracheal intubation is a commonly performed procedure in the neonatal intensive care unit (NICU) but is technically difficult and has a high risk of complications. The aim of this study is to evaluate the frequency with which adverse events occur during intubation in our institution and evaluate the characteristics of a successful intubation.

**Methods used** This was a prospective, observational study of infants who were admitted to the NICU at LAC+USC Medical Center between July 2016 and June 2019. IRB authorization was obtained prior to the start of the study. All infants requiring intubation during admission in the NICU or delivery room setting were included in the study. Factors related to infant, procedure and provider for each encounter were collected immediately following the procedure.

**Summary of results** There were 193 intubation encounters with 398 attempts performed that met inclusion criteria. The mean gestational age was 31 weeks with a mean birth weight 1751 g. Adverse events occurred in 19.6% of intubation encounters and bradycardia was the most common complication (36.8%). Intubations performed outside the NICU were more likely to have adverse events (35% vs. 15%,  $p=0.005$ ). Multiple intubation attempts were not associated with increased risk of complications ( $p=0.100$ ). There was a correlation between training level and the likelihood of success on the first attempt, with an attending neonatologist obtaining success 73% of the time compared to a neonatology fellow at any training level successful 54% of the time ( $p=0.012$ ). A lower birth weight increased the likelihood of requiring more attempts ( $p=0.046$ ). Pre-medication was not associated with successful intubation on the first attempt ( $p=0.315$ ) or decreased likelihood of complications ( $p=0.72$ ).

**Conclusions** Adverse events occur frequently during intubation and success of intubation on the first attempt depends on the experience level of the provider. An increase in the incidence of adverse events is associated with intubation occurring outside the NICU but not with a higher number of intubation attempts. Premedication does not improve success of intubation on the first attempt or decrease complications.

### 120 VARIATIONS IN CAFFEINE USE FOR APNEA OF PREMATURITY IN PRETERM INFANTS IN THE UNITED STATES

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10.1136/jim-2019-WMRC.120

**Purpose of study** The Caffeine for Apnea of Prematurity trial demonstrated that caffeine administration within the first ten days of life in extremely premature infants to treat apnea led to decreased rates of bronchopulmonary dysplasia, death, and neurodevelopmental disability. Recent retrospective studies have suggested that caffeine used prophylactically can lead to similar improved outcomes; however, there are no known large prospective studies proving the effectiveness and safety of prophylactic caffeine and no consensus that prophylactic caffeine should be used. We surveyed NICU medical directors in the United States to delineate variations in usage of caffeine in order to identify potential focuses for future research and guidelines development.

**Methods used** An online survey with questions regarding various aspects of caffeine use was emailed to all NICU medical directors in the United States.

**Summary of results** 127/532 (24%) of medical directors completed the survey. The majority are at level III or IV NICU's (95%) and are academically affiliated (67%). The most common reasons for initiation of caffeine include treatment of apnea (87%), prophylaxis for apnea (73%), and facilitation of extubation (59%). While 69% start caffeine soon after birth, only 34% discuss caffeine during the prenatal consult. Of those, only a third discuss potential side effects. Post menstrual age (PMA) (53%) is the most important factor in the decision to discontinue caffeine, followed by cessation of apneic episodes (42%). 34 weeks is the most common PMA to discontinue caffeine (62%). Neonates are monitored for an average of 6 days following cessation of caffeine prior to discharge. Most (70%) do not send infants home on caffeine. Of those who do, 61% send those infants home with an apnea monitor.

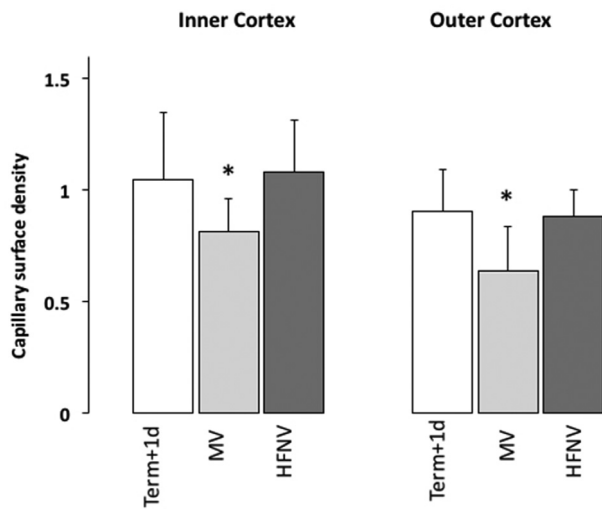
**Conclusions** Caffeine is widely used in preterm neonates both early and prophylactically in the US, despite the lack of strong evidence. Often, parents receive little information about use and side effects of caffeine prenatally. There is variation in clinical indication for stopping caffeine and use of caffeine following discharge. Prospective studies should be aimed at determining optimal timing for initiation and discontinuation of caffeine, as well as to direct development of national guidelines.

### 121 INVASIVE VENTILATION DECREASES RENAL CAPILLARY SURFACE DENSITY MORE THAN NONINVASIVE RESPIRATORY SUPPORT IN TERM LAMBS

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10.1136/jim-2019-WMRC.121

**Purpose of study** Ventilation, regardless of mode, decreases glomerular capillary surface density (SVgc) in the renal cortex of preterm lambs (Staub et al. 2017). We hypothesized that ventilation itself, not just renal immaturity, reduces SVgc. We compared SVgc of unventilated term lambs with two groups of ventilated term lambs: mechanical ventilation (MV) versus noninvasive respiratory support (NRS).



**Abstract 121 Figure 1** Capillary surface density of unventilated (Term +1d) and ventilated (MV or HFNV) term lambs (mean + SD, \* $P < 0.05$ )

**Methods used** Unventilated term lambs were euthanized 1d after birth ( $n=8$ ). Ventilated term lambs were intubated after CS and ventilated by MV or weaned in 2–3h to NRS for 3d ( $n=5$  each). Kidney sections were immunostained with endothelial surface marker CD31 and SVgc calculated by stereological techniques. Physiological data were compared for the two ventilated groups. Statistical differences were tested by t-test for parametrical data and Mann-Whitney-test for non-parametrical data.

**Summary of results** After 3d of MV, SVgc was significantly smaller in the renal cortex of term lambs compared to non-ventilated 1d lambs. In contrast, NRS did not reduce SVgc compared to non-ventilated 1d lambs (figure 1). Mean airway pressure was significantly higher in MV lambs compared to NRS lambs throughout the 3d studies. Other ventilation and physiological parameters were similar in both groups.

**Conclusions** Our results show that MV is associated with lower SVgc in the renal cortex compared to no ventilation or NRS. Our findings suggest that higher mean airway pressure is associated with lower glomerular filtration capacity even after nephrogenesis is complete. This may lead to poor renal function later in life. (HL110002, HL062875; Bangerter-Foundation).

**Purpose of study** Hypoxia contributes to the development of pulmonary hypertension (PH) by promoting an uncoupled state of the enzyme endothelial nitric oxide synthase (eNOS) that produces superoxide instead of nitric oxide (NO). Folic acid has been shown to recouple eNOS and prevent the development of several hypoxia-induced markers of PH in a murine model. The impact of folic acid on recoupling eNOS in a piglet model of chronic hypoxia-induced PH is unknown. We tested the hypotheses that treatment with folic acid will increase eNOS recoupling in hypoxic piglet pulmonary artery endothelial cells (PAECs) and that treatment with folic acid will decrease pulmonary vascular resistance (PVR) in an in vivo piglet model of chronic hypoxia-induced PH.

**Methods used** Piglet PAECs were cultured under hypoxic conditions (4% oxygen) for 48 hours with no folic acid or 1.0  $\mu\text{M}$  folic acid. eNOS dimer-to-monomer ratios were measured by western blot. NO concentrations were quantified by chemiluminescence. Newborn piglets were obtained on DOL 2 and placed in a normobaric hypoxic chamber (10–11% oxygen) for 10 days. Some hypoxic piglets received 5 mg/kg/day of folic acid from days 3–10 of hypoxia while other hypoxic piglets received no folic acid. On DOL 10 hemodynamic measurements of pulmonary artery pressure, left ventricle end diastolic pressure, and cardiac output were obtained to calculate PVR.

**Summary of results** Hypoxic PAECs treated with 1.0  $\mu\text{M}$  folic acid ( $n=9$ ) demonstrated increased eNOS dimer-monomer ratios compared to untreated hypoxic PAECs ( $n=9$ ) ( $p < 0.05$ ). Hypoxic piglet PAECs treated with 1.0  $\mu\text{M}$  folic acid ( $n=13$ ) demonstrated a 16% increase in NO production compared to untreated hypoxic PAECs ( $n=13$ ) ( $p < 0.05$ ). PVR was lower in hypoxic piglets treated with 5 mg/kg/day folic acid ( $n=5$ ) compared to untreated hypoxic piglets ( $n=9$ ) ( $p < 0.05$ ).

**Conclusions** Folic acid increases NO production by improving eNOS recoupling in hypoxic piglet PAECs. In an in vivo piglet model, treatment with folic acid ameliorates chronic hypoxia-induced PH. These findings suggest that folic acid has therapeutic potential to treat PH in human infants suffering from cardiopulmonary conditions associated with chronic hypoxia.

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### PULMONARY FUNCTION TESTS IN VERY LOW BIRTH WEIGHT INFANTS SCREENED FOR PULMONARY HYPERTENSION

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10.1136/jim-2019-WMRC.123

**Purpose of study** Compare pulmonary function tests (PFTs) in very low birth weight (VLBW) infants with and without pulmonary hypertension (PH). We hypothesized that infants with PH would have an increased passive respiratory resistance (Rrs).

**Methods used** Infants with PFTs at 34 to 38 weeks post menstrual age (PMA) as part of a PH screening guideline for infants born at  $\leq 1500$  grams with respiratory support at  $>34$  weeks PMA were included. One pediatric cardiologist reviews the echocardiograms and estimates the right ventricular pressure. Rrs and passive compliance (Cr) were measured with the single breath occlusion and functional residual capacity (FRC) with the nitrogen washout method as per standardized

## Neonatology pulmonary II

### Concurrent session

3:15 PM

Thursday, January 23, 2020

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### FOLIC ACID TREATMENT RECOUPLES ENDOTHELIAL NITRIC OXIDE SYNTHASE AND AMELIORATES CHRONIC HYPOXIA-INDUCED PULMONARY HYPERTENSION IN NEWBORN PIGLETS

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10.1136/jim-2019-WMRC.122

**Abstract 123 Table 1** Demographics and PFT results of infants without and with pulmonary hypertension (PH)

	No PH (n=26)	Any PH (n=22)
Birth weight (g)	945±181	823±224*
Gestational age (wks)	27.4±2.1	26.3±2.0
Male (%)	54	50
Caucasian (%)	73	77
PMA at time of PFT (wks)	35.0±1.1	34.9±1.3
Days of PFT from PH ECHO	3.0±2.3	2.2±2.1
Rrs (cmH2O/ml/sec)	0.073±0.032	0.100±0.047**
Crs/kg (ml/cmH2O/kg)	0.98±0.25	0.77±0.20**
Crs (ml/cmH2O)	1.88±0.51	1.46±0.51**
FRC/kg (ml/kg)	23.0±6.4	22.2±5.6

Values are Mean ± SD unless otherwise noted; FRC obtained in 19 versus 20 patients; \* P

criteria. Based on previous data, about 22 infants were needed per group to show a 25% difference in Rrs with a  $\alpha$  of 0.05 and power of 80%.

**Summary of results** 22 VLBW infants with and 26 without PH were studied. Those with PH had a significantly lower birth weight. There were no other demographic differences between groups. The infants with PH had a significantly increased Rrs and decreased Crs.

**Conclusions** In this pilot study of VLBW infants screened for PH at 34–38 weeks PMA, those with PH had a significantly increased Rrs and decreased Crs compared to those without PH. Additional studies are needed to further phenotype infants with evolving BPD and PH.

### 124 LONGITUDINAL B-TYPE NATRIURETIC PEPTIDE MEASUREMENT AS PROGNOSTIC MARKER FOR OUTCOMES IN CONGENITAL DIAPHRAGMATIC HERNIA

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10.1136/jim-2019-WMRC.124

**Purpose of study** To evaluate B-type Natriuretic Peptide (BNP) as a longitudinal biomarker for clinical outcome in Congenital Diaphragmatic Hernia (CDH). We hypothesize that persistent elevation of BNP (>2 wks of age) is associated with mortality or need for prolonged respiratory support at 56 days (Steurer et al, 2014).

**Methods used** Retrospective cohort study. Detailed clinical information and BNP levels (pg/ml) were collected for the duration of hospitalization. At 56d, infants were classified as Poor Outcome if deceased or receiving ongoing respiratory support or Good Outcome if alive off support. Infants with congenital heart disease other than ASD, VSD, or PDA were excluded. BNP levels were available at week of life 1 (n=35), 3 (n=43), 4 (n=37) and 5 (n=38); week 2 data were insufficient for analysis. At each time point, we generated receiver characteristic curves using log transformed BNP and defined the BNP cut-off that maximized correct classification.

**Summary of results** Of 49 infants, 29 had Poor Outcome and 20 had Good Outcome. There were no differences between groups in median gestational age (Poor: 39.1wk, IQR 38.1–39.3 vs. Good: 39wk, IQR 38.3–39.3; p=0.81) or laterality (Left-sided, Poor: 76% vs. Good: 85%; p=0.44). Liver

**Abstract 124 Table 1** Area under the curve (AUC), and BNP cut-off Values

BNP Time Point	AUC (95%CI)	BNP cut-off (pg/ml, geometric mean)	Sensitivity	Specificity	Correctly Classified
Week 1	0.67 (0.49–0.86)	539	83.3%	52.9%	68.6%
Week 3	0.82 (0.69–0.96)	285	88.9%	81.3%	86.1%
Week 4	0.82 (0.62–1)	101	88.0%	83.3%	86.5%
Week 5	0.82 (0.62–1)	61	85.2%	81.8%	84.2%

herniation into the thorax was more common in Poor (90%) than Good (50%) Outcome (p=0.002). All infants with ECMO support had Poor Outcome (n=7/29, 24%; p=0.018). Median age at extubation was significantly longer in Poor vs. Good Outcome (19d, IQR 14–23 vs. 8d, IQR 4–11; p<0.001).

Median BNP at 1wk was lower in Poor Outcome (480, IQR 259–1020 vs. 1009, IQR 551–1540; p=0.08). At wks 3, 4 and 5, median BNP was higher in Poor Outcome: (3wks: 666, IQR 466–1040 vs. 111.5, IQR 76.5–227.5; p=0.0004); (4wks: 281, IQR 135–448 vs. 37.5, IQR 33–75.5; p=0.0018); and (5wks: 96, IQR 70–301 vs. 29, IQR 17–58; p=0.0025).

**Conclusions** Higher BNP at week 3–5 of life is associated with Poor Outcome in CDH. BNP cut-off points to predict Poor Outcome decline over this time frame.

### 125 NONINVASIVE RESPIRATORY SUPPORT OF PRETERM LAMBS LEADS TO APPROPRIATE ALVEOLAR CAPILLARY GROWTH

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10.1136/jim-2019-WMRC.125

**Purpose of study** We reported that long-term outcomes for former-preterm lambs that were mechanically ventilated (MV) for 6–7d during the first week of postnatal life had persistent structural simplification of alveoli at 5 months corrected postnatal age (cPNA) compared to postnatal age-matched control term lambs. Five months cPNA is equivalent to ~6 yr PNA in humans (Dahl 2018). Most recently, we reported that non-invasive respiratory support (NRS) used for resuscitation and continuing management led to structural indices of alveolar formation that were comparable to the same indices in the lung of control term lambs (Rebentisch, WSPR 2019; J Invest Med 67:91, 2019). However, the latter report did not assess alveolar capillary growth. Therefore, our aim was to quantify alveolar capillary growth in the lungs of the same former preterm lambs that were managed by NRS and control term lambs.

**Methods used** Preterm lambs (~128d gestation; term ~150d; equivalent to lung development at ~28w gestation in humans) were resuscitated by NRS and continued with NRS for 6–7d (n=5; Rebentisch, J Invest Med 67:91, 2019). This NRS group was weaned from all respiratory support and lived for 5 months cPNA. Control term lambs lived for 5 months PNA

(equivalent to ~6 yr postnatal ages in humans). Quantitative histology was used to compared alveolar capillary surface density between the NRS group of preterm lambs and control term lambs.

**Summary of results** Former preterm lambs that were managed by NRS during the first week of postnatal life had the same alveolar capillary surface density ( $1,040 \pm 264 \text{ cm}^{-1}$ ; mean  $\pm$  SD;  $n=5$ ) as control term lambs ( $918 \pm 61 \text{ cm}^{-1}$ ;  $n=5$ ; not significant). Epithelial surface density, the reference space, was not different between the NRS group ( $4,274 \pm 843 \text{ cm}^{-1}$ ;  $n=5$ ) and the control term group ( $3,938 \pm 447 \text{ cm}^{-1}$ ;  $n=5$ ).

**Conclusions** NRS management, including resuscitation, of preterm lambs is associated with equivalent long-term growth of alveolar capillaries compared to control term lambs. These results, combined with our recent results, suggest that NRS management leads to appropriate capillary growth and structural formation of alveoli. Supported by R01 HL110002 and Division of Neonatology

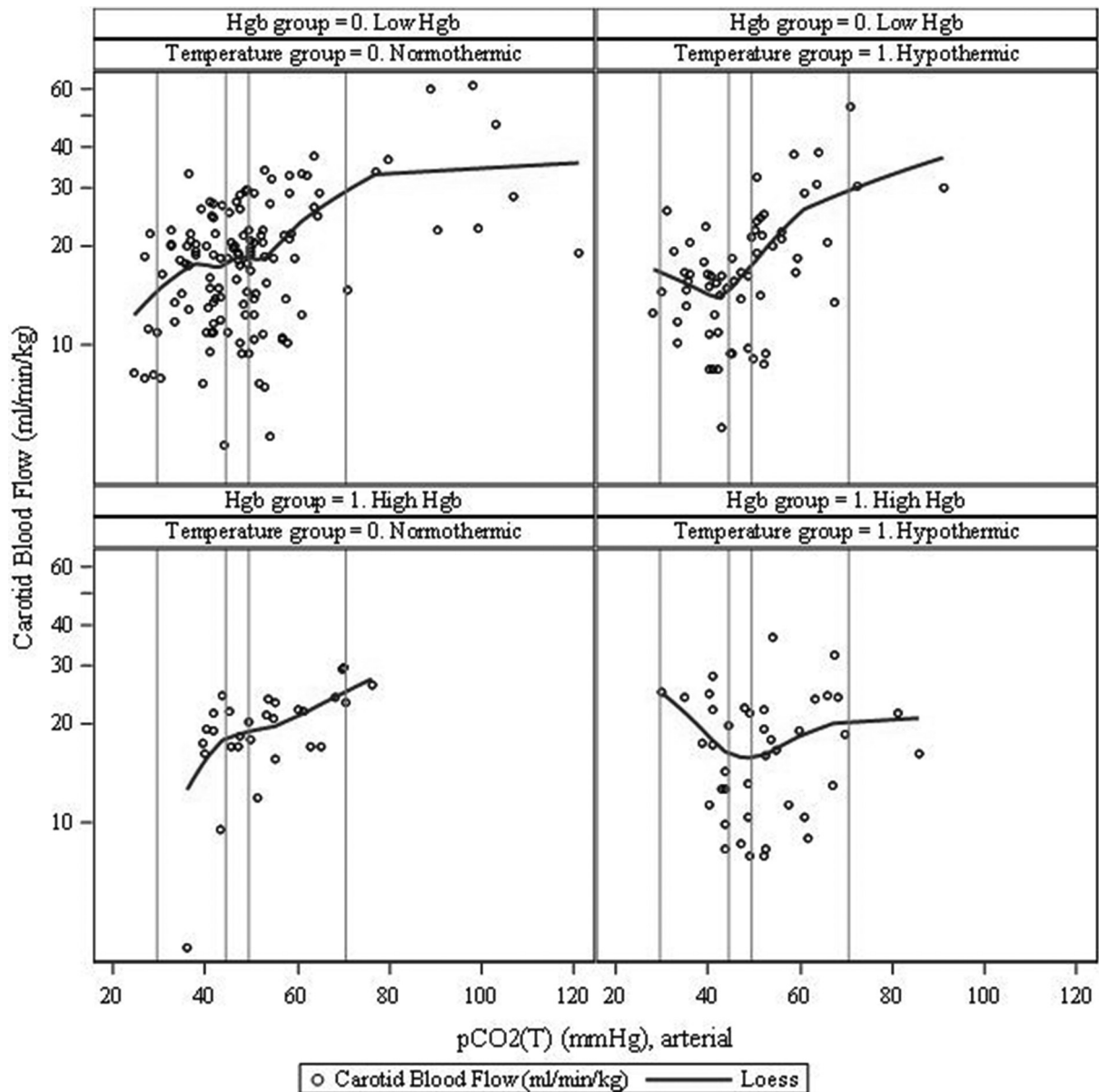
126 GENTLE VENTILATION WITH PERMISSIVE HYPERCAPNIA IN HIE WITH PPHN: HEMODYNAMIC EFFECTS

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10.1136/jim-2019-WMRC.126

**Purpose of study** Therapeutic hypothermia and permissive hypercapnia are strategies to manage hypoxic-ischemic encephalopathy (HIE) and persistent pulmonary hypertension of the newborn (PPHN). The objective of this study was to evaluate the effect of  $\text{PaCO}_2$  on pulmonary and carotid blood flow in lambs with severe HIE and PPHN under normothermia ( $36.5\text{--}37.5^\circ\text{C}$ ) and hypothermia ( $32\text{--}34^\circ\text{C}$ ).

**Methods used** 25 near-term gestation lambs were asphyxiated by umbilical cord occlusion. Meconium aspiration syndrome (MAS) was induced by instilling meconium into the lungs during gasping leading to PPHN. Lambs were ventilated with



**Abstract 126 Figure 1** For normothermia ( $36.5$  to  $37.5^\circ\text{C}$ ) and hypothermia ( $32$  to  $34^\circ\text{C}$ ) groups combined, maintaining higher  $\text{PaCO}_2$  resulted in a statistically significant increase in carotid blood flow in the presence of both high and low Hgb (scattersmooth with LOESS curve)

normocapnia (temperature corrected PaCO<sub>2</sub> 38–48 mmHg) or hypercapnia (50–60 mmHg). Analysis was performed adjusting for hemoglobin (Hgb) level (high: 13–15 g/dL or low: 9–12 g/dL) and temperature.

**Summary of results** For pulmonary blood flow, high vs. low PaCO<sub>2</sub> resulted in a non-significant decrease in geometric mean blood flow of 3% (95% CI for relative change: -4 to 12%, p=0.41). For carotid blood flow (figure 1), high vs. low PaCO<sub>2</sub> resulted in a statistically significant increased geometric mean blood flow of 16% (95% CI for relative change 0.1% to 34%, p<0.05).

**Conclusions** Within a clinically relevant PaCO<sub>2</sub> range of 38 to 60 mmHg, there is no significant alteration in pulmonary blood flow in lambs with HIE and PPHN. In contrast, hypercapnia is associated with an increase in carotid flow and possibly increased O<sub>2</sub> delivery to the brain. Clinical trials evaluating long-term effects of permissive hypercapnia (PaCO<sub>2</sub> 50–60 mmHg) are warranted in HIE with PPHN.

### 127 NASAL HIGH FREQUENCY JET VENTILATION VERSUS NASAL INTERMITTENT POSITIVE PRESSURE VENTILATION AS A MEAN OF POST EXTUBATION RESPIRATORY SUPPORT

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10.1136/jim-2019-WMRC.127

**Purpose of study** To describe our experience of successfully using nHFJV superimposed on to nasal intermittent positive pressure ventilation (NIPPV) after extubation or when NIPPV mode is failing to maintain blood gases in an acceptable range in ELBW infants.

**Methods used** All ELBW infants who received nHFJV while in the NICU were included in this study. IRB approval was obtained. Data was collected using NICU database and electronic medical records. The Bunnell Life Pulse HFJV was used to provide settings of: Jet PIP 30–35 cmH<sub>2</sub>O, Jet Rate 240–300 bpm, Inspiratory time (IT) of 0.03 s. NIPPV rate on the conventional ventilator was set at 40 bpm, PIP at 30 cmH<sub>2</sub>O, PEEP 8–10 cmH<sub>2</sub>O, and IT at 0.5 s.

**Summary of results** Fourteen ELBW patients met the criteria for inclusion. Mean birth weight was 642 g and mean gestational age was 24.5 weeks. In 9 patients, nHFJV was used as a primary mode of extubation along with NIPPV after invasive HFJV treatment while in 5 patients it was used as a rescue mode when NIPPV settings were maximized with hypoxia and carbon dioxide retention. Twelve patients (86%) remained successfully extubated by 72 hours of treatment. Mean duration of invasive and non-invasive ventilation was 36 days and 45 days respectively. Duration of nHFJV was a mean of 9 days before discontinuing nHFJV. Twelve of 14 patients were on room air at the time of discharge.

**Conclusions** This is the first reported case series of the successful use of rescue nHFJV in conjunction with NIPPV to avoid reintubation in ELBW infants. Additional studies are needed to evaluate this mode of support in ELBW infants failing non-invasive modes of respiratory support.

### 128 NEUROBEHAVIORAL OUTCOMES OF FORMER PRETERM LAMBS ARE BETTER WHEN RESPIRATORY MANAGEMENT IS NONINVASIVE COMPARED TO INVASIVE

<sup>1</sup>E Dawson\*, <sup>1</sup>S Bowen, <sup>1</sup>E Voll, <sup>1</sup>A Havlicak, <sup>2</sup>J Beachy, <sup>1</sup>MJ Dahl, <sup>3</sup>C Veneroni, <sup>4</sup>A Lavizzari, <sup>5</sup>D Null, <sup>3</sup>R Dellaca, <sup>1</sup>K Albertine. <sup>1</sup>U of Utah, Salt Lake City, UT; <sup>2</sup>Cohen Children's Med Ctr, New York, NY; <sup>3</sup>Politecnico di Milano, Milan, Italy; <sup>4</sup>Ospedale Maggiore Policlinico, Milan, Italy; <sup>5</sup>UC Davis, Davis, CA

10.1136/jim-2019-WMRC.128

**Purpose of study** Neurobehavioral impairments may be a long-term outcome for survivors of premature birth and invasive mechanical ventilation (MV). Former preterm (FPT) lambs develop diffuse brain damage, evident as increased apoptosis, and decreased proliferation, of neurons and glia compared to other premature lambs managed by noninvasive respiratory support (NRS) or term lambs that are not ventilated. We developed neurobehavioral tests of learning and memory for normal term lambs (Bowen, *J Invest Med* 64:294, 2016). We used these tests to assess the hypothesis that neurobehavioral outcomes will be better when management is by NRS compared to MV.

**Methods used** Three groups of FPT lambs were studied: (1) MV for 6–7d, n=6, (2) NRS, including for resuscitation, for 6–7d, n=5, (3) MV for ~3h followed by NRS for 6–7d, n=5. The FPT lambs lived for 6 months (5 months corrected postnatal age, cPNA; equivalent to ~6 years for humans). Control term lambs were the fourth group (n=8). Tests were repeated at 2 and 5 months. Lambs were habituated to the tests before having two 10-min trials/test (one test/d). Tests were separated by 30-min of rest. The routine was repeated the next day. Different tests were separated by a rest day. One test used a mirror and a non-reflective surface to test socialization. Another test used a maze, for which the reward was ewe's milk, to test memory and problem solving.

**Summary of results** For the 5-month test, 6–7d MV FPT lambs spent significantly more time at the non-reflective surface (8 (24) sec; median (IQR) than NRS FPT lambs (1 (8) sec; p<0.05). No differences were detected between the NRS FPT, MV for ~3h then NRS FPT, and control term groups. For the 5-month maze test, no differences in time to find the reward were detected between the 6–7d MV FPT lambs (7 (134) sec) and NRS FPT group (5 (2) sec).

**Conclusions** Our results suggest that FPT lambs that were managed by MV during the first week of postnatal life have worse long-term neurobehavioral outcomes than NRS FPTs lambs. The range for the MV FPT lambs implies variability that may provide opportunity to identify underlying mechanisms. (HL110002 and Division of Neonatology).

### 129 EXPOSURE TO CANNABIDIOL (CBD) RESULTS IN MYOGENIC DIFFERENTIATION AND ALTERED FUNCTION IN FETAL RAT LUNG FIBROBLASTS

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10.1136/jim-2019-WMRC.129

**Purpose of study** Previously, we have demonstrated that perinatal nicotine exposure disrupts specific epithelial-mesenchymal paracrine signaling pathways, resulting in pulmonary interstitial fibroblast transdifferentiation to a myogenic phenotype.

Recently, cannabidiol (CBD) has been implicated as one of the emerging contributors to the recent teen lung disease crisis in the US. However, it is unknown how CBD affects lung fibroblast differentiation and the developing lung.

Since a balance between Wnt and PPAR $\gamma$  signaling is a key determinant of lung interstitial fibroblast phenotype, i.e., lipogenic vs. myogenic, using a well-established in vitro model, we tested the hypothesis that CBD exposure would up-regulate Wnt and down-regulate PPAR $\gamma$  pathways in fetal rat lung fibroblasts.

**Methods used** Using established methods, embryonic day 19 Sprague-Dawley rat lung fibroblasts were treated for 24 or 72 h with CBD ( $10^{-9}$ ,  $10^{-8}$ ,  $10^{-7}$ ,  $10^{-6}$  M). Rate of triglyceride uptake, a key indicator of lipofibroblast function, was assessed through [ $^3$ H]-triolein uptake assay. Mesenchymal markers of differentiation were determined by western analysis and qRT-PCR.

**Summary of results** As assessed by differentiation and functional assays, CBD treatment affected fibroblast phenotype dose- and time-dependently. However, contrary of our hypothesis, both lipogenic and myogenic markers increased significantly at both time-points examined with more profound changes following 72 h exposure. In particular, Wnt signaling/myogenic markers (LEF-1,  $\beta$ -catenin, Fibronectin, Calponin, and  $\alpha$ -SMA) demonstrated more robust changes, indicating CBD-induced myogenic differentiation of pulmonary interstitial fibroblasts, which was corroborated by triolein uptake assay ( $p < 0.05$ ).

**Conclusions** We conclude that in line with the previously known effects of nicotine on the developing lung fibroblasts, CBD also induces myogenesis. However, unlike nicotine's effects on lung fibroblasts, CBD's effects seem to be more complex, i.e., concomitant up-regulation of both lipogenic and myogenic markers, possibly reflecting a compensatory response to CBD-induced dyshomeostasis. The implications of our data in an intact system are unclear and are being studied using well-established in vivo rodent models.

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#### EVIDENCE FOR PULMONARY GROUP 2 INNATE LYMPHOID TYPE II CELL INVOLVEMENT IN PERINATAL NICOTINE-INDUCED ASTHMA

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10.1136/jim-2019-WMRC.130

**Purpose of study** Exposure of the developing lung to nicotine is a significant contributor to offspring asthma and other allergic diseases. Though the mechanisms underlying perinatal nicotine-mediated pulmonary structural effects are well studied, the mechanisms underlying allergic predisposition remain unknown. Group 2 innate lymphoid type II cells (ILC2s), relatively new players in asthma pathogenesis, produce Th2 cytokines in response to a number of environmental signals; however, their involvement in perinatal nicotine-induced asthma is unknown. We tested the hypothesis that ILC2s are involved in perinatal nicotine-induced asthma.

**Methods used** Using a well-established perinatal nicotine exposure mouse model, pregnant C57BL6/J mouse dams received nicotine (2 mg/kg, s.c.) or diluent once daily from e6 to postnatal day (PND) 21. Starting 3 days before sacrifice on PND21, pups were administered recombinant murine (rm) IL-

33 (0.5 $\mu$ g intranasally) or PBS once daily under brief isoflurane anesthesia, and sacrificed 24h after the last rmIL-33 dose for ILC2s collection using Aria III cell sorter. ILC2s were characterized based on the lack (CD3 $\epsilon$ , CD45R, Gr-1, CD11c, CD11b, Ter119, TCR $\gamma\delta$ , and FC $\epsilon$ RI) and the expression of (CD45, ST2, and CD117) classical lineage markers. Cultured ( $5 \times 10^3$  cells/well) ILC2s from control and nicotine exposed pups were treated with rmIL-33 (10 ng/ml) for 48h and the supernatant was analyzed for Th2 cytokines IL-5 and IL-13. Lastly, the effect short chain fatty acid butyrate on IL-33-induced production of Th2 cytokines by ILC2s was determined.

**Summary of results** Nicotine treatment resulted in a greater yields of ILC2s (ILC2s/lung/mouse-  $2770 \pm 72$  vs  $1790 \pm 89$ ; nicotine vs control;  $N=4$ ;  $p < 0.001$ ). IL-33 treatment of nicotine exposed ILC2s resulted in a higher Th2 cytokine production compared with ILC2s isolated from controls ( $N=4$ ;  $p < 0.001$ ). Sodium butyrate (20 mM) decreased IL-5 production by 61% and IL-13 production by 88% (vs. IL-33 treated group).

**Conclusions** We for the first time implicate the involvement of ILC2s in perinatal nicotine-induced asthma and suggest a novel, safer, and effective mechanism-based (ILC2 negative regulators) therapy for perinatal smoke/nicotine-induced asthma.

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#### COMMON VAPE FLAVORS ARE DETRIMENTAL TO LUNG FIBROBLAST DIFFERENTIATION

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10.1136/jim-2019-WMRC.131

**Purpose of study** A significant strategy of electronic cigarette (e-cig) marketing focuses on the variety of vape flavors available, which often mimic the taste of fruits to more elaborate aromas. Manufacturers of e-liquids, the fluid used in e-cigs, argue that their flavored products are 'food grade' and are 'generally recognized as safe' (GRAS). However, the GRAS certification pertains only to ingestion and does not take into account inhalation nor the heat-induced changes in flavorings' compositions of vapes. The flavoring chemical concentrations, 1–4% range (10–40 mg/mL) in e-liquids are high enough to raise concern for toxicity, particularly, with chronic exposure. Since interstitial fibroblasts are the primary determinants of lung phenotype, we examined the effect of select commonly used e-cig flavorings on cultured fetal rat lung fibroblast toxicity and differentiation.

**Methods used** Using well established methods, embryonic day 19 Sprague-Dawley rat lung fibroblasts were isolated and were treated for 24 h with nicotine ( $1 \times 10^{-9}$ M), vanilla, cherry, and menthol ( $1 \times 10^{-9}$  and  $1 \times 10^{-6}$ M) either alone or nicotine + each flavoring combination. Fibroblast toxicity [lactate dehydrogenase assay (LDH)] and differentiation (protein levels of key lipogenic (PPAR $\gamma$ ) and myogenic proteins ( $\alpha$ -SMA and fibronectin) via western analysis and immunofluorescence staining) were determined.

**Summary of results** Based on the LDH assay, there was no overt effect on fibroblast toxicity among any of the flavorings examined at either tested doses ( $1 \times 10^{-9}$  and  $1 \times 10^{-6}$ M). However, with the exception of menthol and menthol+nicotine, there were marked effects on fibroblast differentiation



in all other groups as evidenced by significantly decreased PPAR $\gamma$  and increased  $\alpha$ -SMA and fibronectin protein levels as well as positive staining for these markers.

**Conclusions** Based on our data, common e-liquid flavorings demonstrated significantly detrimental, albeit, differential effects on lung fibroblast differentiation as demonstrated by reduced lipogenic but increased myogenic markers, which are key characteristics of myofibroblasts. These findings, in general, contradict the claims of e-liquid manufacturers. However, more extensive and in vivo studies need to be performed to determine the clinical significance of our data.

## Neuroscience I

### Concurrent session

3:15 PM

Thursday, January 23, 2020

#### 132 DURATION OF AMERICAN FOOTBALL PLAY AND CHRONIC TRAUMATIC ENCEPHALOPATHY

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10.1136/jim-2019-WMRC.132

**Purpose of study** Chronic traumatic encephalopathy (CTE) is a neurodegenerative disease associated with exposure to contact and collision sports, including American football. We hypothesized a dose-response relationship between duration of football played and CTE risk and severity.

**Methods used** In a convenience sample of 266 deceased American football players from the Veterans Affairs-Boston University-Concussion Legacy Foundation and Framingham Heart Study Brain Banks, we estimated the association of years of football played with CTE pathological status and severity. We evaluated the ability of years played to classify CTE status

using receiver operating characteristic curve analysis. Simulation analyses quantified conditions that might lead to selection bias.

**Summary of results** 223 of 266 participants met neuropathological diagnostic criteria for CTE. More years of football played was associated with having CTE (odds ratio [OR]=1.30 per year played, 95%CI, 1.19–1.41; P=3.8  $\times$  10<sup>-9</sup>) and with CTE severity (severe vs. mild; OR=1.14 per year played, 95%CI, 1.07–1.22; P=3.1  $\times$  10<sup>-4</sup>). Participants with CTE were 1/10th as likely to have played <4.5 years (negative likelihood ratio [LR]=0.102, 95%CI, 0.100–0.105) and were 10X as likely to have played >14.5 years (positive LR=10.2, 95%CI, 9.8–10.7) compared with participants without CTE. Sensitivity and specificity were maximized at 11 years played. Simulation demonstrated that years played remained adversely associated with CTE status when years played and CTE status were both related to brain bank selection across widely ranging scenarios.

**Conclusions** The odds of CTE double every 2.6 years of football played. After accounting for brain bank selection, the magnitude of the relationship between years played and CTE status remained consistent.

#### 133 LONGITUDINAL FUNCTIONAL MAGNETIC RESONANCE IMAGING (fMRI) FINDINGS IN ADOLESCENTS

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10.1136/jim-2019-WMRC.133

**Purpose of study** Studies that have evaluated functional MRI of adolescent cannabis (marijuana) users at a single time point have shown alteration in brain connectivity, especially in the orbitofrontal/temporal areas. However, longitudinal studies of fMRI at two different time points is limited. The objective of this study was to evaluate the fMRI changes in adolescent cannabis users over time.

**Abstract 133 Table 1** Longitudinal MRI Findings in Cannabis (Marijuana) Users

First Author, Year Published, Location	Number of subjects vs. controls and age at initial MRI	Time period to follow-up MRI	Frequency of marijuana (MJ) use	fMRI findings in subjects compared to controls
Cheetham 2012, Australia	Subjects: N=30, Heavy MJ and Alcohol users Controls: Non-users, N=38, age at baseline for both groups=16–19 yr	4 years from baseline	Subjects: median=16.6 times lifetime use Controls: None	Smaller (thinner) orbitofrontal cortex volumes at age 12 years but thicker cortices at f/u in cannabis users compared to non-users (p<0.05)
Jacobus, 2015, USA	Subjects: Heavy MJ, N=22, Controls: Non-users, N=43, age at baseline for both groups 16–19 yrs	1.5 and 3 years from baseline	Subjects: >100 lifetime episodes Controls:	Marijuana and alcohol showed Thicker cortical estimates across the brain (23 regions), particularly in frontal and parietal lobes (p<0.05)
Camchong 2016, USA	Subjects: MJ users, N=22, age at baseline=13–23 yrs Non-users: N=63, age at baseline=10–22 yrs	1.5 years from baseline	Subjects: mean# days=1049 at baseline and 1202 days during f/u period, Controls: 0 days to 22 days during f/u period	Cannabis users showed a decrease in functional connectivity between caudal anterior cingulate cortex and dorsolateral and orbitofrontal cortices across time (p<0.05)
Tervo-Clemmens, 2018, USA	Subjects: MJ users, N=22 Non-users: N=63, age at baseline for both groups=12 yrs	3 years from baseline	Subjects: # Joints/day between 13–15 years (follow-up period) =0.076 Non-users=0	Those who would initiate cannabis use by 15 years of age had activation differences in frontoparietal (increased) and visual association (decreased) regions and poorer executive planning scores (Stockings of Cambridge) compared with noninitiators (p<0.05)

**Methods used** A comprehensive literature review was performed through multiple search engines, such as PubMed, Google Scholar, and Cochrane using keywords, ‘fMRI’, ‘cannabis’, ‘marijuana’, and ‘longitudinal’. Only studies that involved 2 or more fMRIs at least 18 months apart in adolescent cannabis users and a non-user group were included in our analysis.

**Summary of results** Of 20 studies, 4 satisfied our inclusion criteria (table 1). Adolescent cannabis users had thinner cortices pre-initiation of cannabis but compared to non-users thicker cortices at follow-up (after cannabis use). Although cause and effect can't be proven, thinner brain cortex in frontal and orbitofrontal volume may predict cannabis use later in life. In addition, there was a decrease in functional connectivity and impact on executive planning in cannabis users over time. The studies accounted for some, but not all of the confounding variable. There was variation in chronicity, age at onset, and amount of cannabis used.

**Conclusions** Longitudinal fMRI studies in cannabis users are limited but there is some evidence that cannabis causes alterations in certain areas of the brain that may lead to deleterious effects. However, it is not clear if the alteration is due to use of cannabis or other confounding variables such as stage of adolescent maturation, use of other substances or preexisting differences. Prospective, longitudinal studies are needed to evaluate the association between chronicity of cannabis use and fMRI findings, taking into account other confounding variables.

#### 134 BDNF AUGMENTATION BY AMPAKINES EXPRESSION RESCUES SYNAPTIC DYSFUNCTION AFTER GLOBAL CEREBRAL ISCHEMIA IN THE DEVELOPING BRAIN

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10.1136/jim-2019-WMRC.134

**Purpose of study** Global ischemia in the developing brain often leads to poor neurologic outcomes, including learning and memory deficits. Using a novel murine model of juvenile cardiac arrest (CA), we investigate mechanisms of cognitive deficits and recovery. Brain-derived neurotrophic factor (BDNF)-tyrosine kinase (Trk) B signaling is a required pathway for memory formation and hippocampal synaptic plasticity. We recently demonstrated that enhanced BDNF-TrkB signaling contributes to recovery of cognitive function after global ischemia. AMPAkinases are allosteric modulators of AMPA receptors and some have been shown to augment BDNF levels. We hypothesize AMPAkinases that augment BDNF will reverse synaptic dysfunction following CA.

**Methods used** Male juvenile mice (PND 20–25; equivalent to 2–3 year old human) were subjected to 8 min CA and resuscitated. Memory function was measured using contextual fear conditioning, a hippocampal-dependent memory task. Hippocampal CA1 long-term potentiation (LTP), a well-accepted cellular model for learning and memory, was measured in acute brain slices following a theta-burst stimulation (TBS, 40 pulses 100Hz). Increase in field excitatory post-synaptic potential (fEPSP) slope 60 min after TBS was analyzed to quantify LTP. BDNF ELISA from hippocampal tissue was performed per manufacturer's instructions. Results reported as mean±SD.

**Summary of results** Memory is impaired 7d after CA ( $52 \pm 15\%$  sham,  $n=8$ , vs  $24 \pm 19\%$  CA,  $n=9$ ,  $p<0.05$ ) and recovers 30d after CA ( $52 \pm 14\%$ ,  $n=7$ ). Hippocampal LTP correlates with this neurobehavioral recovery. In controls, LTP was  $153 \pm 15\%$  ( $n=8$ ) of baseline (100%). In contrast, 7d after CA, LTP was impaired ( $110 \pm 16\%$ ,  $n=8$ ,  $p<0.05$  vs sham), followed by recovery at 30d ( $157 \pm 16\%$ ,  $n=8$ ,  $p<0.05$ ). Using ELISA, BDNF levels decreased after CA compared to sham animals ( $n=4$ ,  $p<0.05$ ). Injection of the BDNF-inducing AMPAkinase LY404187 7d after CA or sham increased BDNF ( $n=4$  each,  $p<0.05$ ). In paired studies 7 days after CA, LY404187 applied to hippocampal slices 7d after CA rescues impaired LTP ( $111 \pm 12$  [ $n=4$ ] vs.  $155 \pm 13$  [ $n=4$ ],  $p<0.05$ , paired t-test).

**Conclusions** These data provide unique new data that BDNF enhancing drugs are capable of enhancing recovery from global cerebral ischemia in the young brain during critical school ages.

#### 135 EFFECTS OF GSK3B & MTOR ON MICROTUBULE STABILITY & NEURITE LENGTH

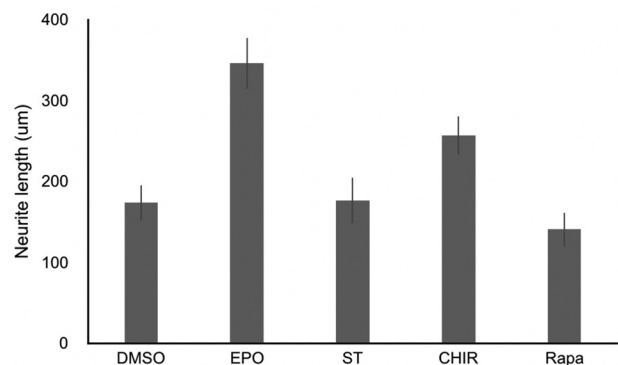
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10.1136/jim-2019-WMRC.135

**Purpose of study** In our study, we hypothesized that modifying GSK3B or mTOR will ultimately result in increased microtubule stability and increased neurite length, which could lend insights into potential avenues for treating Glioblastoma (GBM). Therefore, we investigated whether altering GSK3B or mTOR could promote microtubule stability and increase neurite length in mouse neuronal cells in vitro.

**Methods used** Mouse neurons were treated with DMSO (control and a strong dissociator), CHIR (inhibits GSK3B), Rapa (inhibits mTOR), Epothilone (stabilizes microtubules), and ST401 (destabilizes microtubules). The mouse neurons were derived from mouse stem cells. The differentiation process was straightforward. We took mouse neurospheres, plated them, and then withdrew growth factors from their media and waited approximately one week.

**Summary of results** The average neurite lengths of mouse neurons placed in DMSO was roughly 174um, 347um in EPO,



**Abstract 135 Figure 1** GSK3B inhibition promotes neuronal outgrowth length

177um in ST, 257um in CHIR, and 141um in rapamycin. We observed that the mouse neurons treated with EPO and CHIR appeared more pronounced, clear, and longer, compared to those treated with rapamycin and ST.

**Conclusions** We concluded that inhibiting GSK3B promotes microtubule stability and increases neurite length, and inhibiting mTOR promotes microtubule stability, but decreases neurite length. Future directions include evaluating the molecular response and resistance to mTOR inhibition to improve options for GBM treatment by exploiting vulnerabilities in mTOR targeting and microtubule stabilization.

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### IDENTIFICATION OF PLK1 AND NUSAP1 AS MARKERS FOR FATE-RESTRICTED OLIGODENDROCYTE-LINEAGE PROGENITOR CELLS

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10.1136/jim-2019-WMRC.136

**Purpose of study** This study's purpose was to identify whether a fate-restricted progenitor cell differentiates into oligodendrocyte-lineage cells and, if it does, to characterize the progenitor cell. In addition, we analyzed whether there are differences in the progenitor cell population when comparing wildtype zebrafish to *Boc*<sup>-/-</sup> and *Fbxw7*<sup>-/-</sup> mutants, both of which produce abnormal amounts of oligodendrocytes.

**Methods used** We began experimentation by sequencing the mRNAs expressed by single pMN progenitors. This identified *plk1* and *nusap1* as candidates for markers of fate-restricted oligodendrocyte-lineage progenitor cells. To test this hypothesis, we used fluorescent in situ RNA hybridization to detect expression of *plk1*, *nusap1*, and *olig2* (a marker of all pMN progenitors) in wildtype zebrafish. The fluorescent in situ RNA hybridization was then repeated on *Boc*<sup>-/-</sup> and *Fbxw7*<sup>-/-</sup> mutants.

**Summary of results** *Plk1* and *nusap1* expression were restricted to a subset of *olig2* cells located in the progenitor domain, consistent with the possibility that they mark progenitors fate-restricted to specify into oligodendrocyte-lineage cells. In addition, outside the progenitor domain, *plk1* was colocalized with *olig2* positive cells but there was little colocalization between *nusap1* and *olig2*. Based on the experimentation on mutant zebrafish, oligodendrocyte development seems to be delayed in the absence of Boc receptors for Sonic Hedgehog (Shh) and premature in the absence of *Fbxw7*-dependent degradation of Notch.

**Conclusions** The results provide insight into how the Shh and Notch signalling pathways regulate oligodendrocyte development. In addition, our work supports the theory that a fate-restricted progenitor cell differentiates into oligodendrocyte-lineage cells. We suggest that colocalization between only *plk1* and *olig2* marks oligodendrocyte precursor cells. Furthermore, our work indicates that inducing the expression of *plk1*, *nusap1*, and *olig2* in pluripotent neural stem cells can ultimately create oligodendrocytes that remyelinate damaged axons and restore normal function. Therefore, this research has significance in helping to create a therapy for patients whose myelin has been damaged by disorders such as multiple sclerosis.

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### ASSESSING THE REPEATABILITY OF MEASUREMENTS OBTAINED USING THE VIP-200 PUPILLOMETER

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10.1136/jim-2019-WMRC.137

**Purpose of study** Pupil measurements are an important eye examination that has clinical usage in neuro-ophthalmology, refractive surgery, and neuro critical care. Therefore, it is clinically important for accurate and repeatable measurements when assessing pupil measurements. We assessed the repeatability of pupil measurements with NeurOptics® VIP™-200 pupillometer.

**Methods used** Fifty individuals in the age range of 22 to 35 were examined for this study. Both eyes were measured for each individual after undergoing an ocular examination. Pupillary measurements were obtained using the NeurOptics® VIP™-200 Pupillometer at scotopic (0 lux), low mesopic (0.3 lux), high mesopic (3 lux), and photopic (675 lux) lighting conditions. Trained users obtained two measurements with a time interval of 30 minutes between each measurement. A time interval of 2 minutes was allowed for subjects to dark adapt prior to any measurements performed.

**Summary of results** The mean difference between pupillary measurements is 0.42 mm, 0.62 mm, 0.79 mm, and 0.73 mm for scotopic, low mesopic, high mesopic and photopic conditions, respectively. The paired samples t-test is  $p < 0.001$  for all comparisons. The 95% limits of agreement for measurements is -1.75 to +0.91 mm, -2.02 to +0.78 mm, -2.36 to +0.79 mm, and -1.84 to +0.38 mm for scotopic, low mesopic, high mesopic, and photopic conditions, respectively. Out of 100 sets of measurements, 68, 57, 71, 76 measurement differences are equal to or greater than the clinically significant 0.5 mm for scotopic, low mesopic, high mesopic, and photopic conditions, respectively.

**Conclusions** In assessing the repeatability of NeurOptics VIP-200 infrared pupillometer, we found on average there were small but significant differences in pupil measurements during repeated measurements. On average, each lighting conditions were in the range of 0.50 mm, which is clinically significant and may have significant clinical consequences. Users of the NeurOptics VIP-200 pupillometer should consider taking multiple measurements at different times and averaging their values for more accurate pupil measurements.

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### TARGETING GLYCOGEN SYNTHASE (GYS1) WITH ANTISENSE OLIGONUCLEOTIDE TREATMENT IN A MOUSE MODEL OF POMPE DISEASE

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10.1136/jim-2019-WMRC.138

**Purpose of study** Pompe disease is a progressive myopathy resulting from the deficiency of acid  $\alpha$ -glucosidase (GAA). ERT with recombinant human (rh) GAA works well in alleviating the cardiomyopathy; however, many patients continue to have progressive muscle weakness from muscle glycogen accumulation produced by muscle glycogen synthase (GYS1). Previous studies have provided proof of principle that knockdown of GYS1 mRNA by phosphorodiamidate

morpholino oligonucleotide conjugated with a cell penetrating peptide reduced glycogen, however was nephrotoxic. Antisense Oligonucleotides (ASO) technology has emerged as a powerful therapeutic alternative for the treatment of genetic disorders by targeting RNA. Most recently, therapy for spinal muscular atrophy has been successful using ASOs, and our hope is that ASO technology will be successful in Pompe disease. We propose that knocking down GYS1 with ASOs may prove to be a useful therapeutic target in Pompe disease.

**Methods used** In order to impart specificity for the muscle glycogen synthase (GYS1), we used ASO-mediated gene silencing through the RNaseH1 dependent degradation mechanism.

**Summary of results** Over 150 ASOs were designed and screened in vitro to identify the most efficacious ASO for testing in wild type mice. The lead from the screen were validated in a dose response study and the top 10 ASOs were screened in vivo. Three ASOs (GYS1 ASO#1, ASO#2 and ASO#3) showed the best tolerability and efficacy profile leading to knock down of GYS1 mRNA by approximately 50% of control. We performed a pilot study of the efficacy of three GYS1 ASOs in Pompe mice as monotherapy. We were able to see reduced muscle GYS1 mRNA levels and glycogen with the ASOs versus PBS or a mismatch ASO. ASO#2 however resulted in weight loss of the mice. Overall GYS1 ASOs #1 and possibly #3 seemed the most promising in reducing muscle GYS1 levels and glycogen content.

**Conclusions** These preliminary studies provide proof of principle that GYS ASOs might be a potentially promising adjunct treatment for Pompe disease in reducing GYS1 and glycogen in muscle.

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#### PRESUMED CONVERSION DISORDER IN A PATIENT FOUND TO HAVE NEW ONSET MULTIPLE SCLEROSIS: CHALLENGES IN DIAGNOSIS AND TREATMENT

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10.1136/jim-2019-WMRC.139

**Introduction** Conversion Disorder, referred to as Functional Neurological Symptom Disorder under DSM-5, is often a diagnosis of exclusion after primary organic/neurological causes are ruled out, and when clinical findings do not correlate with recognized disease states. The following case report highlights the diagnostic and treatment challenges in a patient initially thought to have conversion disorder but later diagnosed with severe relapsing-remitting multiple sclerosis (MS).

**Case report** 45-year-old Caucasian female with a history of schizoaffective disorder and mild cognitive delay who was admitted to our facility after reported inability to move her limbs or walk for a month. She underwent extensive testing including neuroimaging of the head, neck, and spine and lumbar puncture in prior hospitalizations. Results revealed an abnormal signal at C5 level of MRI thoracic spine, however further testing was limited due to anxiety and refusal of additional analysis.

On admission, patient was unable to move her body, requiring a sitter to reposition, feed, and bathe her. Neurology was consulted and patient was found to have weakness/rigidity in her extremities as well as sensory/positional deficits below the neck. Labs revealed low vitamin B12 levels and she was

started on replacement therapy in addition to her psychiatric medications. T2-weighted brain MRI with and without contrast with fluid-attenuated inversion recovery showed multiple periventricular hyperintense areas. Cerebrospinal fluid analysis revealed elevated IgG, IgG synthesis rate, and oligoclonal bands, further supporting a diagnosis of MS. Patient was treated with oral prednisone, aggressive plasmapheresis and physical therapy, with subsequent improvement in movement/ambulation.

**Discussion** Clinicians should maintain a high level of suspicion and broad differential diagnosis in patients with established psychiatric illness and new neurologic symptoms. A thorough workup should be done to rule out underlying medical conditions before considering a diagnosis of conversion disorder. This is imperative to prevent misdiagnosis or delay in timely treatment and care.

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#### THE SELECTIVE SEROTONIN REUPTAKE INHIBITOR FLUOXETINE REVERSES ANDROGEN DEPRIVATION THERAPY-INDUCED DISRUPTION OF HIPPOCAMPAL NEUROGENESIS

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10.1136/jim-2019-WMRC.140

**Purpose of study** Cognitive impairment (CI) is an important side effect of androgen deprivation therapy (ADT), a widely used treatment for prostate cancer. Previous studies show androgen deprivation reduces adult hippocampal neurogenesis (AHN), whereas selective serotonin reuptake inhibitors (SSRIs) stimulate it. Therefore, SSRIs may be a potential therapeutic approach to preventing and/or treating disruption of AHN and the subsequent CI. This investigation sought to test the hypothesis that the SSRI, fluoxetine, can reduce or block androgen deprivation-induced reduction of AHN.

**Methods used** Mice were randomly divided into four groups: sham/vehicle, sham/fluoxetine, castration/vehicle, and castration/fluoxetine. They underwent castration or sham surgery and were then given fluoxetine in their drinking water or plain drinking water. The mice were sacrificed five weeks post-surgery and their brains harvested for Western blot analyses of Ki-67 (marker for neuron proliferation), doublecortin (DCX, protein expressed in immature neurons and neuron precursors), and NeuN (protein expressed in mature neurons). GAPDH (a housekeeping protein) was used as a loading control.

**Summary of results** Our investigation showed decreased Ki-67 protein levels in castration/vehicle compared to the sham/vehicle group. The decrease in Ki-67 in the castration/vehicle groups was prevented in the castration/fluoxetine group. Furthermore, there were no differences between sham/vehicle and castration/fluoxetine groups. There were no differences in NeuN and DCX levels among the four treatment groups.

**Conclusions** The results suggest that treatment with fluoxetine reduced the effects of ADT on AHN. It will be important to test whether other drugs that stimulate AHN also are effective in reducing the effects of ADT and whether they can reverse the effects once they develop. This approach may be useful in preventing and/or treating ADT-induced CI in patients with prostate cancer.

### 141 UBE3A OVEREXPRESSION REDUCES HIPPOCAMPAL SK2 CHANNEL LEVELS IN MICE

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10.1136/jim-2019-WMRC.141

**Purpose of study** Angelman syndrome (AS) is characterized by severe developmental delay and cognitive and motor impairments. AS and autism spectrum disorder (ASD) are linked to abnormal neuronal levels of the E3 ligase, UBE3A. UBE3A is an imprinted gene with the maternal allele being expressed and paternal allele silenced. AS is caused by reduced maternal UBE3A gene expression which results in UBE3A protein deficiency. UBE3A overexpression is associated with increased risk for ASD. Our previous studies showed that UBE3A ubiquitinates small conductance potassium (SK2) channels and targets them for degradation. UBE3A deficiency in AS mice results in increased SK2 levels and impairments in synaptic plasticity and learning and memory. We hypothesized that UBE3A overexpression in transgenic (TG) mice would result in decreased SK2 levels, thereby affecting synaptic plasticity and learning and memory in ASD.

**Methods used** Coronal brain sections from TG and wild-type (WT) mice were processed for immunohistochemical staining. After blocking, brain sections were incubated with primary antibody at 4°C overnight. Sections were then washed and incubated with secondary antibodies for 2 hours at RT. After further washes, sections were mounted and imaged with a Zeiss LSM 880 confocal microscope with a 20x objective. ImageJ software was used to evaluate average fluorescence intensity (AFI) of SK2 immunoreactivity (ir) in the hippocampus. Data were analyzed using a two-tailed, unpaired Student *t*-test.

**Summary of results** The AFI of SK2-ir in the hippocampus of TG mice was 38±9.24% of the AFI of SK2-ir in the hippocampus of WT mice (set as 100%) ( $p=0.0068$ ;  $n=12$  sections from 3 TG and 3 WT mice).

**Conclusions** Our preliminary results showed that mice with UBE3A overexpression exhibited decreased SK2 channel levels in the hippocampus as compared to WT mice. These results align with our hypothesis that SK2 is a substrate of UBE3A whose overexpression results in SK2 ubiquitination and degradation. Further experiments will need to test whether decreased SK2 levels affect synaptic plasticity and learning and memory in TG mice.

## Pulmonary and critical care I

### Concurrent session

3:15 PM

Thursday, January 23, 2020

### 142 EMERGENCY DEPARTMENT AIRWAY MANAGEMENT FOR ASTHMA

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10.1136/jim-2019-WMRC.142

**Purpose of study** Data are limited regarding current practice and outcomes for emergency department airway management in asthma. Our goal was to describe the methods, equipment used, medications, techniques, adverse events and outcomes for emergency airway management in asthmatic patients through multi-center surveillance.

**Methods used** We analyzed all intubations with a primary indication of asthma over a three-year period (January 1, 2016–December 31, 2018) using the National Emergency Airway Registry (NEAR), a 25-center prospective observational registry of ED intubations. We report the incidence of intubations for asthma, methods and medications used, device, peri-intubation adverse events, as well as intubation success and failure using univariate descriptive statistics and cluster-adjusted 95% Confidence Intervals (CI).

**Summary of results** A total of 19,071 encounters were recorded during the study period with 14,517 intubated for medical indications. Of those, 173 (1.2%, CI 0.9–1.6%) were intubated for asthma. Nearly two-thirds ( $n=56$ , 62.9%) were pre-oxygenated with bi-level positive airway pressure. Rapid sequence intubation (RSI) was used in 96.5% of cases. For these, more than half ( $n=85$ , 50.9%, CI 30.1–71.4%) were induced with ketamine, followed by etomidate at 48.5% ( $n=81$ , CI 27.8–69.7%). There was an overall adverse event rate of 12.14%. First attempt success was 90.8%. Overall intubation success was 100%. There was no difference in first-attempt success between ketamine and etomidate intubations. Compared to the registry as a whole, asthma patients were more likely to undergo RSI (96.5% versus 80.8%), pre-oxygenation with bi-level positive airway pressure (62.9% versus 6.2%), and induction with ketamine (50.9% versus 12.8%).

**Conclusions** In our registry, intubation for asthma is uncommon. When required, the majority of patients are intubated using rapid sequence intubation after preoxygenation with bi-level positive airway pressure and induction with ketamine, a practice unique to asthma. It is unclear whether the high rate of Bi-PAP use is reflective of initial treatment or simply the most popular means of pre-oxygenation. Videolaryngoscopy use and first-attempt success are high and similar to the registry as a whole.

### 143 POST-OPERATIVE DELIRIUM IS ASSOCIATED WITH POORER HEALTH-RELATED QUALITY OF LIFE AND MORTALITY AFTER LUNG TRANSPLANTATION

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10.1136/jim-2019-WMRC.143

**Purpose of study** Post-operative delirium after lung transplantation (LT) is common. Its association with health-related quality of life (HRQL), depression, and mortality is unclear.

**Methods used** In 236 LT recipients, HRQL and depressive symptoms were measured before and through the first year after LT. Surveys included the Geriatric Depressive Scale (GDS), with lower scores indicating fewer symptoms, and Survey Short Form 12-Physical Component Score (SF12-PCS), with higher scores indicating better HRQL. Delirium was assessed twice daily with the Confusion Assessment Method (Intensive Care Units version). Delirium and

mortality data were extracted from the electronic medical record. We examined the association between delirium and depressive symptoms/HRQL with linear mixed effects models and the association between delirium and mortality with cox proportional hazard models. Models were adjusted for age, sex, native disease, and lung allocation score (LAS).

**Summary of results** ICU delirium occurred in 34 subjects (14%). Delirium was associated with worse generic physical HRQL but not significantly poorer depressive symptoms (table 1). Those who experienced delirium had a nearly 16-fold increased risk of mortality (table 2).

**Abstract 143 Table 1** Differences in patient reported outcome scores by delirium status after LT

	Difference between those who were delirious and those who were not	P-Value
SF12-PCS	-4.0 (95% CI: -7.5, -0.6); [MCID: 5]	0.02
GDS	0.4 (95% CI: -0.7, 1.5); [MCID: 1.7]	0.49

MCID=Minimally clinically important difference

**Abstract 143 Table 2** The association between delirium and risk of death through first post-transplant year

Model	Hazard ratio (95% CI)	P-value
Unadjusted	11.3 (3.3, 38.4)	0.0001
Adjusted for age, sex, native disease, LAS	15.9 (3.9, 64.4)	0.0001

**Conclusions** Delirium after LT identifies a group at high risk for worse outcomes and is associated with poorer HRQL and increased mortality. Implementing strategies to prevent and/or treat delirium may improve both HRQL and mortality risk after LT.

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#### MANAGEMENT OF SEVERE PULMONARY HYPERTENSION IN PREGNANCY WITH EPOPROSTENOL

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10.1136/jim-2019-WMRC.144

**Case Report** Pulmonary arterial hypertension in pregnancy has a limited set of treatment options and we present a rare case in which Epoprostenol lead to a preterm delivery and a protracted hospital course.

Pulmonary arterial hypertension (PAH) is caused by increase in pulmonary vascular resistance secondary to vasoconstriction, remodeling, and thrombosis of small pulmonary arteries and arterioles. In pregnancy, physiologic changes occur which may contribute to increased complications.

We present a 31-year-old African American female, G13P1A11 with multiple comorbidities presenting with sudden onset dyspnea at rest. Right heart catheterization demonstrated mean pulmonary arterial pressure of 43.3 mmHg.

Patient was started on intravenous Epoprostenol in the intensive care unit at 27 weeks and 5 days gestation. The initial dose was 2ng/kg/min with increasing dose by increments of 1–2ng/kg/min every fifteen minutes until the side effects of flushing, jaw pain, nausea, or hypotension occurred. Epoprostenol discontinued due to extreme lethargy. Patient continued to endorse shortness of breath and lethargy, requiring transfer to a higher level of care. After arrival and prior to Epoprostenol being restarted, the fetal heart tracing showed decelerations prompting emergent cesarean at 28 weeks gestation. Postpartum, patient underwent second course of treatment with Epoprostenol and discharged with Sildenafil and Macitentan. Postpartum echocardiography did not demonstrate improvement or worsening of PAH. Within the first postpartum week patient experienced multiple pulmonary embolisms requiring treatment with heparin later transitioning to apixaban. The neonate was delivered via cesarean and transferred to NICU.

Therapeutic agents include endothelin receptor antagonists, phosphodiesterase-5 inhibitors, and prostacyclin analogs. Based on limited data, risk of fetal harm and maternal side effects remains uncertain. There are few case reports describing successful treatment with Epoprostenol in pregnant women with PAH. Endothelin receptor antagonists not used due to teratogenic effects. Further investigation is needed to formulate a safe and efficacious treatment plan.

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#### WORSE SLEEP QUALITY IS ASSOCIATED WITH INCREASED RISK OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE EXACERBATION

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10.1136/jim-2019-WMRC.145

**Purpose of study** Sleep disturbance is recognized as a symptom component in chronic obstructive pulmonary disease.[i] One study demonstrated that poor sleep quality as defined by Pittsburgh Sleep Quality Index (PSQI) score >5 is associated with increased risk of COPD exacerbations.[ii] However, limited sample sizes and confounders have impeded the ability to replicate or quantify this association.

**Methods used** A cross-sectional study of 1,137 participants with COPD from the Subpopulations and Intermediate Outcome Measures in COPD Study (SPIROMICS) were included for this analysis. SPIROMICS is a multi-center prospective cohort of subjects with and without COPD. The Pittsburgh Sleep Quality Index (PSQI) is an instrument with 19 scored responses to assess sleep quality. Participants with an index of 5 or higher were considered to have poor sleep. Exacerbations were defined as events that led to some contact with the healthcare system with use of systemic corticosteroids or antibiotics. We used negative binomial regression to examine the association between COPD exacerbations and the PSQI. The model was adjusted for age, gender, race, FEV1%predicted, GOLD severity, diagnosis of asthma, ischemic heart disease, apnea, depressive and anxiety symptoms, pneumococcal and influenza vaccination status, history of malignancy, income, and educational attainment.

**Summary of results** 609 (53%) subjects had poor sleep. Compared with those with good sleep quality, poor sleepers were

on average younger, more often African-American, of lower income and lower educational attainment, but with less smoking history. Even after adjusting for covariates, each unit increase in PSQI score (range 0–20) was associated with a 2.9% increase in the risk for exacerbation (IRR 95% CI 1.00 – 1.05) and a 4.2% increased risk for severe exacerbations (95%CI 1.00–1.08).

**Conclusions** PSQI score is positively correlated with annual rate of acute COPD exacerbations. Sleep may be an important target for assessment in the treatment of this disease.

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2. Shorofsky M, et al. 'Impaired Sleep Quality in COPD Is Associated With Exacerbations: The CanCOLD Cohort Study.' *Chest* 2019.

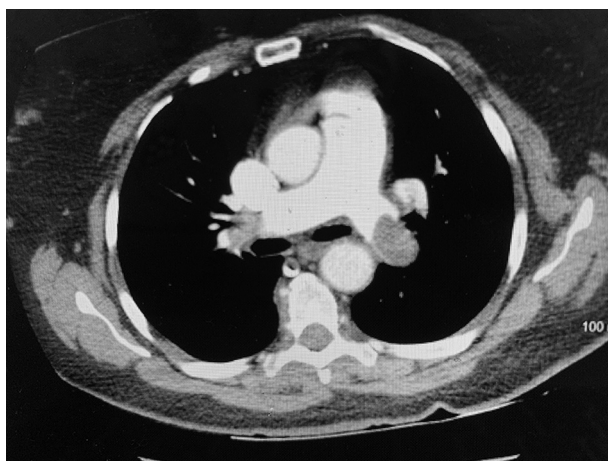
#### 146 RECURRENT SYNCOPE AS A PRESENTATION OF PULMONARY EMBOLISM – A CASE REPORT

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10.1136/jim-2019-WMRC.146

**Case Report** The diagnosis of pulmonary embolism (PE) is challenging especially when patients present with vague symptoms. Early diagnosis and management of PE is crucial to prevent life-threatening sequels.

A 60-year-old woman brought by EMS after having syncope while walking. She reported shortness of breath (SOB) before syncope. She has hypertension, type 2 DM, osteoporosis and multiple syncopes (>10) in past year. Her investigation in another hospital includes EKG, 24-hour telemetry, echocardiogram and stress-test were normal but did not have chest CT. Her vital signs and exam were normal. Blood tests and EKG were unremarkable except mild anemia (Hb10.9) and elevation of troponin T (0.015). She was advised to admit but signed out against advice. On way out, she had another syncope that recovered spontaneously but had worsening SOB. She had tachypnea, respiratory distress and hypoxemia, oxygen saturation in 60s. Chest CTA showed prominent bilateral PE. She received heparin and thrombolysis (EKOS). Doppler sonography found occlusive thrombosis left popliteal vein with parti-



**Abstract 146 Figure 1** CTA - submassive PE

ally occlusive distal left superficial femoral vein. She was discharged on apixaban. Her SOB improved and no recurrent syncope was reported.

PE is a differential diagnosis for syncope in most textbooks, but when patients came due to syncope, PE, a potentially fatal disease requiring urgent attention, is rarely considered. This case is interesting as a patient had multiple syncopes without suspicious of PE until developing severe hypoxemia. PE should be considered in all patients experience syncope particularly with SOB, respiratory distress and hypoxemia.

#### 147 COMPARISON OF LUNG INFLAMMATION IN A HOUSE DUST MITE- AND *ASPERGILLUS FUMIGATUS* EXTRACT-INDUCED ALLERGIC ASTHMA MOUSE MODEL

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10.1136/jim-2019-WMRC.147

**Purpose of study** Asthma affects 8.3% of the U.S. population with rising prevalence and no cure. Current investigations have demonstrated that asthma is multifactorial. Due to these etiological complexities, animal models have been developed to further our understanding of the underlying pathogenesis and pathophysiology of different asthma phenotypes. The most well-characterized mouse model of allergic asthma is the ovalbumin model. However, asthma models induced by house dust mite (HDM) invasion have been recently considered to be more relevant to human asthma. We propose a new *Aspergillus fumigatus* (AF) extract-induced asthma model that may also be relevant to human asthma. Herein, we characterized and compared lung inflammatory responses induced by HDMs and AF extracts in two different mouse models of asthma.

**Methods used** BALB/c mice were challenged with (1) intraperitoneal and intranasal HDMs over 16 days or (2) three times weekly intranasal AF extracts for 8 weeks. Bronchoalveolar lavage (BAL) fluid samples were collected and subjected to differential leukocyte analysis using flow cytometry. Data are represented as the mean of detected CD45+ macrophages, CD11b+ lymphocytes, Ly-6G+ neutrophils and Siglec F+/MHCII+ eosinophils as percentages of total counted viable leukocytes.

**Summary of results** The models produced unique distributions of leukocytes in the BAL fluid. While the control group was almost exclusively characterized by CD11c+ alveolar macrophages (99.95%), the HDM-induced disease group demonstrated a significant neutrophil (39.06%) response. Contrastingly, the AF extract-induced disease group had significant increases in eosinophil (28.51%) and lymphocyte (14.52%) populations compared to controls (0.37% and 5.00%, respectively).

**Conclusions** Differential leukocyte analysis of the BAL fluid collected from HDM-induced asthma suggested a severe, acute invasive response, marked by increased neutrophil infiltration. In contrast, the AF extract asthma model produced a Th2-mediated chronic allergic response, as marked by increased eosinophil and lymphocyte infiltration.

148 **SARCOPENIA IS ASSOCIATED WITH FRAILITY IN LUNG TRANSPLANT CANDIDATES**

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10.1136/jim-2019-WMRC.148

**Purpose of study** Frailty is associated with mortality in lung transplantation (LT). Sarcopenia is considered a part of frailty; this relationship has not been confirmed in lung disease.

**Methods used** In 367 LT candidates, we used three sarcopenia definitions: European Working Group on Sarcopenia in Older People (EWGSOP); FNIH Sarcopenia Project (FNIH); and lowest quartile of appendicular skeletal muscle mass (ASMI). ASMI was measured by bioelectrical impedance analysis. Frailty was measured by Short Physical Performance Battery (SPPB; SPPB ≤7=frail) and Fried Frailty Phenotype (FFP; FFP ≥3=frail). Associations between sarcopenia definitions and frailty were tested by logistic regression adjusting for age, sex, diagnosis. Non-linear associations between ASMI and frailty were tested using generalized additive models (GAMs), adjusting for age, sex.

**Summary of results** Sarcopenia was associated with increased risk of frailty by EWGSOP and lowest quartile definitions (table 1). By GAMs, the relationship between ASMI and frailty risk was linear (figure 1).

**Conclusions** Sarcopenia is associated with frailty in LT candidates by EWGSOP and distribution-based definitions. Studies are needed to optimize sarcopenia definitions and determine if reducing sarcopenia improves LT outcomes.

**Methods used** An analysis of adult patients who underwent wide excision or flap repair of facial skin cancer defects were recruited and provided consent for this study. The automated

facial analysis program Emotrics automatically displays the facial image with 68 facial landmarks used to locate the perimeter of the face, interpupillary distance, and a central vertical axis of the face. These landmarks on preoperative and postoperative photographs were used to quantify facial symmetry. Measurements of facial features: brow, nasal ala, and nasal base excursion were calculated from preoperative and immediate postoperative photos and preoperative and three-month postoperative photos for analysis.

**Summary of results** Photographic results will be presented and demonstrate a time scale for the improvement in facial skin distortion over the healing period. Brow deviation measured at 0.84 cm immediately postoperatively compared to preoperative baseline symmetry, measured at 0.22 cm of deviation from baseline at three-months postoperatively. Decay charts for the various facial regions measured demonstrate a similar phenomenon of improvement towards baseline appearance at three months.

**Conclusions** Measurements of the skin's compliance and the degree to which facial surgical site skin deviation returns to preoperative baseline measurements was captured using a machine learning technology. Further data gathered may help providers tailor counseling for different time points in the perioperative periods of facial surgery and better prepare patients for healing timeframe expectations.

Surgery II

Concurrent session

3:15 PM

Thursday, January 23, 2020

149 **AUTOMATED FACIAL MEASUREMENTS PROVIDE EMPIRICAL DATA OF SKIN COMPLIANCE**

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10.1136/jim-2019-WMRC.149

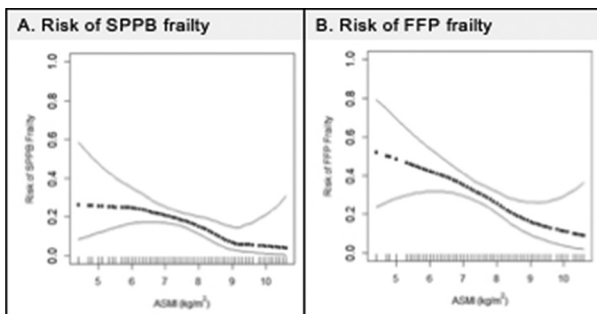
**Purpose of study** A recent study found that concerns about social interactions and physical appearance did not improve until three months after facial reconstructive surgery and may correlate with improved healing and the appearance of skin over time. There is no empirical data and measurements of the skin's compliance and the degree to which facial surgical site skin deviation returns to preoperative baseline measurements. Emotrics, a machine learning technology, provides an objective tool for facial analysis. The data from this study may help providers anticipate patient concerns and tailor counseling for different time points in the preoperative and postoperative periods.

**Methods used** An analysis of adult patients who underwent wide excision or flap repair of facial skin cancer defects were recruited and provided consent for this study. The automated facial analysis program Emotrics automatically displays the facial image with 68 facial landmarks used to locate the perimeter of the face, interpupillary distance, and a central vertical axis of the face. These landmarks on preoperative and postoperative photographs were used to quantify facial symmetry. Measurements of facial features: brow, nasal ala, and nasal

**Abstract 148 Table 1** Sarcopenia and risk of frailty, testing three definitions of sarcopenia

	EWGSOP*	FNIH <sup>o</sup>	Lowest Quartile <sup>r</sup>
SPPB Odds Ratio (95% CI)	3.4 (1.7–7.0); p<0.01	0.9 (0.4–2.2); p=0.86	1.8 (0.9–3.2); p=0.08
FFP Odds Ratio (95% CI)	2.4 (1.2–5.0); p=0.02	1.3 (0.6–2.9); p=0.51	2.3 (1.3–4.1); p<0.01

\*ASMI = ASM/ht2<7.0 kg/m2 in men,<5.5 kg/m2 in women <sup>o</sup>ASM:BMI<0.789 men,<0.512 women <sup>r</sup>ASM/ht2<7.4 kg/m2 men,<5.9 kg/m2 women



Generalized Additive Models. Dotted line = effect estimates w/95% CI (thin lines). Adjusted for age, sex. ASMI = appendicular skeletal muscle index = ASM/hP. SPPB = Short Physical Performance Battery. FFP = Fried Frailty Phenotype.

**Abstract 148 Figure 1** Association between ASMI and predicted risk of frailty using (A) SPPB and (B) FFP



base excursion were calculated from preoperative and immediate postoperative photos and preoperative and three-month postoperative photos for analysis.

**Summary of results** Photographic results will be presented and demonstrate a time scale for the improvement in facial skin distortion over the healing period. Brow deviation measured at 0.84 cm immediately postoperatively compared to preoperative baseline symmetry, measured at 0.22 cm of deviation from baseline at three-months postoperatively. Decay charts for the various facial regions measured demonstrate a similar phenomenon of improvement towards baseline appearance at three months.

**Conclusions** Measurements of the skin's compliance and the degree to which facial surgical site skin deviation returns to preoperative baseline measurements was captured using a machine learning technology. Further data gathered may help providers tailor counseling for different time points in the perioperative periods of facial surgery and better prepare patients for healing timeframe expectations.

#### 150 EFFICACY OF INTRA-ARTICULAR INJECTIONS WITH CORTICOSTEROIDS VERSUS KETOROLAC IN THE HIP AND KNEE

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10.1136/jim-2019-WMRC.150

**Purpose of study** Intra-articular steroid injections have become a mainstay of treating moderate to advanced arthritis. However, concern exists regarding associated risks and adverse effects. Non-steroidal anti-inflammatory injections, such as Ketorolac, may offer similar benefits as steroids without a similar risk profile. There is, however, a paucity of direct comparison between these two injection types. This study evaluates the effectiveness of Triamcinolone, a corticosteroid, and Ketorolac, an anti-inflammatory, in treating symptoms of moderate to advanced osteoarthritis of the hip and knee.

**Methods used** 110 patients (52 hips, 58 knees) with documented moderate to advanced degeneration of the hip or knee were randomized in a double-blinded study. Baseline measurements were obtained via the Visual Analogue Scale (VAS), Knee injury and Osteoarthritis Outcome Score Jr. (KOOS Jr.) or Hip dysfunction and Osteoarthritis Outcome Score Jr. (HOOS Jr.), and PROMIS Global Health Score. Patients were randomly assigned to receive Ketorolac or Triamcinolone injections given via ultrasound guidance. Follow up surveys were collected 1 week, 1 month, and 3 months after the injection date. Data was compared by two-way repeated measures ANOVA with a Bonferroni posthoc test of means comparison.

**Summary of results** No significant differences were noted in comparing the effectiveness of Triamcinolone or Ketorolac for KOOS Jr., HOOS Jr., and VAS ( $p > 0.66$ ). HOOS Jr. and VAS scores for hip injections were significantly lower comparing pre-injection to all time points ( $p < 0.001$ ). Knee injections showed identical results, except comparison of drug-time interactions revealed significant decreases in scores for both drugs with Triamcinolone effect occasionally being significant at a greater number of time points. No significant differences in Global Health score were noted due to injections.

**Conclusions** Ketorolac is non-inferior compared to Triamcinolone in providing improved functionality and pain relief to degenerative joint disease in the hip and knee. This allows providers an additional low-cost medication to offer patients with contraindications to steroid injections. Further studies will be beneficial to assess if Ketorolac has a similar risk profile when compared to steroid injections.

#### 151 EFFECT OF PAIN MEDICATION REGIMEN ON HOSPITAL LENGTH OF STAY AFTER CLEFT PALATE SURGERY

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10.1136/jim-2019-WMRC.151

**Purpose of study** Optimal post-operative length of stay (LOS) for patients having cleft palate surgery is unclear. This study aims to understand how pain medication regimen affects post-operative LOS following primary cleft palate repair.

**Methods used** A retrospective chart review was performed on 200 consecutive patients who had cleft palate repair from June 2011 to May 2018 at BC Children's Hospital. Data collection included: patient demographics, post-operative pain medication regimens (e.g. dose, frequency, regularity), and post-operative LOS.

**Summary of results** The cohort of 200 patients (108 male : 92 female) had a median age of 11.0 months (IQR 9.5 – 12.4) at the time of surgery, and a median post-operative LOS of 43.1 hours (IQR 26.1 – 50.1). Regularly dosed acetaminophen ( $n=77$ ) was associated with a shorter median LOS of 28.6 hours compared to 45.5 hours for PRN dosed acetaminophen ( $n=122$ ), ( $p=0.02$ ). Regularly dosed ibuprofen ( $n=20$ ) was also associated with a shorter median length of stay of 26.1 hours as compared to 43 hours for PRN dosed ibuprofen ( $n=75$ ) and 43.9 hours for no ibuprofen ( $n=105$ ), ( $p=0.03$ ). Length of stay was not associated with patients receiving only acetaminophen ( $n=104$ ) or both acetaminophen and ibuprofen ( $n=95$ ) ( $p=0.26$ ). LOS was not associated with the type of opioid analgesia prescribed: codeine ( $n=66$ ), morphine ( $n=65$ ), or codeine and morphine ( $n=58$ ), ( $p=0.95$ ).

**Conclusions** Patients receiving regularly dosed acetaminophen or ibuprofen have shorter LOS following cleft palate repair. Opioid analgesia is not associated with post-operative LOS.

#### 152 DEVELOPMENT OF A MODEL TO RECRUIT T-REGULATORY CELLS TO VASCULARIZED COMPOSITE ALOGRAFT TISSUE

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10.1136/jim-2019-WMRC.152

**Purpose of study** Regulatory T lymphocytes (T-regs), play a key role in immune homeostasis due to their ability to suppress effector T lymphocytes. Cancer immunology studies have shown that recruitment of T-regs enables tumors to evade the immune system using C-C motif chemokine ligand 22, or CCL22, to recruit T-regs. This concept has been extrapolated

to transplant immunology. The known immunomodulatory potential of mesenchymal stem cells (MSCs) within bone marrow (BM) makes an attractive cell vector for expression of CCL22 in vascularized composite allograft tissue. We aim to assess the fate of the locally injected BM-MSCs expressing CCL22, and their ability to recruit T-regs.

**Methods used** BM cells were isolated from rat hindlimb bones and cultured under standard protocol. After 3 passages, the percentage of MSCs was evaluated by flow cytometry based on CD45-, CD54+, and CD90+ markers. Cultured cells were then transfected with double stranded adenovirus encoding CCL22 and GFP (green fluorescent protein). Images of cultured cells were taken with a fluorescent microscope to confirm GFP expression. These cells were injected into the wound bed of rats receiving syngeneic skin grafts and in a non-surgical area of skin on the same animal. Tissue samples were collected from the skin graft, non-surgical injection site, and native skin on post-operative days 1 and 5. GFP expression was assessed by paraffin embedded tissue examination under fluorescence microscope. T-reg cell recruitment was evaluated by immunohistochemistry of FoxP3 expression.

**Summary of results** We found 73.8% of our cultured BM to have the characteristic markers of MSCs. Transduction efficiency of cultured cells was 99%. Unstained paraffin sections showed no difference in fluorescence when compared to untreated controls. FoxP3 immunohistochemistry was negative for T-regulatory cells in the skin graft tissue and non-surgical tissue with injected cells.

**Conclusions** Though the cultured BM-MSCs were able to robustly express GFP, the cells were not identified *in vivo*, nor were T-regs recruited to the areas examined. There are many variables involved in this experiment and the model requires continued optimization.

### 153 RESUSCITATIVE THORACOTOMY IN THE EMERGENCY DEPARTMENT: FACTORS AND SURVIVAL

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10.1136/jim-2019-WMRC.153

**Purpose of study** The use of resuscitative thoracotomy in trauma patients remains a controversial topic. Previous investigations have reported that patients with blunt injuries have a higher rate of mortality than patients with penetrating injuries. The current retrospective study aimed to further explore the specific mechanisms of injury and factors that may increase survival of the patient undergoing the procedure.

**Methods used** All patients with thoracotomies performed at Arrowhead Regional Medical Center (ARMC) from 2011–2019 were extracted from Electronic Medical Record (EMR). Patients were excluded from the analysis if they were less than 18 years old. Parameters of interest included mortality, age, time of thoracotomy compared to time of arrival, and mechanism of injury (blunt versus penetrating). Data was extracted from nurse notes, paramedic notes, discharge summaries, and EMR.

**Summary of results** Among the 40 patients included in the original database, four patients were excluded due to age <18 years. As a result, 36 patients were included in the final analysis. The average age was 38.2 (SD=15.1) years, 75% (n=27) were males, 55.6% (n=20) were Hispanic, 41.7%, 69.4% (n=25) sustained penetrating trauma, and the average Injury Severity Score (ISS) was 27.6 (SD=17.2). The overall mortality was 77.8% (n=28). Blunt trauma was associated with 100% mortality (n=11 of 11), while penetrating trauma was associated with a 68% mortality (n=17 of 25), however the difference failed to reach statistical significance due to small sample size (p=0.0757). Factors such as age, gender, and ISS were not statistically significantly associated with mortality.

**Conclusions** The primary aim of the study, which was to analyze thoracotomy survival rates at a regional trauma center based on a number of demographic and other factors, was met. The knowledge provided by this study highlights the need for continual revisiting of thoracotomy guidelines in order to decrease utilization of the procedure based on circumstance. Further multicenter studies are needed to illuminate how mortality is impacted by the many external factors listed previously.

### 154 THE IMPACT OF INTRAOPERATIVE INDOCYANINE GREEN ANGIOGRAPHY (SPY-PHI) FOR PATIENTS WITH FACIAL DEFECTS ON OPERATIVE TIME AND NUMBER OF PROCEDURES

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10.1136/jim-2019-WMRC.154

**Purpose of study** Basal and squamous cell skin cancers present a multiplex problem because of the risks of major disfigurement and muscle or nerve injury, especially in fragile areas such as the face. This causes an increase in operative time and trips to the operating room for patients with these facial defects. However, SPY Portable Handheld Imager (SPY-PHI) is a tool that uses indocyanine green fluorescence imaging technology that could aid in reducing operation time and trips. SPY-PHI enhances the surgeon's ability to assess tissue viability by intraoperatively evaluating blood flow and tissue perfusion; thus, providing a more efficient method.

**Methods used** This is a case series using intraoperative SPY-PHI angiography to evaluate patients with facial defects such as basal and squamous cell skin cancers. SPY-PHI was used to assess blood flow, examine the extent of vascular injury, and assist in flap tailoring. Angiography with SPY-PHI is performed at the beginning of the case to demarcate non-viable tissue and affected areas are marked for excision. It is subsequently used after flap elevation to ensure perfusion of transported tissue. Total operative minutes and trips to the operating room are compared to historical cases where SPY-PHI technology was not used.

**Summary of results** Out of 30 patients, 4 have been assessed with intraoperative SPY-PHI angiography. With SPY-PHI, the average number of trips to the OR was 2.75 and the average operation time was 577.5 minutes. For the 26 patients that did not undergo SPY-PHI, the average number of trips to the OR was 1.35 and the average operation time was 202.08 minutes.

**Conclusions** The previous hypothesis stated that SPY-PHI technology would decrease the time spent in the OR as well as trips to the OR. However, this was rejected as the results revealed that using SPY-PHI intraoperatively took more operating time and trips for patients with basal and squamous cell skin cancers. A possible reason for this outcome is that the cases which had used SPY-PHI were more complicated compared to those that had not used intraoperative angiography. Nonetheless, although SPY-PHI is highly useful in aiding surgeons to accurately assess tissue injury and viability, it does not reduce operative minutes and trips to the OR.

### 155 EVALUATION OF COHORT PROGRESSING FROM FIRST TO SECOND STAGE SACRAL NEUROMODULATION AND INDICATIONS FOR UNPLANNED DEVICE REMOVAL

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10.1136/jim-2019-WMRC.155

**Purpose of study** Sacral neuromodulation (SNM) is indicated for the treatment of overactive bladder, urinary retention, and bowel disorders, and is typically implanted in two procedures. Patient selection criteria that predict progression from the first to second Stage of implantation is not well defined. The purpose of this study is to determine whether symptoms, comorbidities, and demographics influence progression to second Stage implantation or future unplanned SNM removal or revision. This study seeks to provide additional clinical guidance for deciding between staged or direct full (single) Stage procedures.

**Methods used** A retrospective review was conducted in patients who underwent staged SNM at a single hospital by five different providers between 2012 and 2019. Outcome was measured as (1) progression from Stage 1 to 2, and (2) indications for unplanned SNM removal or revision. Chi Square analysis, Mann-Whitney U, and Fisher's exact tests were used for data evaluation.

**Summary of results** A total of 153 patients underwent SNM therapy for symptoms of overactive bladder (n=129), urinary retention (n=42), neurogenic bladder dysfunction (n=18), fecal incontinence (n=18), and constipation (n=5). 92.2% (n=118/128) of patients progressed to Stage 2. Diagnoses of urinary retention and neurogenic bladder dysfunction were associated with lower progression to Stage 2 (p=0.034, p=0.017, respectively). Non-obese patients (BMI <30 mg/kg<sup>2</sup>) were more likely to have SNM removal or surgical revision within 4 years (17.5%) than obese (BMI ≥ 30 mg/kg<sup>2</sup>) patients (9.5%) (p=0.041). Other demographic characteristics and medical parameters were not associated with SNM outcome.

**Conclusions** The high progression rate to Stage 2 supports the concept that direct full Stage SNM can be performed in order to save time, costs, and potentially reduce morbidity related to an additional surgery. However, staged procedures should be discussed with patients with urinary retention and neurogenic bladder dysfunction due to their lower progression rates. BMI may also be an important selection criterion since a lower BMI is associated with a higher rate of SNM removal or revision. Future prospective studies are needed to further explore direct full Stage SNM implantation and parameters that predict SNM outcome.

### 156 THE IMPORTANCE OF PREOPERATIVE NUTRITION IN PLASTIC SURGERY PATIENTS: A META-ANALYSIS OF KEY NUTRIENTS

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10.1136/jim-2019-WMRC.156

**Purpose of study** Patients and surgeons have long wondered if significantly increasing specific nutritional supplements such as vitamins, proteins, and minerals will influence the surgical outcomes (would healing time, infection rates) of plastic surgery patients compared to patients on a normal diet with no increase before and after surgery.

Malnutrition is a modifiable risk factor for increased morbidity and mortality in patients undergoing any type of surgery. Postoperatively, they are at risk for delayed healing being in an increased catabolic state in addition to commonly suffering from marginal nutritional deficiencies at baseline before their procedure. Preoperative nutritional interventions for plastic surgery patients have been proven to result in enhanced recoveries by preventing postoperative dietary deficiencies, and improving wound healing.

This article presents a meta-analysis on research that has been done regarding the postsurgical effects of key nutrients such as vitamin A, vitamin C, zinc, arginine, glutamine, hydrolyzed collagen, vitamin B complex, and protein. It aims to further the strength behind the necessity of optimal perioperative nutrition.

**Methods used** The meta-analysis was conducted via searches run through Pubmed, Medline, and Google Scholar using one key nutrient at a time as the search terms. Boolean Operators were utilized to narrow down articles to exclusively surgical cases, especially plastic surgery cases. Extraction of data along with the framing/plotting of summary estimates and examination of publication bias was done on each individual study. A total of 4 articles were initially found, and a final tally of 20 articles were used for this analysis.

**Summary of results** Each nutrient listed above improved at least one postsurgical outcome: reducing inflammation/bruising, tissue healing, effective collagen production, and overall skin health. A common trend discovered was that postbariatric patients were most at risk for not having enough primary nutrients for wound healing following surgery.

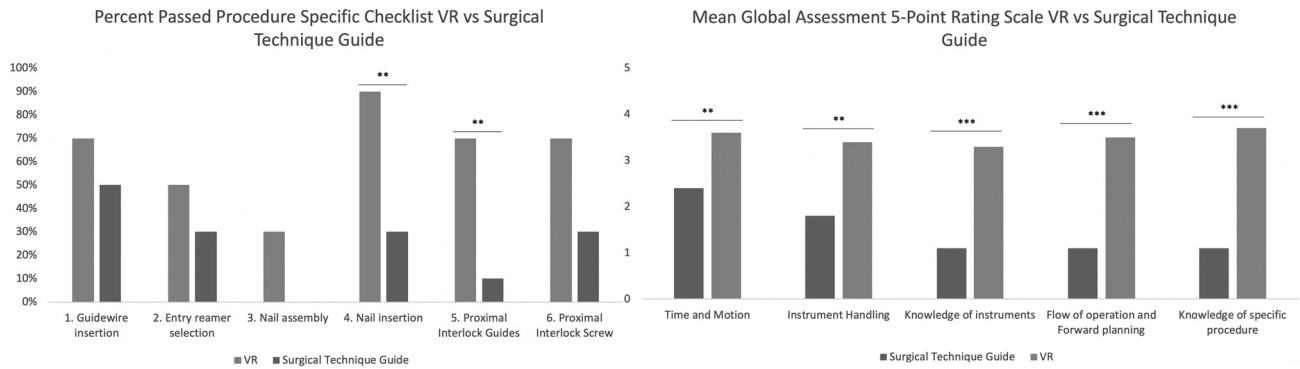
**Conclusions** Appropriate nutritional supplementation with nutrients listed above is an effective means for correcting these nutritional deficiencies and it will also reduce surgical complications associated with the surgery.

### 157 TRIAL OF A VIRTUAL REALITY TOOL TO TEACH SURGICAL TECHNIQUE FOR TIBIAL SHAFT FRACTURE INTRAMEDULLARY NAILING

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10.1136/jim-2019-WMRC.157

**Purpose of study** The aim of this study was to compare the transferability of skills gained in a VR training program of a simulated intramedullary nailing (IMN) of a tibia by comparing performance of VR trained and standard guide (SG) trained novice medical students when performing a SawBones simulation of intramedullary nail fixation.



Abstract 157 Figure 1

**Methods used** 20 first- and second-year novice medical students were recruited and randomized into VR (n=10) and SG (n=10) groups. Students with prior knowledge of the procedure were excluded. All 20 participants completed the first phase and 17 completed the second phase of the study. Participants were randomized to SG or VR training. After training, participants were then observed performing the tibial IMN procedure with SawBones and evaluated by a blinded attending surgeon using procedure-specific checklist and 5-point global assessment scale. Participants returned after 2-weeks for repeat training and evaluation.

**Summary of results** Aggregate global assessment scores were significantly higher for VR than SG group (17.5 vs. 7.5, p<0.001), as were scores in all individual categories. The percentage of steps completed correctly was significantly higher in the VR group compared to the SG group (63% vs. 25%, p<0.002). The average improvement between the first and second phases of the study were higher in the VR group compared to SG group across all 5-categories of the global assessment scale, and significantly higher for knowledge of instruments (50% vs. 11%, p <0.01).

**Conclusions** Virtual reality training was more effective than standard training in our model of simulated tibia IMN for novice medical students. Virtual reality training may be a useful and cost-effective method to reduce the initial learning curve and augment orthopaedic surgery training.

**Methods used** We performed an IRB approved retrospective chart review of patients with ankle fractures treated at UC Davis Medical center from 2017 to 2019. Inclusion criteria included patients with ankle fractures and/or syndesmosis injuries treated with an ORIF using a fibular intramedullary nail and suture-button device. Post-operative results such time to union and complications were analyzed, in addition to radiographic changes including tibiofibular overlap and medial clear space. Data was analyzed using the Student's t-test for numerical data and a chi-squared test for categorical data.

**Summary of results** 22 patients with an average age of 52 were included. Most injuries were inversion/eversion injuries or rotational ankle fractures due to falls. Radiographic results demonstrated a mean increase in tibiofibular overlap by 2.4 mm when comparing pre-operative to post-operative patients (0.4 mm vs 3 mm, p<0.05). The mean decrease in medial clear space was 2.8 mm (5.6 mm vs 2.8 mm, p<0.05) and the mean decrease in tibiofibular clear space was 2.3 mm (5.2 mm vs 2.9 mm, p<0.05). Additionally, the decrease in mean displacement was 1.89 mm (3.5 mm vs 0.91 mm, p<0.05).

**Conclusions** Fixation with nail and suture button is effective for syndesmosis injuries; there was an improvement in most parameters when comparing pre-operative to post-operative patients. Additionally, there was less hardware removal required due to the intra-osseous nature of the nail, and there were no complications. Limitations included small sample size and inability to compare these patients to standard ORIF patients.

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**THE EFFECTIVENESS OF INTRAMEDULLARY NAILING OF DISTAL FIBULA FRACTURES AND DYNAMIC FIXATION OF SYNDESOSIS WITH SUTURE BUTTONS**

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10.1136/jim-2019-WMRC.158

**Purpose of study** Ankle fractures are a common presentation to the emergency department constituting 9% of all fractures. Unstable ankle fractures are treated with open reduction and internal fixation (ORIF) using plate and screw fixation, however, wound healing complications, infection, and hardware prominence are potential negative sequelae. Intramedullary fixation provides an alternative approach that obviates the need for an extensive incision. Our study assessed the efficacy of intramedullary fixation in the treatment of distal fibula fractures with concomitant use of syndesmosis screw fixation or suture button fixation for the syndesmosis.

Poster session

Adolescent medicine and general pediatrics

6:00 PM

Thursday, January 23, 2020

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**HYDROCARBON ASPIRATION PNEUMONITIS**

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10.1136/jim-2019-WMRC.159

**Background** Mineral oil, in the form of baby oil, is a common household product when there are young children in the home. It is often overlooked as a potential source of harmful ingestion. This case is presented to raise awareness that

everyday items in the home can cause significant injury to young children.

**Case** This is a previously healthy 16 month old female who presented to the pediatric emergency department (PED) with fevers and increased work of breathing after ingesting an unknown amount of baby oil. The night prior to arrival, parents witnessed the child drink an opened bottle of baby oil. Overnight, she had a continuous cough, and the next day noted to have increased respirations and fever. She was taken to the PED, and was found to be febrile to 101.8 F and tachycardic, but with a benign lung exam. Her heart rate soon normalized and her lungs remained clear. Labs showed leukocytosis, elevated AST, and CRP. Chest XR demonstrated scattered airspace disease bilaterally more extensive on the right. Poison control recommended 24 hour observation and antibiotics. The patient was admitted for observation and continued on IV clindamycin. She remained afebrile and hemodynamically stable on room air. She continued to improve clinically and was discharged the next day without antibiotics.

**Discussion** Hydrocarbon ingestion primarily exerts its effects on the respiratory and central nervous systems. Most concerning and most often seen are the respiratory complications that result from aspiration because of the organic properties of hydrocarbons. Pulmonary symptoms occur within 30 minutes of ingestion and include coughing, choking, tachypnea, dyspnea, rales, and/or grunting. Aspiration into the lung parenchyma leads to chemical pneumonitis and direct injury to the lung tissue. The prognosis for children who have ingested a hydrocarbon is dependent on the amount and specific agent involved. While most children survive without any complications, some can quickly progress to respiratory failure and death. The importance of this case is to remember that simple, common household products can cause major injuries to children. As a result, pediatricians need to include these products in their anticipatory guidance about poisonings, in addition to the more routinely discussed substances.

## 160 NEONATAL DIABETES MELLITUS

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10.1136/jim-2019-WMRC.160

**Introduction** Neonatal diabetes mellitus is characterized by persistent hyperglycemia typically within the first 6 months of life due to impaired insulin function. Etiology of neonatal diabetes is mostly monogenic and is an extremely rare condition world wide with an estimated incidence of 1:300k to 1:500k individuals. We present a case of neonatal diabetes mellitus that was able to respond to dietary regulation without insulin therapy.

**Case presentation** An ex-37 6/7 wk newborn presented with recurrent episodes of hyperglycemia. Patient was first noted to have hyperglycemia on DOL 1. Glucose at birth was 159 but 24 hours later had quickly risen to 230. Patient was also noted to be hypotonic and having some temperature instability. Patient was transferred to the NICU at that time and placed on antibiotics for possible sepsis. However, given the negative blood cultures and re-assuring WBC count, patient was stopped on antibiotics. However blood sugars continue to rise peaking at >300. Patient had no iatrogenic source of glucose or exposure to any medications that may cause hyperglycemia.

**Management and outcome** Endocrinology was consulted. Patient was found to have low/undetectable levels of insulin. Patient was suspected to have neonatal diabetes mellitus. Genetics was consulted as monogenic diabetes is the most common cause of neonatal diabetes. Patient remained in the NICU for glucose monitoring. Insulin therapy was not initiated as patient does occasionally dip to the 100's and risks of hypoglycemia with insulin therapy outweighed risks associated with hyperglycemia. Patient feeding frequency was increased to Q2 hr to help stimulate pancreas to keep up with carbohydrate intake. Patient's blood glucose began improving to the 130's to 170's. Although blood glucose remains elevated, patient was stable enough for discharge home on DOL 18. Patient scheduled to have close follow up with genetics and endocrine following discharge.

**Discussion** The decision to start insulin therapy always requires careful consideration as risk of hypoglycemia in neonates can lead to poor neurocognitive development in the future. This case demonstrated an interesting presentation of neonatal diabetes mellitus which responded to non-pharmacologic management and dietary regulation alone. This case will add to the understanding of neonatal DM and aid in the decision for initiation of insulin therapy in future cases.

## 161 ESTABLISHING GUIDELINES FOR PEDIATRIC FEVER IN A COMMUNITY HOSPITAL

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10.1136/jim-2019-WMRC.161

**Purpose of study** Fever is one of the most common complaints for pediatric emergency department (ED) visits. As many pediatricians know, serious bacterial infections (SBI) can be difficult to diagnose as infants may only present with fever. Multiple studies have shown that prompt identification and administration of appropriate empiric antibiotic therapy prevents significant morbidity and mortality and improves outcomes. Working in a large, level 1 trauma community hospital with an annual ED volume of 110,000 patients, often pediatric patients are alongside acutely decompensating adult patients resulting in delay of care. This study aims to establish a pathway to aid in appropriate management of these patients.

**Methods used** A needs assessment among physicians and nurses in the ED and department of pediatrics led to the creation of a new 'Pediatric Fever' pathway. The primary outcomes for analysis include (1) appropriate identification of high risk pediatric patients with a fever (2) administration of empiric antibiotics within an hour of identification of a fever in the ED and (3) time to admission from the ED. The algorithm includes transition of care from the ED to inpatient setting. The study also involves retrospective chart review of patients age 72 hours to 2 years presenting with fever, and use of the above measures to compare before and after implementation of the pathway for 3 months.

**Summary of results** The implementation of the Pediatric Fever Pathway in our level one trauma ED and pediatric inpatient setting will provide insight on the percentage of febrile pediatric patients that were appropriately given antibiotics within one hour of identification of fever. The data will also reflect whether the appropriate antibiotic was initiated in the ED.

**Conclusions** Many children's hospitals have various pathways that aid healthcare providers. As a community hospital now caring for more children, it is imperative we collaborate with ED physicians to optimize care. This pathway hopes to address errors in identification and management of pediatric SBI. It promotes antimicrobial stewardship by avoiding inappropriate use of broad spectrum antibiotics to minimize bacterial resistance. This pathway also allows for education of resident doctors and a collaborative approach among emergency medicine and pediatrics.

**162 THE PREPARED FIRST RESPONDER: ENGAGING YOUTH ADVOCATES AT SCHOOL, HOME AND IN THE COMMUNITY**

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10.1136/jim-2019-WMRC.162

**Purpose of study** With youth empowerment at the core of this project and to engage with our surrounding community we found an opportunity to actively work with at-risk Fresno youth on their terms. We partnered with a local high school, Design Science Middle College High School, to develop interactive educational modules in educational areas that the youth found interesting, attributable to their daily living and where they felt they could genuinely advocate for change as advocates at school, home and in their community.

**Methods used** A PhotoVoice project was implemented as a needs assessment tool into the tenth-grade class at DSMCHS to better understand their needs. Three modules were created focusing on topics our students found important; first aid, nutrition, and youth engagement. Surveys were administered before and after the modules using Qualtrics.

**Summary of results** Twenty-seven percent of students reported being concerned about gang violence, drugs/alcohol, and/or poverty within their communities. '[l]ife after college' and '[h]aving a place to belong and feel safe' were their two largest stressors. Sixty-nine percent reported consumption of sodas or sugar-sweetened beverages 1–2 times a day. Seventy percent reported feeling more confident in writing a policy that can positively impact their community

**Conclusions** During the educational modules, students acquired first aid skills to be able to respond to acute injuries they



**Abstract 162 Figure 1** Photovoice collage

might encounter in everyday life learned how to read food labels to make healthier choices and prepared health presentations to improve their public speaking skills.

**163 ALTERED EXPRESSION OF THIOREDOXINS, PEROXIREDOXINS, AND THIOREDOXIN REDUCTASES IN CBS-DEFICIENT HOMOCYSTINURIA IN THE PRESENCE AND ABSENCE OF HOMOCYSTEINE-LOWERING TREATMENT: POSSIBLE IMPLICATIONS FOR REDOX MEDIATED PATHOLOGY**

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10.1136/jim-2019-WMRC.163

**Purpose of study** Cystathionine  $\beta$ -synthase-deficient homocystinuria (HCU) is a poorly understood, life-threatening, inborn error of sulfur metabolism. If left untreated, it can lead to cognitive impairment, connective tissue disturbances, and thromboembolic complications. Multiple lines of evidence from both the transgenic HO mouse model of HCU and human HCU patients indicate oxidative stress as a major pathogenic factor in this disease. Previous work has shown that impaired antioxidant defense may contribute to the generation of oxidative stress in HCU.

**Methods used** We investigated the hepatic expression of the antioxidant proteins thioredoxin (TRX) 1, thioredoxin reductases (TRD) 1 and 2, and peroxiredoxins (PRDX) 1,2 and 3 in the presence and absence of the homocysteine-lowering therapy betaine in the HO mouse model of HCU.

**Summary of results** Western blotting analysis revealed significant repression of TRDX, TRD1 and TRD2 in untreated HCU mouse livers. These effects were not ameliorated by betaine treatment. PRDX 1, 2 and 3 were all induced in HCU livers. Betaine treatment normalized PRDX 1 and 2 expression levels but induced a further induction of PRDX3.

**Conclusions** Our data suggests that impaired expression of thioredoxin 1 and thioredoxin reductases has the potential to contribute to oxidative stress in HCU and that the induction of multiple peroxiredoxin isoforms may constitute a redox-sensitive homeostatic response in this disease.

**164 CLINICAL PATHWAY DEVELOPMENT FOR CHILDREN WITH A SOLITARY FUNCTIONING KIDNEY**

T Po White\*, E Chan, M Catapang, E Matsell, D Cojocar, R Humphreys, C Mammen, D Matsell. University of British Columbia, Vancouver, BC, Canada

10.1136/jim-2019-WMRC.164

**Purpose of study** Congenital anomalies of the kidney, including a solitary functioning kidney (SFK), are frequent causes of childhood chronic kidney disease (CKD). Those at high risk of developing CKD likely require a different standard of long-term care. We hypothesized that long-term SFK outcomes are not uniformly favorable, extensive local practice variation exists for length of follow-up and extent of surveillance, and risk stratification may improve care efficiency.

**Methods used** This was a retrospective cohort study. All patients identified with a SFK from 2000–2017, due to either renal agenesis (RA) or multicystic dysplastic kidney disease (MCDK), were included. Relevant data was extracted from clinical charts. Outcomes highlighting local care patterns and

resource use included length of follow-up, and number of clinic visits and renal ultrasounds over total follow-up. To assess the utility of risk-stratification, SFK patients were stratified into high (HR) and low risk (LR) groups based on an estimated glomerular filtration rate (eGFR)  $<90$  ml/min/ $1.73\text{m}^2$  or  $\geq 90$  at last follow-up, respectively. Between-group differences were analyzed by Mann-Whitney U test.

**Summary of results** A total of 229 SFK patients (71 RA, 158 MCDK) were included. Median age at initial visit was 0.3 (IQR 0.6) years with a median follow-up of 4.3 (4.8) years. The mean eGFR at last follow-up was  $89\pm 28$  ml/min/ $1.73\text{m}^2$ . After stratification based on last eGFR, 53 patients (23%) were classified as HR and 176 (77%) as LR. With regards to practice variation, median number of clinic visits over total follow-up was 4 (2) ranging from 1–47, while median number of ultrasounds was 4 (4) with a range of 0–28. When practice patterns were stratified according to risk, there were no significant differences between HR and LR groups for length of follow-up (3.9 years vs 5.8,  $p=0.07$ ), number of clinic visits (5 vs 6,  $p=0.26$ ), or number of ultrasounds (5 vs 5,  $p=0.57$ ). **Conclusions** Significant practice variation exists in the management of children with a SFK. Moreover, despite differences in long-term kidney function, the care of LR and HR patients is similar, suggesting that current care patterns warrant standardization and risk-based allocation of resources.

## Poster session

### Behavior and development

6:00 PM

Thursday, January 23, 2020

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#### THIRD YEAR RESILIENCY DAYS: FORTIFYING STUDENTS AGAINST BURNOUT

J Sheehy\*, E Yim, A Hayton. Loma Linda University, Loma Linda, CA

10.1136/jim-2019-WMRC.165

**Purpose of study** Medical student mental health is an area of growing interest, with research demonstrating an increase in burnout and decline in empathy in the clinical years (Neumann et al, 2011). While many programs have introduced wellness curricula in the pre-clinical years of medical school (Slavin et al, 2014; Wasson et al, 2016), few have focused on designing resources for the clinical years. In the 2018–19 academic year, this institution implemented a wellness curriculum for third-year medical students, aiming to equip them for the challenges they face on the wards, help them develop skills to bounce back from difficulties, make them feel less alone, and improve their overall sense of wellbeing.

**Methods used** Critical issues for students were identified through faculty brainstorming, student focus groups, and literature review. Faculty developed five 90-minute workshops to build coping skills and grapple with crucial areas: Gender Inequity, Anxiety, Non-accidental Trauma, Assertiveness, and Dealing with Death. In collaboration with key stakeholders, space was made in the curriculum for five required ‘Resiliency Days,’ with topics corresponding to clinical rotations and time split between workshops, team bonding, and leisure.

Students responded to confidential surveys midway through and at the end of the academic year that assessed their mental health using the Brief Resilience Scale (BRS), perceptions of the impact of the days, and suggested improvements. The results were tabulated.

**Summary of results** Of the class of 160 students, 80% filled out the final survey. Of the responders, 62% experienced a direct positive effect on their mental health from the program, 68% learned new skills, and 61% felt less alone.

There were no significant differences in the BRS scores of the aggregated students in December 2018 (3.00,  $n=147$ ) or June 2019 (2.99,  $n=133$ ), nor were there differences in score between gender: female (2.94,  $n=57$ ) and male (3.02,  $n=74$ ). These scores indicate that students at the end of their third-year have borderline low to normal resilience.

**Conclusions** Students reacted positively to the addition of Resiliency Days and felt that they had a beneficial impact on their mental health. They gained tools that may help them face future challenges and felt less alone. Impact on BRS scores was not seen likely because of the many factors that contribute to one’s resilience.

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#### STRESS, MINDFULNESS DISPOSITION, AND HEART RATE VARIABILITY AMONG SMOKERS: A LABORATORY STUDY

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10.1136/jim-2019-WMRC.166

**Purpose of study** The purpose of the project is to (1) describe Heart Rate Variability (HRV) profiles of current smokers during a stress task; and (2) correlate HRV with self-report measures of perceived stress and mindfulness disposition. We hypothesize that HRV scores in response to stress will be anti-correlated with perceived stress and correlated with mindfulness disposition.

**Methods used** In a pilot phase of a randomized controlled trial, participants ( $n=12$ ) completed resting HRV assessment with the Firstbeat Bodyguard 2 device, self-report measures of stress (Perceived Stress Scale, PSS) and mindfulness disposition (Five Facet Mindfulness Questionnaire, FFMQ) during a baseline visit 1. During visit 2, participants were in smoking withdrawal (i.e., not smoked for 12 hrs prior) and completed HRV assessment during a stressor task (i.e., Trier Social Stress Test, TSST). Pearson correlations tested associations between visit 1 PSS and FFMQ and visit HRV parameters (RMSSD; time-domain measure of root mean square of standard deviation and HF-HRV; frequency-domain measure of high frequency range) during rest and the TSST. HRV reactivity (HF-HRV) was calculated by taking the mean difference between HRV at rest and during the TSST.

**Summary of results** At visit 1, PSS scores were anticorrelated with FFMQ domains: non-judgement ( $r=-.88$ ) and acting with awareness ( $r=-.88$ ). These FFMQ domains were anticorrelated with HRV RMSSD during the TSST; non-judgement: ( $r=-.70$ ); acting with awareness: ( $r=-.82$ ). Acting with awareness domain was anticorrelated with HF-HRV reactivity during the TSST ( $r=-.92$ ).

**Conclusions** Since increased parasympathetic control relates to increased HF-HRV reactivity, higher mindfulness disposition may indicate greater self-regulation in response to stress.

Cultivating mindfulness disposition may be beneficial for improving physiological profiles among smokers in withdrawal. This finding has value for future studies that incorporate mindfulness as a behavioral intervention for smokers attempting to improve their stress response and reduce their urge to smoke. Limitations include a small sample size; we aim to retest our analyses in a larger sample.

## Poster session

### Cardiology

6:00 PM

Thursday, January 23, 2020

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#### EVALUATION OF DYNAMIC MONITORS FOR THE PREDICTION OF VOLUME RESPONSIVENESS IN PATIENTS WITH AND WITHOUT DIASTOLIC DYSFUNCTION

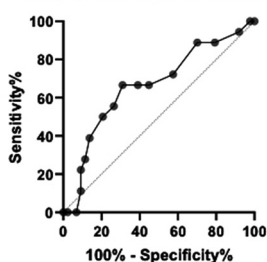
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10.1136/jim-2019-WMRC.167

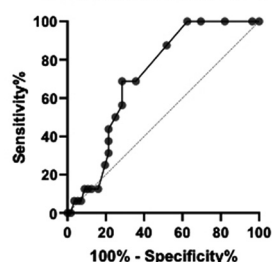
**Purpose of study** Patients with diastolic dysfunction (DD) comprise more than 28% of patients aged 60 and older. Left ventricular DD is known to predict adverse outcomes such as major adverse cardiac events, and in-hospital mortality. Intra-operative optimization of cardiac function, in particular that of intravascular volume, can decrease incidence of complications. Current gold standard of measurement of cardiac function in response to intravenous fluids in patients under general anesthesia is the change in arterial waveform (PPV – Pulse Pressure Variation, SVV – Stroke Volume Variation) associated with respiration. The SVV values predictive of fluid responsiveness have been characterized in a general patient population. Thresholds haven't been specifically validated for patients with DD. Identification and management of these patients can improve perioperative outcomes. Our research aims to evaluate and characterize the potential impact of DD on SVV, and SVV's ability to predict volume responsiveness as measured by EV1000 device.

**Methods used** Assessment of left ventricular DD via trans-thoracic echocardiogram was measured prior to induction of

ROC curve: ROC of Pre-Normal



ROC curve: ROC of Pre-DD



Abstract 167 Figure 1

anesthesia. As hemodynamic parameters necessitated, a 200 ml of crystalloid or colloid was infused via Belmont Rapid Infuser. Patient's response to each fluid bolus was automatically recorded by the monitor, and comparisons were made between patients with and without DD.

**Summary of results** To date, 35 patients have been recruited. ROC curve analysis was produced to compare fluid responsiveness in those with or without DD.

**Conclusions** The total sample size is currently too small for conclusions. Additional data is necessary to fully characterize the relationships.

## Poster session

### Clinical epidemiology and health disparities

6:00 PM

Thursday, January 23, 2020

168

#### EPIDEMIOLOGY OF INJURIES IN ACROBATIC DUNKING ATHLETES

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10.1136/jim-2019-WMRC.168

**Purpose of study** Injuries in professional athletes are common. However, to our knowledge, the injuries seen in acrobatic dunking athletes have not been studied. Our objective is to determine the most common self-reported injuries sustained by current professional acrobatic dunking athletes and their etiologies.

**Methods used** Eligible participants were invited to complete the anonymous survey via the AD Facebook site with approximately 400 members. The survey instrument contained 21 questions covering demographics, history of injuries and additional questions specific to AD. Inclusion criteria: self-identified Dunkers. Exclusion criteria: age <18 years.

**Summary of results** There were 65 total respondents, 96.9% were males, with 56.9% between 23 and 32 years of age. 83.1% were Caucasian. When asked, 83% were associated with a Dunk Team, while only 10.8% were affiliated with a university. Only 26.2% reported having a trainer on the team. Among respondents, there was approximately 9.2 years of experience with dunking (median 7 years) and an average of 1.2 days (median 1.0 days) or 3.7 hours (median 2 hours) of practice per week. There was an average of 22.6 injuries reported over the career of dunking. The most common area of injury was the ankle (51.3%), knee (12.8%), Head or neck (10.3%), and Upper leg (7.7%). These injuries occurred primarily during the landing phase of the dunk (70%) and dunking the ball (13.3%) while at practice (52.2%) and performance (41.8%). The majority of the respondents sought care from a physician (70.6%), followed by a paramedic or EMT (11.8%) and trainer (11.8%). An average of 19 days were missed due to this injury (median 4 days).

**Conclusions** Acrobatic dunking is associated with significant injuries, most of which are musculoskeletal. Further study is needed.



## 169 IMPACT OF CAFFEINE ON SKIN CANCER PREVENTION: A META-ANALYSIS

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10.1136/jim-2019-WMRC.169

**Purpose of study** Skin cancer has an annual incidence of 5.5 million in the U.S., more than all other cancers combined. Epidemiological studies show that caffeinated beverage intake is associated with decreased risks of several skin cancer types: basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma. Due to the high incidence of skin cancer and the popularity of caffeinated drinks, caffeine may have an appreciable impact on skin cancer incidence. We performed a systematic review and meta-analysis to estimate the annual reduction in skin cancer incidence and treatment cost by caffeinated beverage intake.

**Methods used** We searched PubMed, Embase, and Scopus for observational studies that assessed the relative risk of skin cancer with coffee or tea intake up to June 30, 2019. High-quality studies were selected by the Newcastle-Ottawa Quality Assessment Scale for further analysis. Summary relative risk (SRR) was determined by the DerSimonian and Laird random effects model.

**Summary of results** A database search yielded 22 high-quality studies covering 47,593 cases of skin cancer, mostly in the U.S. and Europe. For all skin cancer types combined, caffeinated coffee had the largest effect with SRR (95% confidence interval) of 0.78 (0.68–0.87). Tea had less effect (0.85 (0.77–0.93)), and decaffeinated coffee had no effect (0.98 (0.91–1.06)). Combining coffee and tea intake, SRRs were 0.88 (0.81–0.95) for BCC, 0.81 (0.69–0.93) for melanoma, 0.77 (0.59–0.94) for SCC, and 0.77 (0.59–0.95) for unspecified nonmelanoma skin cancer (BCC or SCC). These effects were dose-dependent. Based on SRR, dose dependency, and proportion of coffee drinkers, we estimate that current coffee consumption leads to 196,344 skin cancers prevented and 289 million dollars saved in treatment cost annually in the U.S.

**Conclusions** Current caffeinated beverage intake significantly lowers the burden of skin cancer in incidence and treatment cost. This meta-analysis has limitations including varying caffeine content in coffee consumed. Future studies should clarify how to optimize skin cancer prevention by determining the ideal timing of caffeine intake relative to sunlight exposure.

## 170 A SURVEY OF PRIMARY CARE PHYSICIANS ON HYPERHIDROSIS TRAINING AND EXPERIENCE

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10.1136/jim-2019-WMRC.170

**Purpose of study** Data on hyperhidrosis education among physicians is lacking. Hyperhidrosis is defined as excessive sweating beyond the body's needs for temperature regulation. The cause of primary focal hyperhidrosis is not well understood. Palmar and axillary primary focal hyperhidrosis are ranked as having the highest impact on quality of life when compared to 40 other dermatologic conditions. The aim of this project was to collect information on the nature and quality of training and knowledge related to hyperhidrosis within

family medicine and internal medicine residency programs. In a recent study approximately 70% of hyperhidrosis patients reported seeing a primary care physician about their condition. This statistic highlights the need for adequate training of primary care physicians to manage patients with hyperhidrosis.

**Methods used** An 8-question survey was administered to Family Medicine (FM) and Internal Medicine (IM) residents and attending physicians within the Samaritan Health Services FM and IM programs via paper copy and Survey Monkey. The survey was sent to 32 residents and 47 attending physicians. 32 residents and 13 attending physicians responded to the survey.

**Summary of results** We recorded a 57% response rate. 92% of attending physicians and 53% of residents indicated that they had encountered a patient with either generalized or focal hyperhidrosis. Approximately 35% of attendings and 75% of residents reported feeling less than reasonably comfortable with diagnosing and managing a patient with hyperhidrosis. Only 7% of all respondents indicated that they were familiar with iontophoresis as a treatment option. It also appears that physicians may tend to underestimate the effect that hyperhidrosis has on an average patient's quality of life. 89% of all respondents reported having no specific training on hyperhidrosis diagnosis or management.

**Conclusions** There appears to be a need for increased awareness and training for primary care physicians on understanding and managing patients with hyperhidrosis. Further work is required in expanding the survey to improve the generalizability of our results.

## 171 IDENTIFYING FACTORS ASSOCIATED WITH LOSS TO FOLLOW-UP IN PATIENTS WITH ADULT CONGENITAL HEART DISEASE

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10.1136/jim-2019-WMRC.171

**Purpose of study** Congenital heart disease (CHD) is the most common form of birth defect affecting around 12 out of every 1000 children. Recent advances in pediatric cardiac care and more effective interventions has reduced mortality rates in children with moderate to severe CHD, which has led to a significant increase in the population of middle-aged and geriatric aged adults with CHDs (ACHD). Continued management of their condition is imperative and identifying risk factors associated with lost to follow up in ACHD may be a significant factor in improving outcomes in the overall population.

**Methods used** For the research subjects, the population was surveyed using The Arizona Birth Defect Monitoring Program (ABDMP). Through the CH-STRONG (Congenital Heart Survey To Recognize Outcomes, Needs, and well-being) project, subjects were contacted by mail and asked to complete a questionnaire about their CHD and non-clinical questions. Patients were deemed lost to follow up if they had not been seen within the past year by a CHD specialist and if no address was on file. For travel time analyses, the Google Maps APIs were used to map the address to closest major specialty care facility sites in Arizona.

**Summary of results** Out of the 2441 subjects identified with CHD, 1676 of them addresses were confirmed and 450 of them responded of these responded to the survey. According

**Abstract 171 Table 1** Group statistics

	Loss to follow-up	N	Mean	Std. Deviation	Std. Error Mean
Miles	Not lost (	167	35.6593	51.93351	4.01874
	Lost (1 yr or longer)	185	47.3427	64.07408	4.71082
Drive Time	Not lost (	166	40.7530	48.66153	3.77687
	Lost (1 yr or longer)	183	52.4426	61.47300	4.54421
Age (Years)	Not lost (	204	23.22	3.480	244
	Lost (1 yr or longer)	246	23.78	3.530	225

to our analysis based on this sample size, drive time but not distance in miles was significant, no insurance vs. commercial and public was trending towards significance, and Hispanic ethnicity was not significant for lost to specialist follow up.

**Conclusions** The key findings demonstrate that neither distance nor insurance type were significantly associated with lost to follow up in ACHD at specialty treatment sites. For future, we would like to determine if our findings are consistent in other states. With this information, we can improve our understanding of the ACHD population and work to develop a system to reduce loss of care in the ACHD population.

## Poster session

### Community health and global health

6:00 PM

Thursday, January 23, 2020

#### 172 PILOT STUDY: USING CENTERING DIABETES FOR ADULT PATIENTS WITH TYPE II DIABETES AT A FREE CLINIC

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10.1136/jim-2019-WMRC.172

**Purpose of study** Diabetes is a multisystem disease, disproportionately affecting minorities, that can lead to complications such as heart disease, stroke, kidney failure, lower limb amputation, and adult-onset blindness if not adequately controlled using the standard of care guidelines. The objective was to examine the use of diabetes group appointments using a Centering model in a free clinic setting. Patients attending Yakima Union Gospel Mission are often inadequately treated for their diabetes due to resource limitations. Centering appointments have been efficacious in treating culturally diverse and low socioeconomic populations for pregnancy and pelvic pain, but limited studies are available for diabetes.

**Methods used** A single group of adult patients with uncontrolled diabetes regularly participated in Centering Diabetes group appointments (n=3). The Centering group met bi-weekly for six sessions related to diabetes care. HbA1c and blood pressure were measured before and after the study. Additionally, pre- and post-study surveys were provided regarding self-efficacy. The curriculum originally included 6 sessions with topics such as: What is Diabetes?, Family Relationship and Stress, Glucose Monitoring, Exercise and Weight, Medications, and Foot and Eye Care.

**Summary of results** Three patients consistently participated in Centering Diabetes appointments: a 44 y.o female with a 10 pack-year history of smoking; 49 y.o. male with difficulty maintaining weight due to insulin use; and a 47 y.o female with significant work and spouse stress. Pre- to post-Centering HbA1c were 12.1 to 11.2, 12.3 to 11.9 and 9.6 to 8.4, while pre- and post-Centering blood pressures were 154/96 to 120/70, 150/100 to 145/100, and 143/80 to 130/76 respectively.

**Conclusions** The curriculum topics addressed the standard of care model and enabled a small group of patients to meet diabetes care guidelines. Challenges were met due to patient availability and difficulty recruiting patients. Patients were satisfied with the group appointments and agreed to continue attending centering appointments based on survey data. While statistically significant differences to blood pressure and HbA1c cannot be drawn from the data, community acceptance of the centering model has opened doors to further studies.

#### 173 SYSTEMATIC REVIEW: EVALUATION OF INTERVENTIONS ADDRESSING TIMELY ACCESS TO SURGICAL CARE AS OUTLINED BY THE LANCET COMMISSION 2030 GLOBAL SURGERY GOALS

<sup>1</sup>C Binda\*, <sup>1</sup>I Zivkovic, <sup>2</sup>D Duffy, <sup>1</sup>G Blair, <sup>2</sup>R Baird. <sup>1</sup>University of British Columbia, Vancouver, BC, Canada; <sup>2</sup>British Columbia Children's Hospital, Vancouver, BC, Canada

10.1136/jim-2019-WMRC.173

**Purpose of study** In 2015, the Lancet Commission on Global Surgery published 6 surgery goals, one of which is to provide 80% of the world's population with timely access to Bellwether Surgical Procedures by 2030. Little research has been done to identify novel interventions implemented in Low and Middle Income Countries (LMICs) to help reach this goal since 2015. This systematic literature review addresses that gap.

**Methods used** With oversight from a health librarian, we conducted a systematic review of articles and grey literature published in PubMed, Cochrane, MEDLINE, Web of Science, Scopus, and CINAHL databases in accordance with PRISMA guidelines. Independent reviewers evaluated captured abstracts to assess for inclusion and exclusion criteria. (inclusion criteria: LMIC interventions, Bellwether Procedures, exclusion criteria: non-surgical interventions, High Income Country (HIC) interventions, non-English papers, publication before August 8th, 2015). Entirety of selected manuscripts were read by 2 reviewers who completed data extraction and risk of bias assessment.

**Summary of results** 1923 articles were collected from the databases; 11 met inclusion criteria and were analysed. Innovations centered around task sharing, development of orthopaedic devices, and the evaluation of disparities in access to care. Quantitative and qualitative outcomes were assessed. 8 papers focused on caesarean sections, 3 on open fracture reduction, and 3 on laparotomy. 5 papers focused on West Africa, 2 on East Africa, 2 on South Asia, and 1 on South-east Asia.

**Conclusions** Multiple innovative interventions have been implemented since the publication of the 2015 Lancet Commission on Global Surgery goals that have or will increase the availability of timely surgical access in LMIC. The changing views

on the validity of task-sharing in surgery with non-clinician surgeons and the scaling-up of innovations addressed in the literature will help realize timely access to Bellwether procedures.

#### 174 MITIGATING ALCOHOL ABUSE IN THE BOOMTOWN ECONOMY OF DOUGLAS, WYOMING

A Blaine\*. *University of Washington School of Medicine, Seattle, WA*

10.1136/jim-2019-WMRC.174

**Purpose of study** As a community that revolves around the energy industry, Douglas, WY is home to transient employees. The Douglas community maintains an above average excessive drinking rate and a high rate of alcohol impaired driving deaths. Community conversations and further evaluation of community assets informed that Douglas needs support services to reduce alcohol consumption among transient energy industry employees.

**Methods used** County health data proved a significant increase in excess drinking as well as an increase in the rate of alcohol impaired driving deaths in Douglas. Solutions for Life (SFL) a state subsidized mental health clinic and local physicians were interviewed regarding the local public health concern. An evidence based literature review outlined primary and secondary factors influencing alcohol abuse. Interviews with various stakeholders in the community and clinical observations provided further insight about energy industry employees perception of how much alcohol consumption is normal. Community conversations also considered the social environment and living conditions of transient employees.

**Summary of results** Evidence based literature identified alcohol abuse interventions that focused on rural communities, transient employees of the energy industry, cultural alcohol misconceptions, social services, and collaborations with energy corporations. The director of SFL confirmed an excessive number court ordered patients in treatment were from the energy industry. Physicians and SFL professionals confirmed that energy employees were living in hotels and temporary housing with poor social networks. Considering the demographic of alcohol abuse reported by the community, evidence based literature determined that a targeted community health campaign towards energy industry employees in collaboration with energy corporations would be the most effective intervention to reduce alcohol consumption in rural communities.

**Conclusions** Support through a strength-based approach from community assets such as SLF provided an understanding of the social background in Douglas. Next steps would include the development of collaboration between SLF and energy corporations to target energy industry employees. The collaboration would facilitate a community health campaign with the intention to decrease alcohol abuse in Douglas.

#### 175 MULTIDISCIPLINARY SUPPORT FOR BUPRENORPHINE-NALOXONE TREATMENT OF OPIOID USE DISORDER

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10.1136/jim-2019-WMRC.175

**Purpose of study** Opioid use disorder (OUD) is a significant concern within the population served by the Confluence Health system in Wenatchee, Washington with an average of 17.6 associated deaths annually. This project utilized an asset-based approach to examine fundamental resources, obstacles, and potential improvements in the prescription of buprenorphine-naloxone for OUD in the community.

**Methods used** Discussion with a buprenorphine-naloxone prescriber outlined pharmacological therapy for OUD available in Wenatchee. OUD patients receiving buprenorphine-naloxone treatment were interviewed regarding craving control, use of addiction sponsors, therapy and support groups. The clinical director of an addiction treatment center detailed outpatient services for OUD and an addiction group therapy session was attended. Meeting with a team responsible for a buprenorphine prescriber incentive program validated administrative support for OUD.

**Summary of results** Effective pharmacotherapy for OUD was determined to focus on harm-reduction and compliance. Observation of group therapy demonstrated limitations of medical management without psychological and social support. Dialogue with involved professionals allowed for distribution of other providers' viewpoints. A poster integrating these findings was shared with buprenorphine prescribers. In assessing next steps, literature review revealed buprenorphine implants to be an effective alternative route of administration. Availability of buprenorphine implants in Wenatchee could improve medical management of OUD in patients with accessibility and diversion issues. Collaboration between mental health professionals and buprenorphine prescribers to determine the best method of administration would be necessary. The existing professional relationships in Wenatchee would foster this collaboration and improve patient-centered care.

**Conclusions** This evaluation integrates expertise of physicians and addiction professionals while providing a testament of the patient experience in OUD pharmacotherapy. It highlights importance of an interdisciplinary treatment plan for patients undergoing treatment for OUD. It identifies an option of buprenorphine implantation as an attainable advancement in OUD treatment given the present infrastructure in Wenatchee.

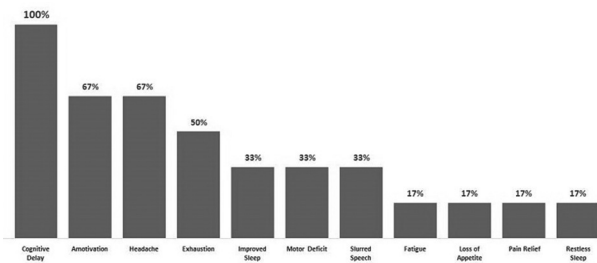
#### 176 UNINTENTIONAL INGESTION OF MARIJUANA IN ADULTS: A CASE SERIES

<sup>1</sup>A Hsueh\*, <sup>1</sup>K Fong, <sup>1</sup>K Kendric, <sup>2</sup>N Siddiqi, <sup>3</sup>J Georgiadis, <sup>1</sup>T Phan, <sup>1</sup>ET Reibling, <sup>4</sup>B Wolk. <sup>1</sup>Loma Linda University School of Medicine, Loma Linda, CA; <sup>2</sup>Nova Southeastern University, Fort Lauderdale, FL; <sup>3</sup>South Baldwin Regional Medical Center, Foley, AL; <sup>4</sup>Loma Linda University, Loma Linda, CA

10.1136/jim-2019-WMRC.176

**Purpose of study** Marijuana use has become increasingly popular as more US states legalize the substance. A greater number of people are admitted to the ED due to marijuana toxicity. Our study reviews a case of adults who were unintentionally exposed. This is novel because most of the current literature focuses on marijuana poisoning in pediatric patients.

**Methods used** We conducted a retrospective analysis of twelve subjects. Subjects were evaluated in the Emergency Department and referred to Medical Toxicology Service after ingesting marijuana from food at a family event. Six of the subjects consented to be interviewed about their experiences which



**Abstract 176 Figure 1** Percentage of subjects experiencing sub-acute symptoms (3+days;n=6)

were qualitatively analyzed and grouped into common themes. The study was approved by the Institutional Review Board.

**Summary of results** Three subjects required observation due to persistent symptoms. Eleven subjects tested positive for tetrahydrocannabinol (THC) via urine drug immunoassay. Two subjects tested positive for ethanol in their blood. Common symptoms experienced included confusion, difficulty speaking, weakness, nausea, tremors, and hallucinations. All subjects reported sleepiness. Subjects also reported multiple emotions, including anger, confusion, disbelief, and helplessness. Three of the interviewed subjects reported a negative impact on work.

**Conclusions** This case series illuminates adverse effects after unintentional marijuana exposure in adults. More incidents of unintentional marijuana intoxications are expected as legal availability increases. Public education of marijuana's effects should be widely disseminated to improve individual awareness and encourage policy implementation and regulation. This may minimize future unintentional intoxication cases.

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### SUPPORTING CALIFORNIA'S MEDICAL THERAPY PROGRAM SERVING CHILDREN WITH DISABILITIES THROUGH TELEMEDICINE

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10.1136/jim-2019-WMRC.177

**Purpose of study** California's Medical Therapy Program (MTP) provides physical therapy (PT), occupational therapy (OT), and medical oversight to children with qualifying disabilities, generally due to neuromuscular and musculoskeletal conditions. The MTP serves nearly 23,000 children at school-based clinics called Medical Therapy Units (MTUs). While every county is required to have a MTP, not every county has a MTU, creating difficulties for children in those counties to access care. Therefore, the School-Based Tele-Physiatry Assistance for Rehabilitative and Therapeutic Services (STARS) program was developed at UC Davis Health. STARS is an innovative program that uses telemedicine to provide medical direction at the MTUs.

**Methods used** A needs assessment of the MTP was performed in all 58 counties through an e-mail questionnaire sent to the MTP's Supervising Therapists. Data were collected on the counties' resources, such as the number of MTUs. Telemedicine services began in San Joaquin and Butte Counties at the beginning of 2019. To evaluate its potential to address the shortcomings of the MTP, parent, physician and therapist

satisfaction surveys were administered at the end of each monthly clinic.

**Summary of results** Of California's 58 counties, 14 do not have MTUs, forcing approximately 105 children to travel to other counties for MTP services. In counties with at least one MTU, approximately 690 children travel to receive PT and OT services because their county does not have these services. The average roundtrip driving distance for physicians traveling to provide care at MTUs, was 175 miles. Furthermore, only 45% of counties have access to a pediatric physiatrist, the specialist who provides medical direction for this patient population. Preliminary satisfaction data were collected from 64 patient-therapist-physician triads. Parents (84%), therapists (91%), and physicians (100%) reported that the quality of care provided by telemedicine was equal to in-person care.

**Conclusions** California's MTP is maldistributed, causing many patients and physicians to travel sometimes long distances for care. The results of the preliminary satisfaction analysis support the STARS program as a means of increasing ease of access to care and reducing burdens on families and providers.

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### 3D IMAGE GENERATION FOR TRANSLATION OF TEXT-BASED MEDICAL QUESTIONNAIRES

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10.1136/jim-2019-WMRC.178

**Purpose of study** Globally those with limited language comprehension or literacy, face problems completing validated written questionnaires related to their health/treatment, hence the importance of developing picture-based scores e.g. facial images to quantify pain. Since health care providers worldwide need software to generate images for such scales, and must choose from several options we reviewed programs suitable for first time users.

**Methods used** We evaluated 3 software programs (Poser version 11.0, Blender version 2.8 and Cheetah3D version 7.0) in order to select one to use to generate lifelike figures for a picture-based version of the 10-item assessment of limitations of activities (LoA) section of the SF-36 questionnaire, a validated written patient self-assessment tool. All 3 provide development tools and templates for creating figures with defined postures, facial expressions and clothing suitable for use in medical symptom scoring scales and picture-based questionnaires.

**Summary of results** Poser software lets users who are beginners produce figures that are more realistic and lifelike than the other programs. In particular, the 'Smooth Translation of Joints' feature allows more accurate rendering of human anatomy. Images can also be animated and exported in BMP, JPEG and TIFF formats. In comparison, Blender is a free high-end open source product but has a steep learning curve and while Cheetah3D is versatile, aimed at amateur artists and easy to use it is specifically written in Cocoa for MacOS users. Limitations of Poser include its cost; the inability to import artwork from other programs; and some illustration tools found in comparable software are lacking, but it does have pencils, markers, airbrushes and shading tools.

**Conclusions** Choices exist for those creating images for picture-based scales and questionnaires. Poser software enabled

first-time users to generate lifelike images for a visual version of the 10 item LoA section of the SF 36 mobility self-assessment score, and then allowed for refinement of these images based on patient feedback to ensure that what the images were deemed to represent matched the content of the written questions. We suggest this software for picture based scale/questionnaire development to aid delivery of care equitably in a global context.

### 179 DOES SNACKING HELP CURB CHILDHOOD OBESITY?

G Suarez\*, J Moon, R Denny, G Brown, D Wagner, E Medina, M Baum. *Loma Linda University, Loma Linda, CA*

10.1136/jim-2019-WMRC.179

**Purpose of study** According to the California Department of Education, students who are in Grade levels 5, 7, and 9, are near 48% overweight or obese. This is more than double what the national prevalence according to the Center for Disease Control. Unhealthy weight for this study is defined as overweight >85% BMI and obesity >95%BMI and is a serious problem that can lead to poor health, starting earlier in children. This study aims to assess a possible correlation between boredom and snacking to overweight and obesity using Body Mass Index (BMI).

**Methods used** Children between the ages of 9–15 years were referred by a physician from a local federally qualified health center in San Bernardino to ‘Operation Fit’, a weeklong day camp, based on their unhealthy weight (BMI>85th percentile). In this program, 113 children participated in a group that was taught with interactive nutrition and physical activity lessons. Parents participated in a survey for lifestyle practices, including a question about boredom and snacking, with a parent education session at the end of the camp. These answers were then compared to their child’s BMI using logistic regression models.

**Summary of results** In response to the statement ‘If I am bored, I will snack more’ there was a statistical significance for those that responded they do not snack.

**Conclusions** Those that agree with snacking when bored are 0.401 times more likely to have children that are overweight than those who disagree. These results can be used in school systems to teach parents that the use of snacks in the correct way—as opposed to when bored—can help reduce the risk of gaining weight in children. This may also lead to the

conclusion that healthy snacking habits can be used to help lower overweight and obese children, helping with reducing the additional risks with being overweight.

## Poster session

### Endocrinology and metabolism

6:00 PM

Thursday, January 23, 2020

### 180 A UNIQUE CASE OF UNDIAGNOSED GRAVES’ DISEASE PRESENTING AS ACUTE TRANSIENT PARALYSIS

<sup>1,2</sup>G Petersen, <sup>1,2</sup>N Karapetians\*, <sup>1</sup>C Anderson, <sup>1</sup>D Farmand. <sup>1</sup>Kern Medical, Bakersfield, CA; <sup>2</sup>UCLA, Los Angeles, CA

10.1136/jim-2019-WMRC.180

**Purpose of study** Thyrotoxic Periodic Paralysis (TPP) is an unusual complication of hyperthyroidism, and is most commonly seen in Asian males. We are describing a case of a young Hispanic male presenting with acute onset lower extremity paralysis after strenuous physical activity who was found to have severe hypokalemia secondary to underlying undiagnosed Graves’ disease.

**Methods used** Retrospective case report.

**Summary of results** A 33-year-old Hispanic male with no significant past medical history presented with a two-day history of sudden onset bilateral lower extremity weakness leading to inability to ambulate. Symptoms started after patient performed strenuous activity in the setting of a sedentary lifestyle. Upon presentation to the ED, patient’s vitals were within normal limits and physical exam showed predominantly proximal bilateral lower extremity weakness, hyperreflexia in bilateral knees and 2 beats of clonus in bilateral ankles, action and postural tremors in bilateral hands. Laboratory assessment revealed severe hypokalemia, hypomagnesemia, mild elevation of creatinine phosphokinase, mild transaminitis, suppressed thyroid stimulating hormone and elevated free thyroxine. Urine potassium/creatinine ratio was less than 1 indicating transcellular shift as the cause of severe symptomatic hypokalemia. ECG 12-lead showed diffuse flattened T-waves. After normalization of potassium and magnesium, the paralysis and ECG abnormalities resolved within the first day of hospitalization. Treatment for hyperthyroidism with methimazole and propranolol was started during hospitalization and patient was discharged with outpatient follow up in endocrinology clinic.

**Conclusions** This is a rare and interesting case of Thyrotoxic Periodic Paralysis in a young Hispanic male as the first manifestation of undiagnosed Graves’ disease. Thyrotoxic Periodic Paralysis often goes unrecognized at first attack due to low prevalence of disease and because patients usually exhibit mild symptoms of hyperthyroidism. TPP should always be considered in young patients presenting with acute onset muscle weakness and hypokalemia.

Abstract 179 Table 1

Variable	P-value	OR	95% CI
Age	0.1701	0.851	(0.676–1.071)
Gender	0.3091	1.512	(0.682–3.254)
Race	0.8204	1.131	(0.392–3.264)
Language	0.6881	0.832	(0.338–2.047)
BMI	0.0258*	0.401	(0.180-0.895)

\*Significant at p<0.05 n=113

## Poster session

## Gastroenterology

6:00 PM

Thursday, January 23, 2020

## 181 A CASE OF ACUTE PANCREATITIS WITH REFRACTORY ELECTROLYTE IMBALANCE

J Bhandohal\*, J Bhaika, R Jariwal, R Gupta, S Allday, C Anderson. *Kern Medical, Bakersfield, CA*

10.1136/jim-2019-WMRC.181

**Purpose of study** Pancreatitis secondary hypertriglyceridemia occurs in 1–14% of all acute pancreatitis cases. There have been no large randomized trials that have evaluated the effect of triglyceride lowering for primary prevention in patients with mild-to-moderate hypertriglyceridemia. It is important to recognize in order to provide appropriate therapy.

**Methods used** Retrospective case report.

**Summary of results** A 36-year-old male presented to the emergency department with epigastric pain with associated N/V x 1 week. Patient had a hx of alcohol abuse of 16 12-ounce beers/day x 1 yr. On physical examination, patient was in significant distress due to epigastric pain with guarding on abdominal palpation. Due to his hx and symptoms, a diagnosis of acute pancreatitis was suspected and patient was admitted for management of abdominal pain and intractable N/V. Initial lab testing did not result as patient's blood sample was found to be grossly lipemic. This provoked a lipid panel to be drawn. Lipid panel was remarkable for triglycerides of 5700 mg/dl and total cholesterol of 658 mg/dl. Of all familial hypercholesterolemia's, Type V dyslipidemia typically presents in adulthood with high risk of acute pancreatitis. Treatment was initiated with IV Insulin and dextrose, similar to the management of diabetic ketoacidosis, although our patient was not diabetic. Blood glucose checks were done Q1 hr to adjust insulin infusion accordingly. Triglyceride levels were checked Q12 hr. Insulin enhances the activity of VLDL and Hormone-Sensitive Lipase to promote the breakdown of FFA and triglycerides in the circulation. Gemfibrozil was added to increase HDL production thus further removing triglycerides from the circulation. Outpatient management includes atorvastatin, fenofibrate, niacin, and fish oil. Lifestyle components play a major role such as alcohol cessation, avoiding complex carbohydrates, initiating an aerobic exercise plan, and increased consumption of fish containing high amounts of omega-3 fatty acids.

**Conclusions** There is limited data regarding which patients with hypertriglyceridemia require treatment and which therapies provide the best outcomes. This patient with pancreatitis secondary to an elevated triglyceride level of 5700 mg/dl was started on an insulin drip therapy for 3 days which lowered the level to 173 mg/dl.

## Poster session

## Healthcare delivery research

6:00 PM

Thursday, January 23, 2020

## 182 ACCULTURATIONAL AFFECTS REPRODUCTIVE HEALTH KNOWLEDGE AND PERCEPTION OF ARMENIAN AMERICANS

A Boodaghian\*, A Hovsepian, AL Nelson, F Dong. *Western University of Health Sciences College of Osteopathic Medicine of the Pacific, Pomona, CA*

10.1136/jim-2019-WMRC.182

**Purpose of study** The purpose of this study was to assess the perceptions about and knowledge of birth control amongst first and second generation Armenian men and women. A secondary objective was to investigate a possible association between education level and knowledge about birth control between the two groups.

**Methods used** An anonymous online survey was administered to men and women who were first and second generation Armenians from ages 18–60. The questions included information about the demographics, self-assessment (perceptions) of their knowledge about birth control and test questions designed to objectively assess their factual knowledge about contraceptive efficacy and safety. The survey was conducted in private at an Armenian community center in Burbank, CA, from 6/10/19 to 7/26/19. Chi-square tests were conducted to assess the associations between knowledge (yes vs. no) and demographic variables collected.

**Summary of results** Of the 147 individuals we approached, 135 participated in our study (response rate=92.8%). Overall, 61.6% were female, 33.3% were age 18–25 and 37.7% were age 26–35; 41.6% had been born in the U.S.

We analyzed the relationship between prior education and perceived and tested knowledge scores by birthplace and age of immigration. Perception of knowledge was higher than actual knowledge ( $p=0.04$ ). Of those who believed they had been educated on birth control, only 33.3% answered the knowledge questions correctly, while those who believed they were not educated on the topic, 29.4% answered correctly. Higher education level correlated with higher actual knowledge ( $p=0.01$ ), although those with less education perceived more knowledge on the topic.

**Conclusions** Overall, only a minority of respondents correctly answered questions about contraceptive efficacy. Correct test scores (knowledge) were statistically significantly associated with both higher education level and birthplace. However, perceptions of contraceptive use had no significant relationship to age, education level or acculturation, either in unmarried or married couples.

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### THE IMPACT OF MEDICAL STUDENT RESEARCH AS A DISCUSSION TOPIC DURING THE RESIDENCY INTERVIEW

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10.1136/jim-2019-WMRC.183

**Purpose of study** The University of Arizona College of Medicine-Phoenix (UACOM-P) requires students to complete a longitudinal scholarly project. The present study surveyed fourth year medical students two weeks prior to the NRMP match. The goal of the study was to determine if medical student research was an important topic of discussion during the residency interview process.

**Methods used** 62 UACOM-P students from the class of 2019 completed a 16-question survey. The survey showed that 36 of the 62 students (58%) took on other research projects in addition to their SP. 32 students (48%) interviewed in primary care and 30 students (52%) interviewed for non-primary care specialties. The survey examined the student's SP, volunteer experiences, work experiences, and non-SP research. The survey also determined if students published or presented research at a conference, and whether the research topics related to the specialty sought by the medical student.

**Summary of results** Students reported that 29% of interviewers asked about their SP. Students interviewing in primary care were more likely to be asked about their SP if their research topic related to their specialty (42% vs 21%,  $p=0.0047$ ). This relationship was not significant for students interviewing in non-primary care specialties (26% vs. 30%,  $p=0.6251$ ). Students in non-primary care specialties were more likely to be asked about research if they had completed other research projects outside of their SP (56% vs 34%,  $p=0.0076$ ). Interviewers were more likely to ask about the SP if the student had published their work or presented at a conference (35% vs 24%,  $p=0.0426$ ).

**Conclusions** Nearly 1/3 of residency interviewers ask students about their SPs. Students interviewing for primary care may expect more questions about their SP if their project is related to their specialty. Alternatively, if students are interviewing for a non-primary care specialty they may be more likely to receive questions about their research if they have completed other research projects in addition to their SP. Students who publish their SP or present their SP at a conference may be more likely to receive questions about their SP compared to those who do not. These findings suggest that scholarly research can provide medical students with an important vehicle of discussion during the residency interview process.

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### DECREASING MEDICARE REIMBURSEMENT FOR DERMATOLOGICAL PROCEDURES 2000–2019

<sup>1</sup>A Dorius\*, <sup>1</sup>M Kropelnicki, <sup>2</sup>JR Pollock, <sup>2</sup>JM Haglin, <sup>3</sup>G Hanson, <sup>3</sup>S Ochoa, <sup>3</sup>AR Mangold. <sup>1</sup>Brigham Young University, Provo, UT; <sup>2</sup>Mayo Clinic Alix School of Medicine, Scottsdale, AZ; <sup>3</sup>Mayo Clinic, Phoenix, AZ

10.1136/jim-2019-WMRC.184

**Purpose of study** With our aging population, patients covered by Medicare will continue to grow. For this reason, understanding Medicare reimbursement within dermatology will be increasingly important. In this study, we examine reimbursement trends for common Dermatology procedures from 2000 to 2019.

### Abstract 184 Table 1

CPT Code	Procedure	Total % Change 2000-2019 Adjusted
17003	Destruction of 2-14 skin growths	-79.43%
11721	Removal of tissue from 6 or more finger or toe nails	-42.25%
17000	Destruction of skin growth	19.66%
17110	Destruction of up to 14 skin growths	45.39%
11720	Removal of tissue from 1 to 5 finger or toe nails	-42.55%
11042	Removal of skin and tissue first 20 sq cm or less	-25.13%
11719	Trimming of fingernails or toenails	-28.36%
11055	Removal of single thickened skin growth	-25.01%
17004	Destruction of 15 or more skin growths	-52.94%
11730	Separation of nail plate from nail bed	-30.12%
11057	Removal of more than 4 thickened skin growths	-18.06%
11043	Removal of skin and/or muscle first 20 sq cm or less	-28.98%
13132	Repair of wound (2.6 to 7.5 centimeters) of forehead, cheeks, chin, mouth, neck, underarms, genitals, hands, and/or feet	-32.17%
17262	Destruction of malignant growth (1.1 to 2.0 centimeters) of trunk, arms, or legs	-10.00%
12032	Repair of wound (2.6 to 7.5 centimeters) of scalp, underarms, trunk, arms, and/or legs	8.46%
11602	Removal of malignant growth (1.1 to 2.0 centimeters) of trunk, arms, or legs	-3.65%
13121	Repair of wound (1.1 to 2.0 centimeters) of scalp, arms, and/or legs	-18.91%
11900	Injection of up to 7 skin growths	-14.62%
11750	Removal of nail	-31.71%
11301	Shaving of 0.6 centimeters to 1.0 centimeters of skin growth of the trunk, arms, or legs	-18.40%
	<b>Average</b>	<b>-21.44%</b>

**Methods used** The most commonly utilized dermatology procedures were found by searching for integumentary procedures in the CPY 2017 PUF data file. National reimbursement averages were then calculated and analyzed from 2000 and 2019 using The Physician Fee Schedule Look-Up Tool. Using the consumer price index, the averages were adjusted for inflation.

**Summary of results** Medicare reimbursement for included procedures from 2000 to 2019 decreased substantially (-21.44% or 1.07%/year). The largest decreases were found in 'Destruction of 2–14 skin growths' (-79.43%), 'Destruction of 15 or more skin growths' (-52.94%), and 'Removal of tissue from 1 to 5 finger or toe nails' (-42.55%).

**Conclusions** According to our data, Medicare reimbursement in dermatology has consistently declined when adjusted for inflation. As reimbursement continually decreases, Medicare patients may experience a decrease in accessibility to dermatologists and a reduced quality of care. A comprehension of these trends is essential as continued progress is made to achieve agreeable Medicare reimbursement in dermatology.

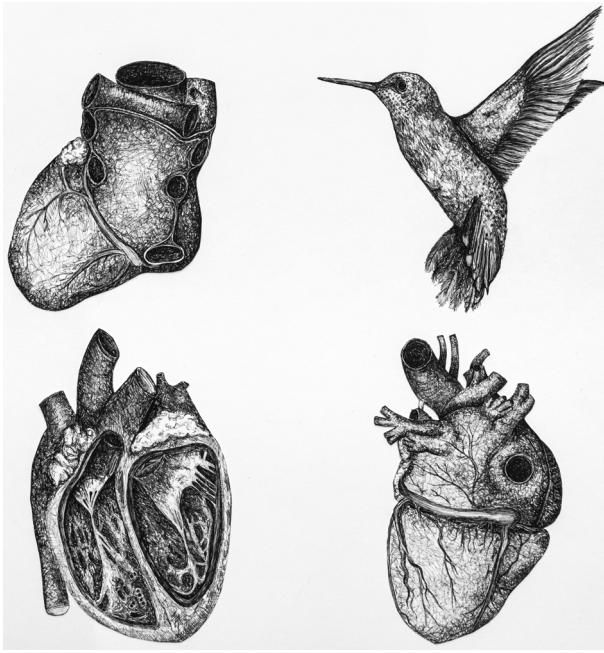
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### LEARNING WITH LITERATURE: HOW ARTS AND HUMANITIES CAN BE USED IN MEDICAL EDUCATION

H Drake\*, C Courneya. *University of British Columbia, Vancouver, BC, Canada*

10.1136/jim-2019-WMRC.185

**Purpose of study** Empathy is the ability to understand the feelings of another and can be used by a physician to understand a patient's values, feelings and perspective of their experience. This is an essential component of the doctor-patient relationship. Research demonstrates that students who engage in humanities develop higher levels of empathy and emotional intelligence; however, arts can be a challenge to incorporate into traditional curricula of medical education.



**Abstract 185** Figure 1 My Glory was I had Such Friends

**Methods used** A student pilot project was developed to explore empathy through reading patients' memoirs and creating reflections. Memoirs were selected based on two criteria: that they were written from the patients' voice and secondly, that a variety of illnesses were captured. The student then depicted the patient's story as a visual art piece, including themes from the book and representation of their illness. This was followed by a written reflection to combine, compare and contrast all of the lessons that were learned through the readings.

**Summary of results** Through analyzing what the authors shared, a better understanding of what patients' experience was developed. This led to the student having more confidence with patients, integrating tools learned from the authors, and understanding patient experiences.

**Conclusions** This model could be adapted to a larger number of students, each reflecting in their own artistic way on the same memoir. A group experience provides different perspectives of the book and results in a deeper analysis.

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#### POCKETOPHTHO: DEVELOPMENT OF A SMARTPHONE-BASED EDUCATIONAL TOOL FOR LEARNING OPHTHALMIC KNOWLEDGE

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10.1136/jim-2019-WMRC.186

**Purpose of study** To create a high-quality smartphone app for educating ophthalmic knowledge developed under supervision of U.S. board-certified ophthalmologists.

**Methods used** Ophthalmic content was curated from a team of board-certified ophthalmologists at the UC Davis Eye Center. De-identified ophthalmic images were obtained from these ophthalmologists and copyright-free online sources. Educational content and images were reviewed, verified, and

updated by at least two independent ophthalmologists. The app was built in XCode, an integrated development environment for building apps compatible with Mac OS-X and iOS Apple operating systems, using the programming language Swift in collaboration with students from the UC Davis Computer Science Department.

**Summary of results** The alpha prototype was built and reviewed with a panel of ophthalmic trainees including residents and fellows for functionality and usability to improve the prototype. The app name was selected based on survey responses. Survey questions include 'Which app evokes reliability,' 'Which app sounds the most user-friendly,' and 'Which app sounds most reputable.' Additional educational content has been included for development of a beta prototype.

**Conclusions** PocketOphtho is a high-quality smartphone app for teaching ophthalmic knowledge developed in conjunction with U.S. board-certified ophthalmologists, which can be useful for residents and fellows in ophthalmology training or in preparation for the Ophthalmic Knowledge Assessment Program (OKAP) or Written Qualifying Exam (WQE).

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#### TRANSITIONING TO ADULTHOOD WITH HYDROCEPHALUS: A PATIENT'S PERSPECTIVE

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10.1136/jim-2019-WMRC.187

**Purpose of study** Hydrocephalus is a chronic neurological condition that affects around 6 in 10 000 live births and is one of the most common indications for pediatric brain surgery. The condition is fatal if left untreated, however the introduction of new operative procedures such as shunt placements has led to most pediatric patients surviving and transitioning to adulthood. However, unlike other chronic conditions such as cystic fibrosis, congenital heart disease, type I diabetes, etc., the transition of adolescents with hydrocephalus from pediatric to adult care is often fragmented and disjointed given the lack of attention and research in establishing appropriate guidelines and models of transfer. This is particularly concerning not only due to the prevalence of hydrocephalus among the pediatric population, but the significant increase in morbidity and mortality associated post-transition with poorly handled transfers.

**Methods used** The study consisted of two phases that used a series of interview and survey questions to collect qualitative and quantitative data to identify factors that challenge young adults with hydrocephalus who are transitioning/transitioned from B.C Children's Hospital in Vancouver into adult care at Vancouver General Hospital.

**Summary of results** Emerging themes from the data highlighted the difficulty patients and their family members have in forging strong and familiar relationships that have been formed over the years at B.C Children's Hospital, adapting to the new cultural environment in an adult clinic and becoming self-reliant.

**Conclusions** Understanding the expectations, concerns and overall input of patients is one of the many important steps that must be taken in order to build a foundation for a transition model of care that can carefully attend to the needs of patients with hydrocephalus.



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### ORAL SELF-EMULSIFYING DRUG DELIVERY SYSTEM FOR DETECTION OF BETA AMYLOID PLAQUES IN THE RETINA OF AD MICE

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10.1136/jim-2019-WMRC.188

**Purpose of study** Alzheimer's disease (AD) is a neurodegenerative disease characterized by cognitive deterioration and is characterized by the accumulation of amyloid plaques found in neuronal tissue. A $\beta$  plaques can form in retinal tissue, allowing for early detection of AD. The objective of this project was to develop a self-emulsifying drug delivery system (SEDDS) for oral administration to enhance systemic absorption of curcumin via lymphatic route. Higher blood levels of curcumin equilibrate within the eye allowing binding to A $\beta$  plaques in retinal tissue. The intrinsic fluorescence of curcuminoids bound to A $\beta$  plaques would be quantified by imaging.

**Methods used** SEDDS were developed using medium-length chain triglycerides (MCT), polyoxyl castor oil (emulsifying agent), and Transcutol to solubilize curcumin. These formulations were observed for stability, diluted, and incubated at 37°C for 24 hrs. Before testing *in vivo*, formulations were selected based on particle size and triglyceride ratio and the dialysis membrane method was used to test drug release *in vitro*. SEDDS were diluted and 0.2 ml were added into a dialysis bag which was immersed into 19 ml of citrate buffer containing 0.5% SDS. Samples were withdrawn at different time intervals until 48 hours and were analyzed for curcumin released into the medium by HPLC.

**Summary of results** Addition of Oleic acid (OA) to MCT containing formulation dramatically decreased the release of curcumin from the micelles by 60%. Absolute values for drug release at 37°C for formulation #S407/10 (with OA) and #S407/9 (without OA) were 18.7% and 84.1% respectively at 48 hour. Whereas, addition of poloxamer 124 (another emulsifying agent) to polyoxyl castor oil containing formulation (#S507/8) increased drug release by approximately 80%.

**Conclusions** A decrease in drug release for formulation #S49\_7/10 could be due to greater lipophilicity of oleic acid, which is a long chain fatty acid. On the contrary, incorporation of a hydrophilic surfactant poloxamer 124 to polyoxyl castor oil possibly allowed greater release due to higher dissolution medium penetration within the micelles. Oral delivery of SEDDS formulations will be tested *in vivo* in mice to determine oral bioavailability of curcumin as a future diagnostic tool for AD.

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### EMPOWERING NURSES: USING KNOWLEDGE TO SCREEN & IDENTIFY VICTIMS OF HUMAN TRAFFICKING

P Khanna\*, F Dong, R Trudgeon, IC Tuason. *Western University of Health Sciences, Pomona, CA*

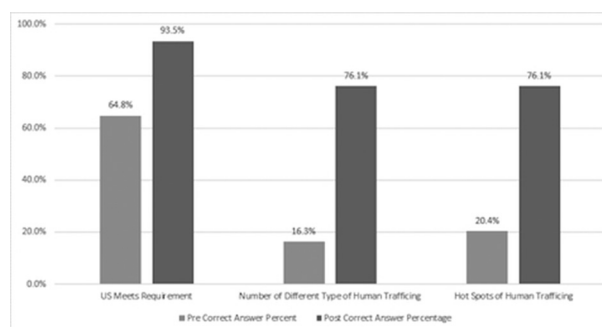
10.1136/jim-2019-WMRC.189

**Purpose of study** Nursing professionals are indispensable to the care team when serving victims of human trafficking. Knowledge & trauma informed training are pivotal for developing & implementing screening tools for potential victims. Purpose is to assess the effectiveness of an educational intervention to increase the knowledge of current graduate nursing students

about resources and federal laws for victims of human trafficking

**Methods used** Pre-licensure students & licensed nursing students at Western University of Health Sciences were invited to participate in an educational activity about human trafficking. Participants were asked to fill out a pre seminar questionnaire. A 30- minute presentation was delivered. After the presentation, participants completed a post seminar questionnaire that consisted of the same ten questions from pre seminar questionnaire.

**Summary of results** Final analysis included 65 students. There was significant increase in awareness about human trafficking (84.9% vs 97.8%, p=0.0082). 7% corrected rank order of at risk victims before lecture and 15.2% post lecture (p=0.1025). Statistically significant change to correct response to questions was noted; which standard did US meet to eliminate human trafficking (64.8% vs 93.5%, p=0.0002), number of different types of human trafficking (16.3% vs 76.1%, p<0.0001), & what are the hotspot of human trafficking (20.4% vs 76.1%, p<0.0001).



Abstract 189 Figure 1

**Conclusions** Study suggested increased information and awareness about human trafficking. The project aim, to empower nurses with knowledge so that they are informed agents of change was met. Equipping nurses with information is paramount for providing trauma informed care. Doing so by focusing on nurse edu. solidifies the importance of nurses' knowledge about the growing public health concern.

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### DECREASING MEDICARE REIMBURSEMENT FOR OPHTHALMOLOGICAL PROCEDURES 2000–2019

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10.1136/jim-2019-WMRC.190

**Purpose of study** A large portion of ophthalmological patients are elderly, therefore, Medicare policy may disproportionately affect this field. In this paper, we analyze the change in Medicare reimbursement rates for common ophthalmological procedures from 2000 to 2019.

**Methods used** Using the Centers for Medicare and Medicaid Services website, the most utilized ophthalmology procedures and treatments (65000–68000) were selected using the CPY 2017 PUF data file. The 2000 and 2019 national reimbursement averages for each procedure were gathered using the Physician Fee Schedule Look-Up Tool, and the data was

**Abstract 190 Table 1** Adjusted reimbursement trends. all values adjusted for inflation

CPT Code	Procedure	Total % Change 2000-2019 Adjusted
66984	Removal of cataract with insertion of lens	-38.79%
67028	Injection of drug into eye	-59.14%
66821	Removal of recurring cataract in lens capsule using laser	22.82%
68761	Closure of tear duct opening using plug	16.06%
65855	Laser repair to improve eye fluid flow	-47.43%
67820	Removal of eyelashes by forceps	-44.23%
67210	Laser destruction of retinal growth	-32.65%
67904	Repair of tendon of upper eyelid	-16.45%
67228	Laser destruction of leaking retinal blood vessels	-69.30%
66761	Creation of eye fluid drainage tract	-35.35%
67840	Removal of eyelid growth	3.84%
68840	Probing of nasal-tear duct	-27.33%
67917	Repair of detached retina and drainage of eye fluid between the lens and retina	-31.42%
67145	Extensive repair of turning-outward eyelid defect	3.54%
68801	Dilation of tear-drainage opening	15.51%
65800	Aspiration of eye fluid	-50.94%
67515	Preventative retinal detachment treatment by heat or laser	49.95%
67036	Removal of eye fluid (vitreous) between the lens and retina	-26.73%
67900	Repair of brow paralysis	-13.54%
67810	Biopsy of eyelid	-34.82%
<b>Average</b>		<b>-20.82%</b>

analyzed. Each average was adjusted for inflation using the consumer price index.

**Summary of results** When adjusted for inflation, the average reimbursement for the procedures analyzed in this study has decreased dramatically since 2000 (-20.82%). Rates for the majority of procedures have decreased by sizeable amounts. The largest decreases were seen in 'laser destruction of leaking retinal blood vessels' (-69.30%) and 'injection of drug into eye' (-59.14%).

**Conclusions** These results demonstrate that Medicare reimbursement rates for ophthalmology procedures have declined over the last 20 years. As the number of patients covered by Medicare continues to increase, a growing portion of a physician's patients will be covered by Medicare. If ophthalmology procedure reimbursement rates continue to fall, access to quality care for millions of Americans with Medicare may suffer.

### 191 IMPACT OF WAITING ROOM ART INTERVENTION ON PEDIATRIC PATIENTS' ANXIETY AND COOPERATION WITH PHYSICIAN

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10.1136/jim-2019-WMRC.191

**Purpose of study** To determine whether the implementation of an art activity decreases pediatric patients' anxiety in the waiting room and increases cooperation with their healthcare provider. This is a longitudinal pilot study that will expand on existing pediatric anxiety studies. The relationship between art therapy and pediatric stress levels has not been evaluated in detail in this specific circumstance.

**Methods used** Research is being conducted in the Patient Care Center at Western University of Health Sciences, Pomona, CA, and is approved by the Institutional Review Board. A randomized controlled study design is done with pre-and-post intervention evaluations of both the intervention and control groups. The subjects in the experimental group perform a creative art activity while control subjects choose their own activity. Anxiety is evaluated when the subjects enter the waiting room and before the physician encounter using a modified SCARED questionnaire. The physician assesses the quality of the encounter by completing a questionnaire. Data will be analyzed using the SAS software for Windows version 9.3. Descriptive statistics will be presented as means and standard deviations for continuous variables, along with frequencies and proportions for categorical variables. The change in the anxiety score will be calculated as the summation of the five key items. The change will be assessed by the general linear model with the group (control vs intervention) as the categorical variable. All statistical analyses will be two-sided. P-value<0.05 will be considered to be statistically significant.

**Summary of results** We are currently completing data collection. We hypothesize that an art intervention will reduce pediatric patients' anxiety. This will result in better cooperation with the physician during the medical encounter. Data analysis will focus on quantifying subjects' daily anxiety and situational anxiety in the PCC waiting room.

**Conclusions** Conclusions are pending until an appropriate amount of data is collected. If our hypothesis is supported by this pilot study, we will expand this research to a larger number of subjects and facilities to obtain confirmation. This can yield recommendations for pediatric waiting room settings. \*AB and PM have contributed equally to this work.

### 192 ANALYSIS OF MEDICARE REIMBURSEMENT TRENDS FOR MEDICAL OFFICE VISITS 2000–2019

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10.1136/jim-2019-WMRC.192

**Purpose of study** This study examines Medicare reimbursement trends from 2000 to 2019 for medical office visits for new and existing patients. These codes are commonly used in most medical specialties.

**Methods used** The Physician Fee Schedule Look-Up Tool from CMS website was utilized to calculate national reimbursement averages from included codes (codes 99201–99205 and 99211–99215). Averages were then adjusted for inflation using the consumer price index.

**Summary of results** From 2000–2019, Medicare reimbursement rates for the longest new patient visits of 45 and 60 minutes have increased by 64.7% and 110.3% respectively. Meanwhile, the shortest new patient visits of 10 and 20 minutes have decreased by 64.7% and 35.8% respectively. From 2000 to 2019, there was a 13.3% increase in reimbursement for new patient office visits (99201–99205), with a 32.1% decrease in reimbursement for existing patient office visits (99211–99215). Patient office visits codes 99201–99205 and 99211–99215 have seen a 9.4% overall decrease.

Abstract 192 Table 1 New patient office visits

CPT Code	Length of Office Visit	Total % Change 2000-2019 Adjusted
99201	10 min	-64.7%
99202	20 min	-35.8%
99203	30 min	-7.8%
99204	45 min	+64.7%
99205	60 min	+110.3%
	<b>Average</b>	<b>+13.3%</b>

Abstract 192 Table 2 Existing patient office visits

CPT Code	Length of Office Visit	Total % Change 2000-2019 Adjusted
99211	5 min	-88.3%
99212	10 min	-68.7%
99213	15 min	-36.3%
99214	25 min	-2.3%
99215	40 min	+35.3%
	<b>Average</b>	<b>-32.1%</b>

**Conclusions** According to our results, Medicare reimbursements have increased for longer patient visits and decreased for shorter patient visits. Additionally, Medicare reimbursement has increased for new patient visits and decreased for existing patient visits. Healthcare quality and access could be impacted by these trends as physicians are incentivized to accept new Medicare patients rather than follow-up visits. Future studies should be done to further examine reimbursement trends.

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### 20 YEARS OF MEDICARE REIMBURSEMENT TRENDS IN TRANSPLANT SURGERY

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10.1136/jim-2019-WMRC.193

**Purpose of study** As the elderly population of the United States grows, so does the Medicare population and the need for transplant surgery. This study examines the Medicare reimbursement trends for transplant surgeries from 2000 and 2019.

**Methods used** The Centers for Medicare and Medicaid Services website was utilized to find the most commonly utilized transplant procedures using the CPY 2017 PUF data file and searching for the term 'transplant' in the HCPCS description. Using The Physician Fee Schedule Look-Up Tool, national reimbursement averages were calculated from 2000–2019 and data was analyzed. Averages were adjusted for inflation using the consumer price index.

**Summary of results** Medicare reimbursement for included procedures decreased from 2000 to 2019 (-19.85% or 0.99%/year). The largest decreases were seen in 'Harvest of donor bone marrow for transplantation' (-45.75%), 'Transplant of tendon and muscle rerouting at lower leg or ankle' (-43.19%), and 'Removal of bladder and lymph nodes on both sides of pelvis with transplantation of ureters to small or large bowel

Abstract 193 Table 1

CPT Code	Procedure	Total % Change 2000-2019 Adjusted
50360	Transplantation of Donor Kidney	-15.62%
50365	Removal of kidney and transplantation of donor kidney	-15.82%
32851	Transplant of lung	-8.64%
48554	Transplantation of donor pancreas	-8.52%
33945	Transplantation of donor heart	9.95%
32853	Transplant of both lungs	4.63%
38230	Harvest of donor bone marrow for transplantation	-45.75%
38241	Transplant of patient's bone marrow or blood-derived stem cells	-13.70%
26480	Transplant of tendon of hand	-20.88%
65710	Transplantation of one cornea to other cornea	-14.44%
65755	Transplantation of one cornea to other cornea	-22.56%
26483	Transplant of tendon of hand	-27.36%
27692	Transplant of tendon and muscle rerouting at lower leg or ankle	-43.19%
27691	Transplant of deep tendon with muscle rerouting at lower leg or ankle	-27.39%
27690	Transplant of tendon and muscle rerouting at lower leg or ankle	-26.85%
23440	Transplantation of biceps tendon	-28.15%
51590	Removal of bladder with transplantation of ureters to small or large bowel with creation of urinary opening	-31.17%
51596	Removal of bladder and lymph nodes on both sides of pelvis with transplantation of ureters to small or large bowel with creation of urinary opening, open procedure	-33.20%
51595	Removal of bladder and lymph nodes on both sides of pelvis with transplantation of ureters to small or large bowel with creation of urinary opening	-34.46%
32854	Transplant of both lungs on heart-lung machine	4.11%
	<b>Average</b>	<b>-19.85%</b>

with creation of urinary opening' (-34.46%). There were only 3 procedures with increased reimbursement.

**Conclusions** Medicare is continually decreasing physician reimbursement rates for most transplant surgeries. Unfortunately, this potentially creates barriers to access these life-saving procedures for Medicare patients. This trend could also present many difficulties for surgeons and hospitals.

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### ONSITE CLINIC CARE OF WORK INJURIES IN HEALTHCARE WORKERS

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10.1136/jim-2019-WMRC.194

**Purpose of study** Onsite clinics (OSCs) render care for minor illnesses and uncomplicated hypertension, diabetes and other conditions. The aim of this pilot study was an analysis of OSC care by Advanced Practice Providers (APPs) – Nurse Practitioners or Physician Assistants – of healthcare workers (HCW) with workers compensation (WC) injuries.

**Methods used** We compared the incidence of injuries and lengths of restricted duty (RD) among 18,000 hospital-based HCW, versus those expected from data of the US Bureau of Labor Statistics (USBLS) and a database associated with the American College of Occupational and Environmental Medicine (ACOEM).

**Summary of results** HCW reported 68 injuries over 6 months for an incidence rate of 0.76 RD cases/100 workers per year, compared to 1.0 for all US HCW. RD days differed according to type of care (table 1). OSC care was associated with fewer RD days than expected. HCW who were prescribed physical therapy (PT) had 6-fold as many RD days, while those referred for specialty care (usually orthopedic) had over 5-times as many RD days, some results pending post-operative recovery. Causes included lifting and other direct patient care

**Abstract 194 Table 1** Actual vs. expected restricted duty days (RDD) according to prescribed type of care

OSCs only (N=47)		OSCs + PT (N=6)		OSCs + Referral (N=15)	
Actual RDD	Expected RDD	Actual RDD	Expected RDD	Actual RDD	Expected RDD
6.8±7.2	12.3±8.6	43.3±15.5	21.0±0.0	31.9±27.1	15.5±10.7
p=0.001		p=0.008		p=0.0375	

(35%), slips or trips (19%), and assaults (7%). Resulting effects included sprains or strains (40%), low back pain (25%) and abrasions or contusions (19%).

**Conclusions** Reported injuries were fewer than expected by USBLS criteria. So were RD days according to an ACOEM-affiliated database, unless PT or specialty referral were prescribed. Whether these differences in RD days reflects severity of the injuries or other factors will require additional analysis. Care of hospital-based healthcare workers rendered in OSCs staffed by Advanced Practice Providers generally yielded very good results.

**Abbreviations** OSCs, onsite clinics; PT, physical therapy; RDD, restricted duty days.

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**HEALTH COACHING: BIOMETRICS WERE BETTER AFTER A YEAR**

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10.1136/jim-2019-WMRC.195

**Purpose of study** To compare glycemic control and other biometrics over 1 year in 2 groups of wellness program participants (WPP) at a rural North Carolina workplace. Group A WPP had high-risk biometrics and were provided health coaching. Group B WPP had lower risks and got no coaching. **Methods used** Glycated hemoglobin (HbA1c) was measured by high performance liquid chromatography. Fasting blood glucose (FBG), total cholesterol (TC), low- and high-density lipoproteins (LDL, HDL) and triglycerides (TG) were measured by autoanalyzer in 94 Group A WPP (age 48 ± 10 SD, 62% male) and 390 Group B WPP (age 45 ± 12 SD, 41% male). A certified health and wellness coach provided 2 to 4 counseling sessions to Group A WPP depending on risk factors:

prediabetic and diabetic HbA1c >5.6 and >6.4, respectively, and improved diet, exercise, and weight control. WPP in both groups got letters with their blood test results requesting they share them with their physicians.

**Summary of results** By group definitions, initial values of FBG, lipoproteins and blood pressures (table 1) were all much less salubrious in Group A than B (p=0.02–0.0001). A year later, between-group differences remained except for TC and LDL. HbA1c improved in Group A but glycemic control by FBG waned in Group B. TC and LDL also worsened in Group B. HDL and TG improved in both groups, with small but significant falls in diastolic blood pressure (BP).

**Conclusions** Health coaching was accompanied by improved glycemic control not found in uncoached WPP. HDL and TG improved in both coached and non-coached groups, as did diastolic BP. The durability of these improvements requires further investigation.

Poster session

Infectious diseases

6:00 PM

Thursday, January 23, 2020

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**EVALUATION OF THREE CYTOMEGALOVIRUS IGG LATERAL FLOW ASSAYS FOR DETERMINATION OF CYTOMEGALOVIRUS SEROSTATUS**

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10.1136/jim-2019-WMRC.196

**Purpose of study** Cytomegalovirus (CMV) serostatus is a major determinant of CMV reactivation risk. Current clinical serology assays are limited by slow turnaround time and need for either trained personnel and/or specialized equipment.

**Methods used** We assessed the performance of three rapid lateral flow assays (LFA) for detection of CMV IgG antibodies compared to a primary reference CMV enzyme-linked immunoassay (ELISA) (Zeus ELISA™ CMV IgG), in serum from 200 consecutive adults, performed clinically. A subset (N=60) of samples for which there was discordance between the

**Abstract 195 Table 1** Biometric results in wellness program participants (WPP) with health coaching (Group A) vs. Group B WPP with no coaching.

	Group A			Group B		
	Initial	1-year follow-up	Paired p	Initial	1-year follow-up	Paired p
HbA1c:	8.7±1.8	7.6±1.4	0.027	N/A	N/A	N/A
FBG:	123±51	117±40	0.15	94±13	101±51	0.008
TC:	171±38	177±40	0.13	TC: 159±33	174±41	0.002
LDL:	102±37	104±34	0.70	LDL: 91±29	102±33	0.0002
HDL:	43±12	47±13	0.0001	HDL: 47±12	52±14	0.001
TG:	193±105	171±99	0.028	124±64	115±66	0.007
BP, systolic:	137±15	133±14	0.008	126±12	126±13	0.56
BP, diastolic:	86±7	84±8	0.024	82±6	81±6	0.006
Weight, pounds:	248±55	245±54	0.71	202±47	202±48	1.0

**Abstract 196 Table 1** Summary of diagnostic accuracy studies of the three lateral flow assays only 100 samples were used for the QNow UV Flashlight reader

Lateral Flow Assays	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)
Healgen	86 (79 to 93)	83 (76 to 90)	82 (74 to 89)	87 (81 to 94)
QNow Automated Reader	99 (97 to 100)	93 (87 to 98)	93 (88 to 98)	99 (97 to 100)
nanoComposix	57 (47 to 67)	97 (94 to 100)	95 (89 to 100)	72 (65 to 80)
QNow UV Flashlight	97 (92 to 100)	97 (92 to 100)	95 (88 to 100)	98 (95 to 100)

primary reference assay and one or more of the LFAs was also tested by a second reference method: LIAISON DiaSorin CMV IgG. LFA testing was done by a single blinded research technician and followed by inter-operator agreement assessment in three independent, blinded, non-laboratory-trained personnel, using the LFA with the best performance characteristics.

**Summary of results** By the primary reference ELISA, 93 patients (46.5%) were seropositive, and 107 (53.5%) were seronegative, and there was 100% agreement (60/60) with the subset tested by the second reference assay. The sensitivity and specificity of the three LFAs (Healgen, Qoolabs read with Automated Reader, and nanoComposix), compared to the ELISA reference assay, were: 86%/83%, 99%/93%, and 57%/97%, respectively. For the QNow assay, the sensitivity and specificity were similar when interpreted by visual inspection with a UV wavelength flashlight (97%/97%). There was inter-operator agreement for 29/30 (97%) observations (10 samples; 4 positive, 6 negative).

**Conclusions** All three LFAs were rapid, easy to perform and interpret, but showed variability in performance. The ease of performance and rapid turnaround time provide the rationale to further evaluate these assays in clinical settings where these attributes would be advantageous.

cirrhosis prognostic scores were Child Pugh A and MELD 10. TIPS was non-functional by ultrasound. MRI brain found mild hydrocephalus and abnormal periventricular signal in midbrain structures with severe leptomeningeal enhancements. Lumbar puncture had normal opening and closing pressures, lymphocytic pleocytosis, hypoglycorrhachia, and elevated protein. Serum and CSF coccidioidal antibody immunodiffusion were reactive with severely elevated complement immunofixation titers. Due to thrombocytopenia intrathecal amphotericin was deferred. Because of fluconazole failure and voriconazole hepatotoxicity, isavuconazole was started. Dexamethasone taper was added due to hearing and short term memory loss. Outpatient audiogram and liver function monitoring was arranged with plan for lumbar puncture in four weeks. The pharmacokinetic and pharmacodynamic impact on his lifelong azole therapy from TIPS recanalization and impaired cytochrome P450 3A4 and 3A5 is unknown.

**Conclusions** Coccidioidal meningitis is fatal if not treated. Hepatic impairment complicates management due to therapeutic limitations. Prognostic impact needs to be studied further but, in our experience, it is diminished.

### 197 COCCIDIOIDAL MENINGITIS AND CIRRHOSIS: IS THE GAME OVER?

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10.1136/jim-2019-WMRC.197

**Introduction** Coccidioidal meningitis requires lifelong, potentially hepatotoxic, triazole therapy. Complicated cases might need neurosurgical shunt or reservoir for intrathecal treatment. Cirrhosis complicates treatment options due to impaired hepatic function, coagulopathy and thrombocytopenia. We share a challenging case of coccidioidal meningitis in a cirrhotic patient with thrombocytopenia.

**Case report** 62 year old Hispanic male with alcoholic cirrhosis, portal hypertension requiring transjugular intrahepatic portosystemic shunt (TIPS), thrombocytopenia with splenic embolization, protein S deficiency with thrombosis of portal vein and left cephalic vein now off warfarin for two years, prediabetes and pulmonary coccidioidomycosis for two years off fluconazole for two months due to insurance presented with six weeks of progressive persistent occipital headaches, photophobia, nausea, vertigo, tinnitus, decrease hearing, blurry vision and short term memory lapses. Initial CT neuroimaging found 8 mm hyperdense focus in the posterior left cerebellum. Platelets were 51,000/uL. Presenting

### 198 LYME DISEASE: DIVERSITY OF *BORRELIA* SPECIES IN CALIFORNIA AND MEXICO BASED ON A NOVEL IMMUNOBLOT ASSAY

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10.1136/jim-2019-WMRC.198

**Purpose of study** Lyme disease is a growing tickborne epidemic with more than 400,000 new cases reported each year in the USA. If left undiagnosed and untreated, many of these cases progress to chronic Lyme disease, as recently defined (Stricker & Fesler, *Am J Infect Dis* 2018;14:1–44). Although *Borrelia burgdorferi sensu stricto* is considered the primary agent of Lyme disease in North America, recognition of previously undetected species of *Borrelia burgdorferi sensu lato* (Bbsl) and Relapsing Fever *Borrelia* (RFB) has complicated the diagnosis and treatment of Lyme disease. We report preliminary results of a serological survey of Bbsl and RFB in California and Mexico using a novel immunoblot technique.

**Methods used** The immunoblot method was designed to detect seroreactivity with specific species of Bbsl and RFB based on recombinant *Borrelia* membrane proteins, as previously described (Liu et al, *Healthcare* 2018;6:99; Shah et al, *Healthcare* 2019, in press). Patients were considered seropositive if they reacted with at least two proteins from a specific *Borrelia* species.

**Summary of results** Sixty-seven patients who resided in California or Mexico met the clinical definition of chronic Lyme disease. Immunoblot testing revealed that 30 patients were seropositive for Bbsl (Group 1), while 44 patients were seropositive for RFB (Group 2). Group 1 included patients who were seropositive for *B. californiensis* (6), *B. spielmanii* (8), *B. afzelii*/*B. garinii* (8), and mixed infections that included *B. mayonii* (3). Group 2 included patients who were seropositive for *B. hermsii* (5), *B. miyamotoi* (7), *B. turicatae* (7) and *B. turcica* (2). Seven patients were seropositive for both Bbsl and RFB species. In addition, four patients in Group 1 were seropositive for two species of Bbsl, while two patients in Group 2 were seropositive for two species of RFB. In the remaining Group 1 and Group 2 patients, the exact *Borrelia* species could not be identified using the immunoblot technique.

**Conclusions** Lyme disease is associated with a diversity of *Borrelia* species in California and Mexico. The clinical significance of this diversity in terms of missed diagnosis and response to antibiotic therapy requires further study.

### 199 OSTEOMYELITIS WITH INFECTED HARDWARE DUE TO STREPTOCOCCUS DYSGALACTIAE SUBSPECIES EQUISIMILIS

<sup>1</sup>R Hall\*, <sup>2</sup>S Choi, <sup>1</sup>D Holt, <sup>3</sup>A Govindarajan, <sup>3</sup>A Heidari. <sup>1</sup>Ross University School of Medicine, Miramar, FL; <sup>2</sup>Arizona College of Osteopathic Medicine (AZCOM) at Midwestern University, Glendale, AZ; <sup>3</sup>Kern Medical – UCLA, Bakersfield, CA

10.1136/jim-2019-WMRC.199

**Purpose of study** Group C streptococci (GCS), specifically *Streptococcus dysgalactiae* subspecies *equisimilis*, are gram-positive, β-hemolytic bacteria frequently isolated in the gastrointestinal tract, urogenital tract and occasionally as a part of the normal skin flora. We are presenting a complicated case of hip arthroplasty infection with *Streptococcus dysgalactiae* subspecies *equisimilis*.

**Methods used** Retrospective chart review.

**Summary of results** An 80-year-old female with a right total hip arthroplasty over 10 years ago was transferred to our hospital for fever, right hip swelling and pain. She stated that her hip dislocates every 6 to 8 months. Imaging showed underlying greater trochanter fracture and absent of hip abductors resulting in trochanteric escape and instability with hip dislocations. Imaging also revealed thick walled collection lateral to the hip extending to left iliacus muscle. She underwent incision and drainage and culture grew *Streptococcus dysgalactiae* subspecies *equisimilis* (SDSE). Sensitivity showed benzylpenicillin 0.32 mcg/mL and ceftriaxone 0.064 mcg. After 2 incision and drainage, She underwent 2 stage total hip revision. She continued on ceftriaxone 2 gram for 6 weeks.

**Conclusion** *Streptococcus dysgalactiae* subspecies *equisimilis* is an emerging bacterial infection to humans. Infection of Total Hip Arthroplasty with this pathogen is rare and has not been published.

*Streptococcus dysgalactiae*, virulence, skin and soft tissue, infection, osteomyelitis, management.

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### 200 DISSEMINATED COCCIDIOIDOMYCOSIS TO THE CHEST WALL: FLESH-EATING FUNGUS

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10.1136/jim-2019-WMRC.200

**Purpose of study** Coccidioidomycosis is an infection caused by *Coccidioides* endemic to southwestern United States.<sup>1</sup> The incidence of coccidioidomycosis has risen substantially: in California, the annual incidence increased from 2.5 to 8 per 100,000 during 1995–2006.<sup>2</sup> The rates increased to 14 during 2010–11,<sup>3,4</sup> and after a decline, jumped back to 13.7 in 2016 with the highest annual number to date.<sup>5</sup> Although manifestations of coccidioidomycosis infection are well-described and typically resemble flu-like symptoms,<sup>6,7</sup> presentation and treatment of disseminated coccidioidomycosis of chest wall is not well-studied.<sup>8</sup>

**Methods used** Retrospective study.

**Summary of results** A 33-year-old Hispanic male presented to regional hospital with complain of chest swelling, which increased over 6 weeks and eventually became painful with mild shortness of breath. He denied having a fever, cough, night sweats, or chills but reported generalized weakness and fatigue for 6 months, which started after a cold-like illness that lasted a week. He developed painful maculo-papulovesicular rash on his upper anterior chest wall. He was evaluated by several providers prior to the ER visit and was diagnosed with dermatoid varicella zoster infection. CT scan revealed multiple loculated fluid collections in the mid portion and right side of the anterior chest wall, suggesting abscesses. These measured approximately as big as 14.5 × 9.2 × 3.2 cm. CT guided drainage was done which revealed coccidioidomycosis *immitis*. Extensive incision and drainage were done which left bilateral large open wounds on both sides of the upper chest wall. He underwent several weeks of amphotericin IV with aggressive wound care which eventually allowed secondary closure. His treatment changed to high dose oral fluconazole. After a year, patient's cocci titers were 1:256 with Cocci IgM and IgG reactive. After 2 more years of fluconazole, his treatment was tapered and stopped by outside providers.

He presented to us with reactivation of his serology back up to 1:32 and was restarted on his treatment. During this time, he only complains of generalized weakness and is undergoing investigation of other foci of infection.

**Conclusions** A diagnosis of disseminated coccidioidomycosis should be considered in any unusual presentations in endemic areas for coccidioidomycosis.

### 201 A COMMON ILLNESS MASQUERADING AS PYELONEPHRITIS

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10.1136/jim-2019-WMRC.201

**Case report** A 20 year old, otherwise healthy student, presented to the Emergency Room with 5 days of intermittent fevers, shaking chills, dry cough and a non tender neck mass. She had been seen 48 hours prior in urgent care

where a mono spot and strep screen were negative. In the ER she denied sore throat and dysuria, however she did note abdominal pain. Exam was remarkable for a temperature of 38.9<sup>o</sup> C. She had fullness in her neck but no discrete lymph nodes; pharynx and lungs were normal. Bilateral upper abdominal and left CVA tenderness were noted. Lab studies showed a WBC of 7,300 (41% neut, 47% lymphs, 10% monos), hematocrit 42 and platelets 107,000. Urinalysis showed protein >500 mg/dL, 6–10 WBCs and 11–20 RBCs/HPF. Nitrite and leukocyte esterase were negative with moderate bacteria. Renal function was normal. She was admitted with the diagnosis of pyelonephritis and started on Ceftriaxone. CT of the neck/chest/abd/pelvis revealed bilateral enlarged anterior cervical lymph nodes and an enlarged spleen. Her temperature reached 40.2<sup>o</sup> C with worsening abdominal pain. On day 2 she developed a significant anemia with a mild elevation in LDH, urine culture was no growth and Epstein Barr virus (EBV) infection was confirmed. Antibiotics were stopped. Because of the severity of her fever and an unremitting cough she received solumedrol. Acyclovir was considered but not given. She was discharged on day 4 with a prednisone taper only to develop urticaria within 48 hours. The urticaria, felt to be associated with EBV, resolved 2 weeks after onset. In summary we present a case of initial mono spot negative EBV infection without pharyngitis but with lymphadenopathy, splenomegaly, abdominal pain and unusually high fevers on presentation. The urine abnormalities were consistent with interstitial nephritis, a rare, under recognized complication of EBV; sometimes mistaken for a UTI. Renal involvement is usually self limited as in our case. Additionally she experienced anemia, and urticaria which have been reported with EBV. In conclusion EBV, one of the most common viruses worldwide, and asymptomatic in many, can present with a confusing constellation of findings and without the hallmark pharyngitis leading to misdiagnosis, as in our patient. Our patient recovered, however rare reports of acute renal failure, encephalitis, and splenic rupture have been linked to EBV infection.

## 202 PEDIATRIC COCCIDIOIDOMYCOSIS MENINGITIS

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10.1136/jim-2019-WMRC.202

**Background** Coccidioidomycosis is a fungal infection that can manifest as flu like symptoms to more severe symptoms such as pneumonia or meningitis. However, coccidioidomycosis in the pediatric populations is not frequently studied with few studies on the management of pediatric coccidioidomycosis.

**Case Report** A 7-year-old male presented to the ED with a cough and fever for 2 days. Chest x-ray indicated a right upper lobe and lingular pneumonia. Patient arrived 2 days after with persistent fevers, fatigue, nausea, emesis and meningeal symptoms with a positive Kernig and Brudzinski sign. He was afebrile and tachycardic on admission. Patient was admitted to the pediatric floor where he was given Dexamethasone,

Acyclovir 200 mg, Ceftriaxone 2g and Vancomycin 320 mg. A lumbar puncture showed WBCs of 720, glucose of 27 and proteins of 128. CSF gram stain noted no organisms but with many PNMs. Patient continued to have nausea, emesis and fevers for 48 hours with temperatures up to 103. On day 3 of admission, serum coccidioidomycosis results indicated no IgM but a positive IgG with titers of 1:4 whereas the CSF results were negative. The patient was started on oral Fluconazole 200 mg and then transferred to a pediatric higher level of care. During transfer the patient suffered a grand-mal seizure for 1.5 minutes. He was then treated at the facility with Fluconazole 12 mg/kg/day and Keppra 30 mg/kg/day. Patient was discharged one week later with oral Fluconazole 100 mg twice a day and told to follow up for repeat LP and serum titers. An EEG conducted during his stay indicated mild encephalopathy. Patient would require Fluconazole as a lifetime treatment.

**Conclusion** In the course of a coccidioidomycosis infection less than 50% have IgM present a week after symptom onset indicating a high false negative during the early stage of infection. The stated patient had no antibodies in the CSF. As a result, following up with a repeat LP is crucial to confirm the etiology of his meningitis. Very few cases of pediatric cocci meningitis have been reported. As a result, establishing a standard of care when encountering such cases is imperative.

## 203 BACTERIAL TWO-COMPONENT SYSTEMS AS ANTIMICROBIAL TARGETS

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10.1136/jim-2019-WMRC.203

**Purpose of study** Two-component systems (TCS) comprising sensor histidine kinase (HK) and response regulator proteins are ubiquitous bacterial signal transduction mechanisms with regulatory functions in virulence, antibiotic resistance, toxin expression, cell differentiation and others. Some TCS are essential for bacterial viability yet no similar mechanisms are found in the animal kingdom. TCS are thus considered attractive antimicrobial targets. Previous efforts have identified lead compounds that inhibit multiple HK proteins and feature promising broad spectrum antimicrobial activities. Medicinal chemistry efforts resulting in a series of 50 novel compounds were probed for improved antimicrobial activities of the initial lead compounds.

**Methods used** Antimicrobial activities of 50 novel compounds against *Staphylococcus aureus* were assessed by Kirby-Bauer disk diffusion assays following Clinical & Laboratory Standards Institute guidelines. Minimal inhibitory concentrations (MICs) for the most promising compounds were assessed against a variety of Gram-negative and Gram-positive bacterial pathogens by serial dilution. All compounds were assayed for in vitro HK inhibitory activities and off-target inhibition of structurally related DNA-gyrase and structurally unrelated serine/threonine kinases were determined.

**Summary of results** Antimicrobial assays of the compound series singled out three with MICs in the µg/mL range

against all tested bacterial pathogens. The compound series revealed inhibitors with varying specificities for a set of three HK in vitro, as assayed by autoradiography. None of the compounds showed off-target inhibition of DNA-gyrase, which shares a structurally related ATP-binding domain with HK proteins. Similarly, structurally unrelated serine/threonine kinases were not inhibited by any of the compounds.

**Conclusions** Novel compounds with promising antimicrobial activities were identified. TCS continue to be attractive targets and our efforts contribute towards a body of research with the ultimate goal of identifying effective inhibitors that can serve as new antibiotic agents.

## Poster session

### Morphogenesis and malformations

6:00 PM

Thursday, January 23, 2020

204

#### BILATERAL AGENESIS OF THE INTERNAL CAROTID ARTERIES

TS Matern, A Shinagawa\*, R Rangaswamy. *University of Nevada, Reno, Reno, NV*

10.1136/jim-2019-WMRC.204

**Introduction** Bilateral internal carotid artery agenesis (BLICAA) is a rare anomaly with minimal reporting in the literature. This case of BLICAA, consistent with previous case reports, presented with neurological symptoms.

**Case description** This case outlines an instance of bilateral ICA agenesis in a 59 year old male. The patient was hospitalized for acute onset left arm numbness. On admission, imaging revealed bilateral agenesis of the ICA. The intracranial vertebral arteries demonstrated atherosclerotic plaque with ~50% occlusion. MRI C-Spine also revealed severe left neuroforaminal stenosis at C6-7. The patient continued to experience left arm weakness and numbness, in a non-dermatomal distribution, with decreased bicep deep tendon reflexes. He denied associated radicular pain. The patient was discharged and instructed to follow-up with neurosurgery as an outpatient. Follow-up MRI revealed multiple lacunar infarcts. These imaging findings, in conjunction with an absence of radicular pain, were determined to be the cause of the patient's left arm weakness and numbness.

**Discussion** This case is classified as an instance of BLICAA (delineated from aplasia by the absence of carotid canal on CT), of which only 32 cases were found to be previously reported in the literature. Furthermore, this patient presented with two additional vascular variations; first, a common origin of the right vertebral artery and common carotid artery, and second, an aberrant right subclavian artery. It is unclear exactly how this patient's vascular anomalies contributed to his presentation, but in the context of previous cases, the absence of both ICA's was presumably a significant factor in the development of his cerebrovascular symptoms.



Abstract 204 Figure 1 CTA Neck reconstruction

## Poster session

### Neonatal pulmonary

6:00 PM

Thursday, January 23, 2020

205

#### DOES CESAREAN SECTION INCREASE THE RISK OF LOWER RESPIRATORY TRACT INFECTIONS IN INFANTS?

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10.1136/jim-2019-WMRC.205

**Purpose of study** There has been some suggestion that infants born by C-section may be at higher risk of lower respiratory tract infections (LRTI) but the evidence is not clear. The objective of this study is determine if c-section is associated with increased risk of LRTI in infants.

**Methods used** A literature review was conducted using Google Scholar and PubMed using key terms such as: lower respiratory tract infection (LRTI), c-section bronchiolitis, and pneumonia. Only studies that included infants born via c-section and a control group (vaginal delivery) with one or more LRTIs during the first 36 months of age were included in our analysis.



**Abstract 205 Table 1** Association of c-section and lower respiratory tract infection in infants

Author, Year; Location of Study	Type of Study	Average age to LRTI or Bronchiolitis	Outcome Details	N with LRTI/Total N C-section (C/S) Group	N with LRTI/Total N Vaginal Group	Statistical Significance	Confounding variables* accounted for (Y/N)
Hendaus, 2014 - Qatar	Retrospective	10 days– 34 months	Rate of RSV Hospitalization	89 (48%) of 185	215 (43%) of 493	p=0.965	N
Kristensen, 2015 - Denmark	Population-based, cohort study	0–2 years	Rate of Hospitalization per/1000 person-years for RSV	Acute C/S (N=31,715) =17.15 Elective C/S (N=30,965)=25.21	Vaginal (N=336,497) =15.56	Adjusted HR† for RSV hospitalization in children born by acute and elective CS were 1.09 (95% CI: 1.01–1.17, P=0.035) and 1.27 (95% CI: 1.19–1.36, P<0.001), respectively.	Y
Magnus, 2011 - Norway	Prospective birth cohort study	0–36 months of age	Recurrent LRTI 3 or more episodes	Elective C/S 111 (6.6%) of 1,687, Acute C/S 143 (5.2%) of 2,736	1374 (4.4%) of 30829	Elective vs Vaginal Adjusted RR=1.19, CI=(0.95–1.48 ) Acute vs. Vaginal Adjusted RR=1.01, CI=(0.83–1.22)	Y
Moore, 2011 - Australia	Retrospective population-based cohort study	0–23 months	Hospitalization due to bronchiolitis	1051 (3.1%) of 33,421	3465 (2.7%) of 127,045	Admissions for bronchiolitis at age	Y
Shang, 2014 - China	Case-control study	less than 12 months	Respiratory Syncytial Virus, Bronchiolitis	104 (82%) of 126	69 (68%) of 101	Odds of RSV-positive bronchiolitis was significantly higher in elective cesarean delivery (adjusted OR 2.32, 95% CI 1.19–4.52) after adjusting for confounding variables	Y

\* The confounding variables included: maternal age, pregnancy complications, maternal smoking during pregnancy, maternal asthma. †HR: Hazard Ratio ‡IRR: Incidence Rate Ratio

**Summary of results** We found 28 studies and of those, 5 met our inclusion criteria (see Table). Three of 4 studies that looked at the incidence of respiratory syncytial virus (RSV) showed a correlation between c-section and hospitalization due to RSV bronchiolitis. The correlation may be stronger in infants delivered by elective c-section vs emergent c-section (Shang et al). One study (Hendaus et al) did not find a correlation between c-section and recurrent LRTIs but this study did not take into account confounding variables, such as maternal age, pregnancy complications, maternal smoking and asthma.

**Conclusions** Our review suggests a possible link between C-section and increased risk of hospitalization due to RSV bronchiolitis. Large prospective studies that take into account various confounding variables are needed to confirm this association.

## 206 PRECISION CARE FOR ALVEOLAR CAPILLARY DYSPLASIA

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10.1136/jim-2019-WMRC.206

**Purpose of study** The majority of patients with alveolar capillary dysplasia and misalignment of the pulmonary veins (ACD) die in early infancy from respiratory failure and pulmonary hypertension (PH). Here we report a patient with ACD who has survived for more than four years with precision care.

**Methods used** With IRB approval, we reviewed the medical records of a patient with ACD.

**Summary of results** Timeline: 0–3 months: The patient developed respiratory failure and pulmonary hypertension on the

first day of life. He was refractory to treatment with high frequency ventilation, surfactant and inhaled nitric oxide (iNO); and was supported with ECMO from days of life 1–6. His inpatient therapy also included, epoprostenol, sildenafil and bosentan. Tests for genetic variants associated with surfactant deficiency were negative.

3–10 months: He was treated with sildenafil, bosentan, a diuretic and oxygen (O<sub>2</sub>). The severity of PH decreased and bosentan was stopped after 5 months.

11–24 months: He developed evidence of severe PH, right heart failure with an increase in B-type natriuretic peptide (BNP) and an increased O<sub>2</sub> requirement with a respiratory infection. A CT angiogram raised concern for pulmonary veno-occlusive disease or pulmonary capillary hemangiomatosis. A lung biopsy showed evidence of a mild form of ACD. Genetic testing revealed a c.246C>G (p.F82L) heterozygous, novel and de novo variant in the FOXF1 gene. He was treated with bosentan, sildenafil, digoxin, aspirin and additional diuretics. His BNP normalized unless he experienced subsequent respiratory infections.

25–50 months: Heart catheterization and acute vasodilator testing (AVT) were performed to explore options for treatment with additional medications. His response to O<sub>2</sub> with iNO satisfied the Sitbon criteria for an acute responder. AVT with nicardipine confirmed that outpatient treatment with a calcium channel blocker would be appropriate. Amlodipine was added. Estimates of systolic pulmonary arterial pressure remain high; however, his BNP has been normal despite occasional respiratory infections and a decrease in diuretics.

**Conclusions** This case describes a patient with ACD who has survived for more than 4 years with medical therapy. His

acute response to nicardipine and his long-term response to amlodipine suggests that AVT can be used to guide precision care, even in a patient with right heart failure.

## Poster session

### Neonatology general

6:00 PM

Thursday, January 23, 2020

#### 207 IMPROVING RESIDENT CONFIDENCE AT NEONATAL RESUSCITATION THROUGH INCREASED EXPOSURE

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10.1136/jim-2019-WMRC.207

**Purpose of study** Deterioration of resuscitation skills is seen with 39% of residents failing neonatal resuscitation program (NRP) skills shortly after completing training despite mandatory NRP training and adherence to ACGME requirements for newborn and NICU rotations. One study showed that pediatric residents were present at less than 50% of deliveries, declining to as low as 5%. The residents at our program attend very high risk resuscitations with a neonatologist, but are not required to attend normal term deliveries or lead resuscitations. This project hopes to advocate for increased exposure and a more deliberate curriculum toward resuscitative skills which has been shown to improve retention of NRP skills.

**Methods used** An initial anonymous survey was sent to all residents at our program (n=36) about their resuscitation experience. Normal newborn resuscitations (NNR) defined as a term newborn born via vaginal delivery with no pre-determined risk. A high risk delivery defined as any change from normal delivery, such as cesarean section but no neonatologist need be present. Responses (n=24) gave insight on (1) exposure to NNR (2) interest towards attending resuscitations (3) confidence in running resuscitations. Survey results were presented to program leadership advocating for increased exposure to NNR. This led to a new requirement to attend an additional 15 deliveries of normal newborn and high risk deliveries over the 3 year residency. The first resident class affected was surveyed before the implementation was set, and re-surveyed at the end of the year post intervention.

**Summary of results** The initial survey demonstrated that 92% of respondents requested more exposure to NNR in residency, which then led to a change in requirements. After implementing this change, there was an improvement in the number of residents who felt increased comfort at running resuscitations on their own from 21% to 58%. There was also improvement in knowledge regarding the type of equipment used at resuscitations.

**Conclusions** By increasing the number and variety of newborn resuscitations our residents are required to attend, our program has made their first steps in improving resident confidence and comfort in applying their NRP skills at neonatal resuscitations. This study implies that more exposure will continue to improve confidence in leading newborn resuscitations, and retention of NRP skills.

#### 208 EVALUATING AND IMPROVING CONTINUOUS MORPHINE WEANING PRACTICE IN THE NEONATAL INTENSIVE CARE UNIT

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10.1136/jim-2019-WMRC.208

**Purpose of study** In the Neonatal Intensive Care Unit (NICU), some critically ill infants require intravenous continuous morphine (ICM) for pain control, sedation, or comfort care. Exposure to ICM can lead to increased central line days, feeding intolerance, poor tone and motor function, and prolonged hospitalization. In our institution no protocol exists for weaning ICM which could contribute to longer morphine exposure than necessary. The goal of this Quality Improvement (QI) project is to shorten the ICM wean duration in our Level 3 NICU by 25% by Feb 2020 by creating a standardized protocol for weaning and discontinuation of ICM.

**Methods used** The first step was to analyze our current practice trends. All infants who received ICM for at least three consecutive days between Nov 2018 and Feb 2019 were evaluated for inclusion. Exclusion criteria were transfer to another facility or death while on ICM. The following data was collected for each patient: gestational age at birth (BGA), birth weight (BW), gender, gestational age (CGA) and primary diagnosis at initiation of ICM, duration of ICM, highest dose of ICM, duration of ICM wean, and duration and method of wean off ICM.

**Summary of results** Data collection identified a total of 23 infants who met inclusion criteria, 13 infants were excluded, leaving 10 infants for analysis. Patient demographics included average BGA of 32w5d (23w4d–40w6d), 60% males, average BW of 2602 grams (565–4645 grams), and average CGA at time of initiation of ICM of 35w3d (25w1d–43w4d). Common primary diagnoses during ICM included pulmonary hypertension and hypoxic ischemic encephalopathy (HIE). Average exposure to ICM was 9.6 days (4–18.3 days). Average duration of the wean was 11.8 days (0–29 days). Infants weaned off directly from ICM compared to weaned off on a scheduled regimen had a shorter wean by 14.6 days (1.6 days versus 16.2 days).

**Conclusions** Our opioid weaning protocol has been approved by the NICU physicians and pharmacists. and is now in the trial phase. The protocol will be implemented for infants on ICM, with the first cycle running from Nov-Dec 2019, and the second cycle Dec 2019-Jan 2020. After each cycle, we will assess not only duration of ICM weaning, but also adherence to the weaning protocol by practitioners and barriers to adherence.

#### 209 SHORT-TERM OUTCOMES OF VENO ARTERIAL -ECMO FOR HIE AND SEVERE PPHN

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10.1136/jim-2019-WMRC.209

**Purpose of study** To evaluate in-hospital outcomes of infants with Hypoxic Ischemic Encephalopathy (HIE) and severe Persistent Pulmonary Hypertension (PPHN) requiring therapeutic

hypothermia (TH) and Venous-Arterial Extra Corporeal Membrane Oxygenation (VA-ECMO).

**Methods used** Single center retrospective evaluation of neonates with HIE on TH requiring VA-ECMO from 2011–2019.

**Summary of results** Among infants with HIE, meconium aspiration was the commonest cause of PPHN. All infants had echocardiographic evidence of PPHN and had received inhaled Nitric Oxide before ECMO. All except one infant tolerated complete course of TH for 72 h. Close monitoring of coagulation profile with prompt correction of abnormal values was performed during ECMO. All subjects were discharged home and 56% had normal MRI and only one patient had intracranial hemorrhage.

**Conclusions** Among patients with HIE, severe PPHN observed during TH can be effectively treated with VA-ECMO with overall good results. In patients with HIE and PPHN, TH through ECMO is an effective strategy.

**Abstract 209 Table 1** Neonatal characteristics and hospital outcomes - median (IQR) or n (%)

Total patients	9
Gestational age (weeks)	40 (39.3–40.3)
Male gender	3 (33.3%)
Birth weight (grams)	3480 (2820–3760)
Intubation in Delivery Room	7 (77.7%)
CPR in Delivery Room	6 (66.6%)
5 min Apgar score ≤5	7 (77.7%)
Blood gas for which cooling was initiated	
- pH	6.86 (6.8–6.97)
- Base deficit- mmol/Ltr	17 (14–19)
Seizures	2 (22.2%)
Co -morbidity	
- Meconium	8 (89%)
- Pulmonary hemorrhage	1 (11%)
- Trisomy 21	2 (22%)
- Sepsis	1 (11%)
Age at starting Nitric oxide (hrs)	4 (3–6)
Echo finding before ECMO	
- Pulmonary hypertension	9 (100%)
- Ventricular dysfunction	3 (33%)
Values just before ECMO	
- Platelet count	201 (157–216)
- INR	1.47 (1.32–2)
- Fibrinogen	200 (176–225)
- Intracranial Hemorrhage	0
- Oxygenation Index	51 (43.5–60)
- Vasoactive Inotrope Score	22 (15–55)
Characteristics during ECMO	
- Age at initiation (hrs of life)	24 (23–36)
- Cooling during ECMO*	7 (77.7%)
- Intracranial hemorrhage	1 (11.1%)
- Lowest PaCO2**	27 (19–31)
- Total ECMO duration (days)	5 (4–7)
Duration of Mechanical Ventilation (days)	15 (13–18)
Age at MRI (days)	13 (10–15)
Normal MRI	5 (55%)
Length of stay (days)	36 (30–59)

\* One patient was rewarmed at referral hospital before transfer at 32 h of life for worsening PPHN. Second patient ECMO was started after 72 h of TH \*\* Patient with IVH had lowest PaCO2 of 17 mm Hg

## 210 INDEPENDENT EVALUATION OF THE NEONATAL SEQUENTIAL ORGAN FAILURE ASSESSMENT SCORE WITH DIRECT COMPARISON TO HERO TECHNOLOGY

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10.1136/jim-2019-WMRC.210

**Purpose of study** An operational definition neonatal sepsis is lacking. Technological tools and biomarkers that can accurately predict infection mortality outcomes, especially risks for multi-organ dysfunction syndrome, are constantly being sought. The neonatal sequential organ failure assessment (nSOFA) score, recently published by Dr. Wynn and Dr. Polin in *Pediatric Research*, provides an objective, electronic health record-automated score. Conversely, HeRO incorporates proprietary algorithms to calculate a sepsis score based upon variations in the patient's heart rate. This study will independently validate the nSOFA score and directly compare the efficacy of nSOFA and HeRO scoring systems in predicting mortality related to neonatal sepsis.

**Methods used** A retrospective chart review of infants born <33 weeks' gestational age between 2012 and 2015 at UCSD Medical Center with positive blood cultures and/or necrotizing enterocolitis (NEC) were included. The electronic health records of these infants were reviewed to ascertain and document components of the nSOFA score (range 0–15) including: (a) need for mechanical ventilation and oxygen requirement (score range 0–8); (b) administration of vasoactive drugs including corticosteroids (score range 0–4); and (c) presence and degree of thrombocytopenia (score range 0–3). Scores were calculated for each infant at nine time points, including –48, –24, –12, –6, time 0 (sepsis evaluation), +6, +12, +24, and +48 hours. nSOFA data was directly compared to HeRO scores at similar time point to determine efficacy in predicting neonatal mortality associated with sepsis and/or NEC.

**Summary of results** Seventy-five patients born <33 weeks' gestational age were identified to have one or more positive blood cultures during the study period and were included for analysis. In addition, seventeen patients diagnosed with necrotizing enterocolitis during this time period have been identified. Chart review is nearly completed with final statistical analysis expected in November 2019.

**Conclusions** Complete results with conclusion will be available by the WSPR conference date.

## 211 EFFECT OF LOW-DOSE HIGH-FREQUENCY MULTIMEDIA REFRESHER MATERIALS ON HELPING BABIES BREATHE SKILLS RETENTION IN TANZANIA

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10.1136/jim-2019-WMRC.211

**Purpose of study** Helping Babies Breathe (HBB) is an educational module created by the American Academy of Pediatrics that teaches the knowledge and skills required to care for babies in the first few minutes of life after birth. Since its creation in 2010, HBB has been implemented in 80 countries and has been taught to over 450,000 birth attendants resulting in a reduction of neonatal mortality by as high as 50%. The program relies on in-person trainings that cover both the knowledge and skills required to care for newborns. However,

recent studies have shown that low-dose high-frequency refresher trainings are an effective means of accomplishing this, but to date these trainings have not incorporated multimedia tools. While multimedia materials have already been created to aid in teaching HBB, their effectiveness has never been studied. This project aims to study the effectiveness of targeted low-dose high-frequency refresher videos of HBB material in one hospital in Tanzania.

**Methods used** Previously trained birth attendants and health care providers at Muhimbili National Hospital in Dar es Salaam, Tanzania will be recruited to participate in this study. Participants will be randomized to either a cohort that only views a refresher video, or a cohort that receives the standard in-person refresher teachings. Skills over time will be measured using the already established HBB bag and mask ventilation skills checklist. To establish a baseline, all participants will be scored by this checklist at the beginning of the study. Before the interventions are implemented, skills will be checked after 2 months to examine how skills change over time. Then, either a short refresher video or a hands-on person-to-person skills refresher will be presented to the respective cohorts. Skills stations will be set up in the labor and delivery area and all participants will self-practice bag and mask ventilation weekly for 5 minutes. The video cohort will be required to re-watch the skills video twice a month. The bag and mask ventilation skills checklist will be administered again after 2 months and the performance of the two cohorts will be compared.

**Summary of results** Pending

**Conclusions** It is hypothesized that the two cohorts will perform similarly which may suggest that self-study videos can replace in-person refresher trainings when trainers are not available.

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### DOES CONTINUOUS POSITIVE AIRWAY PRESSURE ALTER THE FECAL MICROBIOTA OF VERY LOW BIRTH WEIGHT INFANTS?

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10.1136/jim-2019-WMRC.212

**Purpose of study** The gut microbiota influences host innate and adaptive immune responses, and alterations in the microbiota appear to play a role in necrotizing enterocolitis and sepsis. Continuous positive airway pressure (CPAP) is commonly required in very preterm infants with gaseous abdominal distention a common side effect. The impact of swallowed air on the fecal microbiota is unknown. We hypothesize that distention of the distal small bowel and colon with swallowed air leads to dominance of pathogenic facultative anaerobes as opposed to the commensal obligate anaerobic population in a healthy gut.

**Methods used** In a single center cohort study of infants with gestational age less than 33 weeks, we collected fecal samples twice weekly. We performed 16S ribosomal RNA gene sequencing of serial fecal samples from 22 infants who received CPAP for 5 or more days (94 samples) and from 19 infants not receiving CPAP therapy (129 samples). Measures of alpha diversity (Shannon) and beta diversity (non-metric multidimensional scaling (NMDS) based on weighted and unweighted UniFrac distances) will be compared between

Abstract 212 Table 1

	CPAP (N=22)	No CPAP (N=19)	P value
Birth weight (grams, median, IQR)	835 (710, 998)	1340 (1148, 1725)	<0.01
Gestational age (weeks, median, IQR)	26 (24, 28)	30 (28, 31)	<0.01
BPD (oxygen requirement at 28 days, N(%))	21 (95)	8 (42)	<0.01
BPD (oxygen requirement at 36 weeks, N(%))	12/17 (70)	5 (26)	0.02
Length of stay (median, IQR)	85 (59, 121)	55 (47.5, 64.5)	<0.01
Antibiotic days (median, IQR)	4.5 (2, 13)	2 (2,3)	0.02

groups and in the subset of CPAP infants before and after cessation of CPAP.

**Summary of results** Demographic details for the infants included in the analysis are summarized in the table. The sequencing of the samples has been completed and the bioinformatics analysis is in process.

**Conclusions** The infants receiving >5 days of CPAP were more preterm, smaller, and had more BPD and longer hospital stays than the infants not receiving CPAP. Thus, differences in the microbiota will be heavily influenced by these confounders. Three comparisons will be most valuable in addressing our hypothesis: samples at matched gestational ages, samples in the same infants during and after CPAP, and samples from intubated infants compared to matched CPAP infants.

## Poster session

### Nephrology and hypertension – adult

6:00 PM

Thursday, January 23, 2020

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### ATYPICAL PRESENTATION OF SEVERE NON-TRAUMATIC RHABDOMYOLYSIS RESULTING IN MULTI-ORGAN FAILURE

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10.1136/jim-2019-WMRC.213

**Purpose of study** To bring awareness about the different presentation of acute kidney injury with a significant increase in creatinine from baseline with acute tubular necrosis and non-traumatic rhabdomyolysis.

**Methods used** Retrospective Study.

**Summary of results** Patient is a 37-year female with no past medical history who presented to the emergency department complaining of a four-day history of constant epigastric pain 10/10 in severity associated with nausea headache, non-bloody vomiting, productive cough with yellow sputum, and chest pain on inspiration. Results from an outside hospital showed CT of the abdomen was negative for pancreatitis and US of the abdomen showed fatty liver. Notable labs were lipase: 8120, AST/ALT: 3079/789, BUN 85, and creatinine 11.40. The urinalysis was notable for RBC>50 and protein 300 mg/dl. Chest x-ray was notable for bilateral multilobar

patchy infiltrates. The patient was hemodynamically stable, not requiring oxygen despite the diffuse bilateral pulmonary infiltrates, and her pain was controlled with medication. Given the severe multiorgan disease process in a previously healthy person, autoimmune etiology was likely. Pulmonary service was consulted and performed a diagnostic bronchoscopy on the patient. However, the pathology was negative for malignancy or infection. Nephrology service was consulted and started dialysis. Both specialties agreed with an autoimmune etiology and high dose steroids was started. ANA, double stranded DNA, Smith Ab, Sjogren Ab, P-ANCA, C-ANCA, cardiolipin, and beta2 glycoprotein were negative. Parvo B19 and anti-streptolysin was negative. IGG subclass 4 was negative. Salicylate, acetaminophen, HIV, and hepatitis panel were negative. C3 was borderline low at 80. Given the negative workup, a renal biopsy was performed for definitive diagnosis, which showed ATN secondary to rhabdomyolysis and mild arteriosclerosis. The patient was continued on dialysis and prednisone and showed improvement in her multiorgan dysfunction. Her abdominal pain and pulmonary infiltrates had resolved. Her creatinine improved to 5.12. She was discharged with prednisone and outpatient dialysis.

**Conclusions** Acute kidney injury from non-traumatic rhabdomyolysis and diffuse pulmonary infiltrates requiring steroids and hemodialysis is a rare phenomenon.

#### 214 SPONTANEOUS BILATERAL SUBCAPSULAR RENAL HEMATOMA

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10.1136/jim-2019-WMRC.214

Spontaneous bilateral subcapsular hematoma is a rare condition. Upon literature review, only two case reports have elucidated possible etiologies for such a presentation. Similarly, we present a 52 year old female with PMH of DM type II, HTN, decreased cognitive function s/p TBI from MVAx2 last one in 2011, who developed spontaneous bilateral renal subcapsular hematoma on admission for management of DKA and pyelonephritis. Typically, subcapsular hematoma achieves spontaneous resolution with conservative management, however our patient



**Abstract 214 Figure 1** CT angio abdomen & pelvis with triple phase contrast shows bilateral subcapsular hematoma

was having active bleed with hypotensive shock needing left renal artery embolization and eventually left nephrectomy. Her condition was further complicated with total left lung collapse secondary to mucous plug and septic shock.

**Purpose of study** Report a rare case of Bilateral spontaneous subcapsular hematoma.

**Methods used** Chart review.

**Summary of results** Our patient has multiple factors that are believed to set the stage for bilateral subcapsular hematoma. Uncontrolled DM predisposes her to diabetic nephropathy and pyelonephritis, bilateral ureteral stents and remote history of laceration of the right kidney.

**Conclusions** The main interest of this case report lies in bilateral spontaneous subcapsular hematoma in a patient who has multiple factors that could have played a role in this condition. Our patient was treated with embolization, bilateral nephrostomy tubes, and nephrectomy of the left kidney. We present the first case of spontaneous bilateral subcapsular hematoma in the setting of no major risk factors that could possibly affect both kidneys simultaneously.

## Poster session

### Surgery

6:00 PM

Thursday, January 23, 2020

#### 215 SOMETHING STINKS! FINDING WAYS TO MANAGE NOXIOUS ODOURS IN THE OPERATING ROOM: A RANDOMIZED CONTROLLED TRIAL

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10.1136/jim-2019-WMRC.215

**Purpose of study** The operating room can be saturated with noxious smells. Anecdotally, medical staff apply products to surgical masks to lessen the impact of these smells. This study aimed to determine the odour-masking ability of four inexpensive and convenient products.

**Methods used** This study was a randomized, single-blinded crossover study. Individuals between ages 19 and 30 years were included. Exclusion criteria included active allergies, upper respiratory tract infection, alteration to sense of smell, or failure of olfactory screen. Eighty-one individuals were recruited; one was excluded following a failed olfactory function test. Participants were exposed to an experimental odour in lieu of a noxious surgical odour. After smelling the experimental odour without barriers, participants were re-exposed to the odour using five surgical masks in randomized order. Each mask was lined with a test product (cherry lip balm, tincture of benzoin, Mastisol<sup>®</sup>, mint toothpaste, and control (plain mask)). Participants rated the effectiveness of products at masking the experimental odour from 0–100 (0 = completely ineffective, 100 = completely effective). Participants also rated the pleasantness of the products, recorded if the products made them feel unwell, and identified their preferred product overall. The main outcome measure was the odour-masking effectiveness of the four products.

**Summary of results** Eighty participants were included in the study (33 male, 47 female), averaging 24.2 years of age. Mean odour-masking effectiveness for cherry lip balm was 66.5 ( $\pm 24.6$ ), tincture of benzoin: 62.6 ( $\pm 25.0$ ), Mastisol<sup>®</sup>: 61.3 ( $\pm 23.9$ ), mint toothpaste: 57.5 ( $\pm 27.4$ ), and control: 21.9 ( $\pm 21.8$ ). All products performed better than the control ( $p$ -value:  $< 0.001$ ), but there was no significant difference in performance between products. Cherry lip balm was the most preferred odour-masking product (29 participants), followed by mint toothpaste (22), Mastisol<sup>®</sup> (14), tincture of benzoin (10), and control (5).

**Conclusions** All tested products demonstrated odour-masking abilities. We recommend that healthcare professionals find the odour-masking product that works best for them, starting with cherry lip balm.

### 216 POINT OF CARE ULTRASOUND EVALUATION OF AIRSPACE DISEASE BEFORE AND AFTER PROLONGED SURGERY

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10.1136/jim-2019-WMRC.216

**Purpose of study** Point-of-care ultrasound (POCUS) has rapidly emerged as a modality to improve bedside assessment of pulmonary air-space disease. Indeed, POCUS has demonstrated to be superior for the assessment of air-space disease in comparison to both Chest x-ray and stethoscope auscultation. Given that patients undergoing a long surgical procedure requiring general anesthesia are at risk for pulmonary complications the ability to assess air-space disease perioperatively is of interest. The authors designed a feasibility study to evaluate the utility of point of care ultrasound to evaluate the development of air-space in this patient population.

**Methods used** Adult patients were screened for those undergoing a surgical procedure scheduled for more than 3 hours of surgical time. Patients were then scanned using a validated POCUS examination to detect both the presence and severity of air-space disease across 5 lung fields for each side (total of 10 views). POCUS exams were performed immediately before and after their surgical procedure. Airspace disease was defined by the presence of B-lines, as previously validated. Before-to-after comparisons in air-space disease was performed by Chi-Square Analysis in the frequency of B-Lines in each lung quadrant and in total. A  $p$  value of less than 0.05 was identified as significant.

**Summary of results** Preliminary data on 15 patients with 150 ultrasound images demonstrates significantly higher number of B lines post-surgery (17%) compared to pre-surgery (10%),  $p < 0.05$ . The dependent lung zones were the most frequent areas to develop B lines both in the pre-op and post-op settings. All patients were able to have ultrasound images of the lung parenchyma across all lung fields.

**Conclusions** POCUS examination of the lungs fields can be successful performed in the perioperative setting. Our preliminary data supports this tool be useful in the assessment of the change in the aeration of lung tissue from pre to post surgery. Specifically, for patients undergoing long surgical procedures, this modality may be useful to detect the development of new areas of airspace disease.

### 217 COMPARISON OF PATIENT OUTCOMES FOLLOWING ANKLE FRACTURE FIXATION WITH OR WITHOUT ARTHROSCOPY TREND TOWARD IMPROVED OUTCOMES WITH THE USE OF ARTHROSCOPY

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10.1136/jim-2019-WMRC.217

**Purpose of study** Rotational ankle fractures are among the most commonly treated orthopedic injuries, yet there is no consensus on the role of arthroscopy in the management of acute ankle fractures. The purpose of this study is to investigate the rate of chondral pathology and other intra-articular injuries in ankle fracture patients and compare the clinical and radiographic outcomes of the patients who underwent arthroscopy at the time of ankle fracture open reduction internal fixation (ORIF) with those patients who did not. Our hypothesis was that patients who underwent arthroscopy at the time of ankle fracture ORIF would have better patient reported outcomes scores compared to ORIF without arthroscopy.

**Methods used** We recorded each patient's demographic data, injury characteristics, surgical details, and follow-up radiographs to determine the degree of osteoarthritis and to assess the final outcome of the fracture. We then contacted the study patients via an email or telephonic survey. We utilized the PROMIS Global Health Short Form and the two question PASS scale as our selected patient reported outcome scores.

**Summary of results** Among patients who received ORIF with arthroscopy, there was a 47.9% rate of arthroscopic intervention beyond the standard debridement of synovitis and fracture hematoma. The mean PROMIS physical function score was higher in the ORIF plus arthroscopy group compared to the traditional ORIF group ( $p$  value 0.064). 78% of the traditional ORIF group is satisfied with the function of their ankle compared to 89% satisfaction in the ORIF plus arthroscopy group. Patients with Weber B fibula fractures or tibiotalar joint dislocations that underwent arthroscopy plus ORIF had a statistically significant higher PROMIS physical function score at final follow up ( $p$  value 0.01).

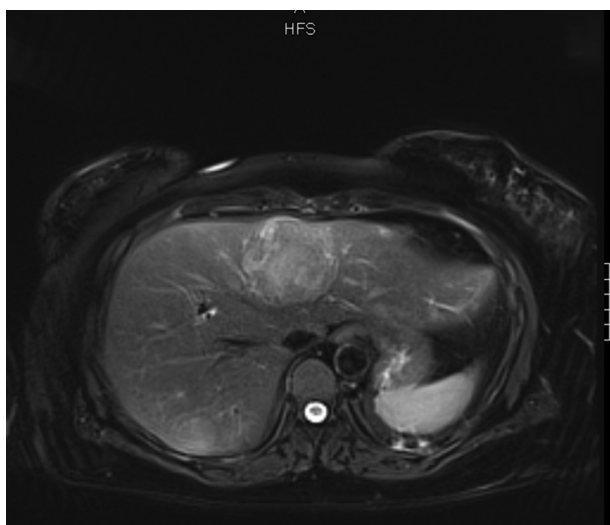
**Conclusions** We found that patients treated with ankle arthroscopy in addition to ORIF for a rotational ankle fracture had superior patient reported outcomes for all tested metrics and across all specific fracture mechanisms and characteristics. Ankle arthroscopy is a useful adjunct to traditional ORIF and can improve outcomes without a significant increase in operative time and no change in complication rate.

### 218 ADULT MESENCHYMAL HAMARTOMA OF THE LIVER: CASE REPORT AND LITERATURE REVIEW

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10.1136/jim-2019-WMRC.218

**Case report** A 39-year-old woman presented to the emergency department for acute onset epigastric pain. Imaging demonstrated a 5 × 6 cm lesion in segment 4 of the liver. A left hepatic resection was performed and the patient did well post operatively. Final microscopic diagnosis demonstrated mesenchymal hamartoma. Mesenchymal hamartoma of the liver (MHL) is a benign lesion, commonly seen in children younger than five years. MHL rarely occurs in adults, with only 31



**Abstract 218 Figure 1** MRI of the abdomen with contrast demonstrating multiple masses in liver, with largest occurring within the anterior left hepatic lobe measuring 5.9 cm

cases reported worldwide as of 2010. The pathogenesis of MHL is not completely understood, though it is believed to relate to aberrant development of the bile ducts. Despite a typically benign course, malignant transformation may occur. Recent cytogenetic analysis has identified chromosomal rearrangements nearly identical to those observed in undifferentiated embryonal carcinoma (UEC), an aggressive lesion with a median survival of less than 1.5 years. UEC has arisen from MHL in multiple instances, while hepatic angiosarcoma has also been reported. Additionally, MHL may grow to massive proportions. Due to the potential for such complications, aggressive surgical management with complete resection is mandated when feasible. Herein we discuss the aforementioned case as well as the epidemiology, clinical presentation, histopathology, cytogenetics, and treatment of this rare adult neoplasm.

#### 219 UTILITY OF EEG IN PREDICTING HEMISPHERIC SURGERY OUTCOME

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10.1136/jim-2019-WMRC.219

**Purpose of study** Treatment resistant epilepsy is a major health burden. Recurrent seizures can result in negative sequelae which include seizure related injury, cognitive and memory impairment, and increased healthcare utilization. Hemispheric surgery is an excellent and potentially curative option for carefully selected patients and is currently underutilized. One of the important modalities used to assess patient suitability for the surgery is the electroencephalogram (EEG), which can non-invasively study brain activity. The goal of this project was to evaluate the role of EEG in predicting surgery outcome.

**Methods used** We hypothesized that generalized or bilateral epileptic abnormalities captured on EEG would be associated with risk of ongoing seizures and ongoing need for antiepileptic drugs (AEDs) post-surgery. To test this hypothesis, the

medical records of all patients who had undergone hemispheric surgery at BC Children's Hospital were evaluated. Data was gathered on clinical history, neuroimaging, EEG reports, seizure types, seizure frequency pre- and post-surgery and AED use.

**Summary of results** We observed that over 90% of patients had very good outcomes in terms of seizure freedom with surgery but 43% percent of patients were still using AEDs post-operatively despite seizure freedom. Analysis of the data showed trends towards increased seizure recurrence and AED use with bilateral or generalized brain abnormalities on EEG, as hypothesized. However, these results were not significant, likely due to small sample size (n=40).

**Conclusions** Given the high success rate of hemispheric surgery, when seizure freedom is the metric, any modest prediction capability conferred by EEG analysis would be of limited clinical use. However, there may be a role for using pre-operative EEGs to inform medical care after surgery with regards to AED requirements and weaning.

#### 220 RACIAL DIFFERENCES IN THE PROSTATE CANCER MICROENVIRONMENT

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10.1136/jim-2019-WMRC.220

**Purpose of study** African-American men (AAM) are more likely to be diagnosed with prostate cancer (PC), and have more aggressive PC at diagnosis, than any other ethnic group. Differences in inflammatory cell types among races may account for this imbalance. We previously found that AAM have more T-cells in their PC as compared to European American men (EAM). Herein, we developed a panel to quantify myeloid cells in the same tissue samples. We hypothesize there are racial differences in myeloid-derived suppressor cell (MDSC) counts in the prostate cancer microenvironment.

**Methods used** Using 5-plex immunofluorescence (IF) on prostate biopsy formalin-fixed paraffin-embedded (FFPE) slides of AAM and EAM matched controls and PC cases, we quantified granulocytic (G) and monocytic (M) MDSCs. The panel includes antibodies for CXCR2, CD14, CD11b, HLA-DR, and cytokeratin, enabling us to quantify the recruitment and density of M-MDSCs and G-MDSCs to the tumor microenvironment. M-MDSCs are defined as CD14+ and HLA-DR low/-, whereas G-MDSCs are defined as CD14-, HLA-DR low/-, and CD11b+. Each cell type was counted in PC regions as well as in biopsy negative controls. Data were then compared using unpaired t-tests with  $\alpha=0.05/n$ , where n is the number of markers used, to accommodate multiple testing.

**Summary of results** Among all men with PC, we found higher M-MDSC density in cancers vs. controls, though these differences were not statistically significant ( $p=0.076$ ). AAM PCs had significantly more M-MDSCs ( $p<0.017$ ) and G-MDSCs ( $p>0.19$ ) than AAM non-PCs, though the latter was not statistically significant. There was a trend for higher G-MDSCs in EAM non-PC tissue as compared to AAM non-PCs ( $p<0.055$ ). AAM PCs had significantly more CXCR2+ cells than EAM PCs ( $p<0.008$ ).

**Conclusions** We found racial differences in MDSC counts both in PC and non-PC prostate tissues. These preliminary results

require further validation. Limitations of the study include potential selection bias, since sections were manually chosen for analysis, as well as imperfect multiplex staining of tissue.

## 221 COMPARATIVE ASSESSMENT OF PATIENT SURGICAL RISK BY SURGEONS VS. A UNIVERSAL, PARSIMONIOUS STATISTICAL RISK SYSTEM

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10.1136/jim-2019-WMRC.221

**Purpose of study** The literature lacks evidence on accurate pre-operative prediction of postoperative surgical outcomes by surgeons. The Surgical Risk Preoperative Assessment System (SURPAS) provides individual patients with accurate procedure-specific preoperative risk prediction of 30-day postoperative adverse outcomes including mortality, overall morbidity, & 9 other surgical complications. To predict these values, SURPAS uses 8 variables including procedural complexity & procedure-specific risk (both derived from the current procedural terminology code), functional health status, American Society of Anesthesiologists Physical Status Classification (ASA class), patient age, emergency status of the operation, in-/out-patient procedure, & surgeon specialty. These risk algorithms were developed from American College of Surgeons National Surgery Quality Improvement Program (NSQIP) data, which include the independent variables entered into SURPAS & the postoperative adverse outcomes.

**Methods used** We compared the accuracy of surgeons' ability to predict overall morbidity & mortality for a variety of surgical procedures within their specialty to the outcomes predicted by SURPAS, & to the known postoperative outcomes. 30 patients' NSQIP data was presented to surgeons in standardized vignette formats, including the procedure performed & each patient's comorbidities. Vignettes of 6 patients in each of ASA class I-V were randomly presented to the participants. Surgeons were asked to predict each patient's likelihood of 30-day postoperative mortality & overall morbidity.

**Summary of results** Preliminary results from general surgery residents show that surgeons were able to accurately & precisely predict both the morbidity & mortality risk amongst low risk patients (ASA class 1–2). In high risk patients (ASA class 3–5) the agreement amongst surgeons on both mortality & morbidity was variable. Surgeons were also less accurate at predicting risk in the high risk patients.

**Conclusions** The data supports continuing the study in attending surgeons of different specialties. Each specialty will be administered a survey using the same standardized vignette format that includes common procedures from within their field of expertise. We will measure surgeon accuracy.

## 222 EFFECTS OF DELAYED ICU ADMISSION FROM THE POST-ANESTHESIA CARE UNIT VS. DIRECT ADMISSION TO THE SURGICAL INTENSIVE CARE UNIT IN POST-OPERATIVE PATIENTS

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10.1136/jim-2019-WMRC.222

**Purpose of study** The post-anesthesia care unit (PACU) was established to minimize complications immediately after anesthesia and surgery. Often patients are held up in PACU due to bed availability or lack of appropriate staffing. This study was conducted with the hypothesis that PACU admission of a critically ill patient increases ICU length of stay (LOS). Secondly we also looked at hospital LOS and mortality.

**Methods used** A retrospective chart review was conducted at a tertiary academic medical center between 2/1/13–6/1/19. We identified all surgical patients admitted to the SICU, a total of 5365 patients. We separated these patients into two groups: (1) direct SICU admission and (2) PACU then SICU admission. We collected the following data: (1) demographic characteristics; (2) the American Society of Anesthesiologists (ASA) score; (5) PACU LOS; (6) SICU LOS; (7) Hospital LOS and (8) mortality.

**Summary of results** Preliminary results of demographic data showed no statistically significant difference between the two groups. (Table 1) Outcomes data showed a statistically significant increase in SICU and hospital LOS for PACU admitted patients. Mortality was also statistically significant but was higher for SICU admitted patients. (Table 2)

Abstract 222 Table 1

	PACU (n=3201)	SICU (n=2164)	p
Age Median (IQR)	57 (28)	54 (34)	0.000889
Sex Count (percent)	M: 1966 (61%) F: 1235 (39%)	M: 1272 (59%) F: 892 (41%)	0.06
Race Count (percent)			
Caucasian:	2475 (77%)	1635 (76%)	0.22
African American:	356 (11%)	278 (13%)	
Hispanic:	27 (1%)	24(1%)	
Asian:	120 (4%)	81 (4%)	
Other/Unknown:	223 (7%)	146 (7%)	
ASA Median	3	3	0.78

Abstract 222 Table 2

		PACU (n=3201)	SICU (n=2164)	p
SICU LOS in Minutes	Median (IQR)	2621 (5296)	1777 (2585)	<0.001
Hospital LOS in Minutes	Median (IQR)	15798 (18997)	11569 (16832)	<0.001
Mortality	Total Deaths (percent)	424 (13%)	368 (17%)	<0.001

**Conclusions** We saw a median PACU LOS of 103 mins yet the PACU to SICU group's SICU LOS was 844 mins longer than the PACU group. When it came to hospital LOS the PACU to SICU group had a 4229 mins longer stay. Delay in ICU care leads to increased LOS in the SICU and the hospital. The mortality was significantly higher in the directly admitted SICU patients which from our preliminary analysis appears to be from patients who had high ASA and APACHE II scores and died soon after ICU admission.



223 **SURGICAL OUTCOMES OF SUPRAVALVULAR AORTIC STENOSIS REPAIR TECHNIQUES IN PEDIATRIC PATIENTS: A SYSTEMATIC REVIEW**

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10.1136/jim-2019-WMRC.223

**Purpose of study** Supravalvular aortic stenosis (SVAS) is a congenital anomaly arising from familial or sporadic mutations in the elastin gene. This mutation results in severe constriction of the sinotubular junction. SVAS is most commonly seen as a feature of Williams Syndrome. One, two, and three patch aortoplasty techniques are the most frequently performed corrective procedures for SVAS worldwide and have shown efficacious outcomes in the repair of SVAS. However, data comparing the outcomes and survival rates between these techniques are limited.

**Methods used** A systematic literature review using PubMed and EMBASE identified 15 papers for data extraction related to pediatric SVAS surgical outcomes and survival. Papers were selected through systematic use of search terms and were manually assessed for relevance and inclusion of pertinent data. These data included re-operation rates, pre/post-operative Doppler gradients, mortality, and significant comorbidities. Review and meta-analysis were conducted according to PRISMA guidelines.

**Summary of results** The average age of pediatric patients assessed was 7.8 years  $\pm$  3.2 with 44% of patients presenting with Williams syndrome. The pre/post-operative Doppler gradients showed no significant difference between the one, two, and three patch aortoplasty techniques. Similarly, early and late mortality was not significantly different between techniques. However, reoperation rates due to restenosis varied with an incidence of reoperation of 13.8%, 4.8%, and 0% in patients with one, two, and three patch aortoplasties, respectively.

**Conclusions** In pediatric SVAS patients, one, two, and three patch aortoplasty techniques show no significant differences in pre/post-operative gradients and survival rates, while three patch aortoplasty reveals decreased incidence of reoperation. Further studies are needed to better delineate the best surgical approach.

224 **OBSTRUCTIVE SLEEP APNEA AND EARLY WEIGHT LOSS AMONG ADOLESCENTS THAT UNDERGO BARIATRIC SURGERY AT CHILDREN'S HOSPITAL COLORADO**

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10.1136/jim-2019-WMRC.224

**Purpose of study** Adult literature demonstrates impressive results regarding the effect of bariatric surgery in ameliorating obstructive sleep apnea (OSA) however data are scarce in pediatric literature. As morbid obesity and OSA become increasingly common in adolescents, it is important to quantify the prevalence of OSA and the effects of surgical intervention in this unique, growing population.

**Methods used** Retrospective chart review of adolescents enrolled in the Bariatric Surgery Center at Children's

Hospital Colorado (CHCO) with pre- and post-surgical polysomnography (PSG) between 06/17–08/19 (70/83 total patients). Inclusion criteria was based on availability of presurgical PSG results. Variables including age, gender, race, comorbidities, PSG results, and weight were collected. Pediatric OSA criteria were applied to PSG results to determine presence of OSA. Tests for nonparametric data were used to compare baseline characteristics and surgical outcomes between patients with and without preoperative OSA.

**Summary of results** The prevalence of OSA among those with preoperative PSG, defined as apnea hypopnea index  $\geq$ 1, was 77% pre-surgery, with 44% demonstrating severe OSA by OAH  $\geq$ 10. There were no significant differences in race, gender, BMI, or comorbidities according to diagnosis of OSA. Of 12 patients with preoperative OSA and a postoperative sleep study, 58% resolved their OSA an average of 4.92 months post-surgery. Average preoperative BMI for resolving patients was 45.46 versus 56.76 in those who did not have resolution of OSA ( $p=0.03$ ). Average change in BMI from pre- to post-operative sleep study was -21.9% in the resolved group and -13.5% in the unresolved group ( $p=0.12$ ).

**Conclusions** The prevalence of OSA in the population of adolescents seen in the Bariatric Surgery Center at CHCO was more similar to the estimated prevalence in adults seeking bariatric surgery (74%) than the general population of adolescent with obesity (43%). Resolution of OSA after surgery correlated with lower preoperative BMI, but sample size limited further analysis.

225 **CLINICAL OUTCOME DIFFERENCES BETWEEN SINGLE AND MULTI-STAGED TRANSTIBIAL AMPUTATIONS**

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10.1136/jim-2019-WMRC.225

**Purpose of study** Transtibial amputations are currently performed as single guillotine amputations or multi-staged amputations with primary and formalization amputations. This study assessed if multi-staged amputations provide improved clinical outcomes over single stage transtibial amputations and what patient groups it may benefit.

**Methods used** We queried 207 records of patients receiving transtibial amputations from January 2015 through December 2018. Patient demographics, comorbidities, preoperative factors, surgical factors, and complications were recorded. Regression modeling was utilized to compare functional outcomes and influential perioperative variables between single and multi-staged amputation groups. After accounting for exclusion criteria, 148 patient records were analyzed.

**Summary of results** From the records analyzed, 49 patients (37%) underwent multi-stage amputation. Patients with multi-stage amputations had a hazard ratio of 0.60 for complication risk ( $P=0.04$ ). The most common complications, often requiring readmission, were infection ( $n=30$ ) and wound dehiscence ( $n=21$ ). This was the case for both single and multi-staged amputations. For patients who were readmitted, 72% required amputation revision. Of the patients who experienced complications, 56% of patients were independently ambulatory with a prosthesis and 31% were ambulatory with additional assistive devices (e.g., cane, front

wheel walker) after one-year post-surgery. Approximately half of the patients from each amputation group were independently ambulatory with a prosthesis (51% for single stage and 49% for multi-stage). Similarly, 27% of patients in both amputation groups were ambulatory with additional assistive devices.

**Conclusions** Based on these preliminary results, single stage and multi-stage amputation groups demonstrate similar complication rates and recovery. However, multi-stage transtibial amputations may provide a protective effect against complication risk compared to single-stage amputations.

## 226 SLEEP BEHAVIORS IN ADOLESCENTS UNDERGOING BARIATRIC SURGERY EVALUATION

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10.1136/jim-2019-WMRC.226

**Purpose of study** Poor sleep behaviors has been associated with increased risk of obesity and insulin resistance. Sleep health has not been examined in adolescents with obesity undergoing bariatric surgery.

**Methods used** A chart review was performed and all patients receiving care at the Children's Hospital Colorado (CHCO) Bariatric Surgery Center between 06/17–08/19 were included. Demographic, medical history, sleep behaviors, and laboratory measures were abstracted. T-tests were used to examine the differences between sleep variables and baseline weight and comorbidity status.

**Summary of results** Data from 85 patients, aged 16.8 years, were identified. The majority of patients were female (71%) and Hispanic (52%). The majority of patients reported a family history of obesity (69%) and T2D (80%). Over half (52%) reported receiving mental health counseling previously. Pre-surgery, 24% of the patients were diagnosed with hypertension and 20% with Type 2 Diabetes. A total of 29% screened positively for anxiety and 41% were diagnosed with depression. Over half of the patients (60%) stated they did not have a regular sleep schedule. A typical total time in bed of 9 hours was reported with as much as 86 minutes of variability. A total of 36% of patients reported a bedtime of midnight or later and 78% were documented to have a mobile device with them in their bed. Patients who reported variability in their sleep schedule of at least 60 minutes were found to have significantly higher weights (139.1kg vs 131.1kg;  $p=0.02$ ) and BMI (48.8 vs 44.9;  $p=0.04$ ) at baseline. Similarly, patients who reported less than 8.5 hours of time in bed each night had significantly higher weights (144.7kg vs 131.7kg;  $p=0.002$ ), BMI (50.3 vs 45.9;  $p=0.02$ ), and HbA1c levels (6.18 vs 5.85;  $p<0.001$ ), compared to patients that had greater than 8.5 hours of time in bed each night.

**Conclusions** In a population of adolescents seen in the bariatric surgery center at CHCO, sleep behaviors preoperatively were related to baseline weight, BMI, and HbA1c levels. Insufficient sleep and unhealthy sleep behaviors may adversely impact adolescents' overall health. Interventions to improve sleep health should be evaluated as part of efforts to improve health outcomes in patients undergoing bariatric surgery.

## 227 OPTIMAL NAIL DIAMETER TO MEDULLARY CANAL RATIO IN DIAPHYSEAL TIBIA FRACTURES TREATED WITH INTRAMEDULLARY NAILING

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10.1136/jim-2019-WMRC.227

**Purpose of study** Up to 17% of diaphyseal tibia fractures result in delayed union. Most patients achieve excellent outcomes with intramedullary nailing and it is unknown why some experience delayed healing. The goal of our study was to assess potential risk factors that may influence fracture healing in these patients with an emphasis on the nail diameter to medullary canal (ND/MCD) ratio.

**Methods used** Adult patients that underwent intramedullary nailing of tibia fractures over a 10-year period were retrospectively reviewed. Exclusion criteria were inadequate follow-up (<12 months), additional lower extremity fractures, additional hardware, non-diaphyseal and pathologic fractures. Post-operative anteroposterior (AP) and lateral radiographs were used to calculate the ND/MCD ratio. Multi-variable logistic regression analyses were used to identify demographic and clinical variables associated with complications. A receiver operating curve analysis was used to identify the ND/MCD ratio that best differentiated between subjects who developed a nonunion and those who did not.

**Summary of results** The average age among the 95 individuals included in the study was 44.2 years ( $\pm 16.1$ ). The cumulative incidence of complications was 29% [95% CI: 20.3 to 39.7%]. The presence of an open fracture was the only variable significantly related to the risk of a complication. The odds of a complication among open fractures were 10.1 times [95% CI: 3.2 to 32.1,  $p<0.0001$ ] times the odds of a complication among closed fractures. Nonunion was noted in 18 patients [19.0%, 95% CI: 11.1 to 26.8%]. Age, sex, ND/MCD ratio, and presence of an open fracture were used to build a logistic model to predict nonunion (AUC=0.83; 95% CI: 0.71 to 0.96). ND/MCD ratio cutoff of 85% was associated with the highest AUC value (sensitivity=44%, specificity=79%) in an exploratory analysis differentiating between the subjects that developed nonunion and the ones that did not.

**Conclusions** Presence of an open fracture is strongly associated with increased complication rates among patients undergoing intramedullary nailing of tibia fractures. Canal fill of <85% should be avoided as it may lead to nonunion development.

## 227A UNDERSTANDING TECHNIQUES OF AND ATTITUDES TOWARDS PREOPERATIVE RISK ASSESSMENT

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10.1136/jim-2019-WMRC.227A

**Purpose of study** In the era of big electronic health data, formal surgical risk assessment tools have been developed to predict risk of adverse postoperative outcomes. Patients desire to understand their risks and report improved shared decision-making with use of such tools. However, these risk assessment tools are underutilized. We surveyed surgeons' techniques of and attitudes towards preoperative risk assessment.

**Methods used** 108 surgical faculty and 95 surgical residents at the University of Colorado were emailed a 16-question survey between 8-9/2019. Surveys were excluded if the respondent was no longer practicing or did not complete the survey.

**Summary of results** Of 203 surveys disseminated, 51 faculty and 41 residents responded. Of surgical faculty, median years in practice was 11, 42% were general surgeons, and 94% practiced at a large academic hospital. 55% of residents sometimes rely on online risk calculators, while 58% of faculty never or rarely use them ( $p < 0.001$ ). 82.0% of faculty and 35.5% of residents rely on prior experience to estimate risk most or all of the time ( $p < 0.0001$ ). 70.0% of faculty rely on current literature for risk estimates most or all of the time vs 75.0% of residents who rely on it some or most of the time ( $p = 0.02$ ). Surgical faculty and residents were equally likely to discuss risk with patients  $> 65$  years of age, when patients ask about risk, when they were perceived to have significant risk factors, and to dissuade patients/families from surgery. Faculty were more likely than residents to discuss risk with patients prior to an emergency operation. Barriers to use of a formal risk assessment tool include the amount of time needed to use the tool (40.0% report this is a moderate barrier), lack of integration into the electronic health record (33.3%: moderate barrier), and inaccessibility of the risk tool during the patient visit (38.9%: moderate barrier).

**Conclusions** Surgeons rely heavily on prior experience and current literature to guide assessment of surgical risk. Surgical faculty communicate surgical risk directly rather than relying on residents. Time constraints and lack of accessibility are moderate barriers to using an objective, evidence-based risk assessment tool.

## Adolescent medicine and general pediatrics II

### Concurrent session

8:00 AM

Friday, January 24, 2020

#### 228 VASCULAR ANOMALIES, THROMBOEMBOLISM, AND ORAL CONTRACEPTIVES: A RETROSPECTIVE STUDY

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10.1136/jim-2019-WMRC.228

**Purpose of study** Vascular anomalies, specifically venous and venolymphatic malformations, are rare disorders that are associated with increased risk of coagulopathy. In addition, hormonal contraceptives have been associated with increased risk of venous thromboembolism in the general population. There is limited literature on the relationship between oral contraceptives and risk of coagulopathy in patients with vascular malformations.

**Methods used** In this study, we evaluated patients registered in the Stanford Children Vascular Anomalies Clinic database. In this database, the total number of patients was 432. The upper limit ( $< 49$  years old) and lower limit ( $> 25$  years old) of the age inclusion criterion were based on the childbearing age provided by the CDC. The gender criterion for this study was female. Furthermore, we restricted our study to the

diagnosis of 'venous malformation' or 'mixed lymphatic venous malformation.' Patient data were collected from the past 3 years (2017–2019), which included 40 female patients of childbearing age with venous malformations.

**Summary of results** Three of the seven (43%) patients using oral contraceptives developed clotting complications, as compared to 13 of 28 (40%) patients who did not use oral contraceptives. The majority of our participants were using third-generation progestin pills, including norgestimate, etonogestrel, and desogestrel. Only one participant used a second-generation progestin, known as levonorgestrel. This suggests that newer generations of oral contraceptives present less risk than earlier generations.

**Conclusions** In our retrospective cohort study, we found that female patients with venous malformations who use oral contraceptives showed a similar propensity for developing clotting complications as those who did not use oral contraceptives. While previous literature suggests that female patients who are prescribed oral contraceptives should undergo additional monitoring for potential coagulation disorders, our study found minimal differences in risk.

#### 229 DIETARY SUPPLEMENT USE AMONG COLLEGE STUDENTS AND ATHLETES: A LITERATURE REVIEW

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10.1136/jim-2019-WMRC.229

**Purpose of study** Recent reports have suggested that 15–30% of dietary supplements do not list the ingredients or the amounts posing a risk of adverse health events to the users. Therefore, gaining an understanding about the patterns of dietary supplement use among youth is very important. The purpose of this study was to investigate the characteristics associated with supplement use among college students and athletes.

**Methods used** A literature review using Pubmed and Google Scholar with the keywords 'Use of Dietary Supplements among College Student', 'Dietary Supplements College Athletes', 'College Student Supplement Use' was conducted. Only studies published after 2003 that incorporated questionnaires that categorized the frequency of supplement use in otherwise healthy college students were included in our analysis.

**Summary of results** Of the 17 articles, only 10 satisfied our inclusion criteria with 6 studies involving college students and 4 involving college athletes exclusively. Prevalence of supplement use ranged from 26.5%–86.9% among college students and 76.8%–89.0% among college athletes. The most dietary supplement used were energy or caffeine containing drinks (48–80%), vitamins/mineral (18–80%) and protein supplements (17–42%). The reasons given for use of supplements were: to promote and maintain good health (14–73%), increase energy (29–50%), and improve strength and muscle (20–43%). The most popular source of information or influence for supplements among women was their families and for men was the internet. One limitation noted among the studies was the wide variation in the frequencies mainly due to the differences in reporting of short-term vs. long-term or recurrent use.

**Conclusions** Supplement use is prevalent among college students and college athletes. With the increasing availability and access to these supplements, it is critical that healthcare

professionals inquire about their use and serve as an important resource to provide education and awareness. Students should be educated to consume healthy diets consistent with accepted nutritional requirements and discouraged from using supplements to substitute for other healthy nutrition or behaviors.

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### THE IMPACT OF SCOLIOSIS BRACE TYPE ON SATISFACTION AND PERFORMANCE AS ASSESSED BY THE SCOLIOSIS RESEARCH SOCIETY-24

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10.1136/jim-2019-WMRC.230

**Purpose of study** Scoliosis often requires the wearing of a back brace. There are a variety of braces that are used, and there is no data one brace is superior in terms of efficacy. The quality of life is negatively affected by the wearing of a scoliosis brace but little data is available on how different types of scoliosis braces affect the quality of life. We hypothesized that the type of scoliosis brace used in treatment impacted the quality of life of patients with scoliosis.

**Methods used** An online survey was conducted to gather data on patients with scoliosis; all participants granted informed consent. Collected data included demographic data, clinical information, treatments administered, compliance, patient experience including friendships, teasing, attitude towards scoliosis back brace, and involvement in choice of the brace used in their treatment. In addition, the Scoliosis Research Society-24 (SRS-24) questionnaire was used to determine subject satisfaction and performance. The SRS-24 instrument is a validated instrument used in adolescents with idiopathic scoliosis to determine satisfaction and performance after treatment. The SRS-24 measures pain, self-image, function, level of activity, and satisfaction.

**Summary of results** Data collection is ongoing; to date 32 scoliosis patients have responded. Almost all respondents (96.9%) wore a brace as part of their treatment, 43.8% of patients had surgery, and 38.7% were prescribed exercises as part of their treatment. Among respondents, 59% wore a Boston Brace, 19% Rigo Cheneau, 13% Providence, 3% Charleston Brace, and 6% did not know their type of brace. Doctors chose the brace used in treatment for most patients (77%); parent(s) or guardian(s) chose the brace in 19.4% of patients. Satisfaction with wearing a scoliosis brace was low with 28.1% of respondents reporting they 'hate' their brace, and 43.8% stating they 'dislike' their brace. The total mean SRS-24 score was 3.6. We did not find a correlation between type of brace and SRS-24 scores.

**Conclusions** Scoliosis and the use of a back brace has an impact in the quality of life of adolescent females. Despite this most girls do not have a say in the choice of their scoliosis back brace. There was no correlation between the type of brace worn and attitudes towards wearing the brace on the SRS-24 score.

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### OBESITY-RELATED COMORBIDITIES AND OUTCOMES IN A MULTIDISCIPLINARY PEDIATRIC WEIGHT MANAGEMENT CLINIC

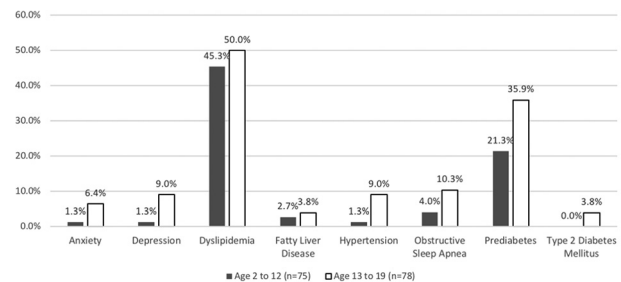
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10.1136/jim-2019-WMRC.231

**Purpose of study** The purpose of this study was to identify the demographic characteristics, analyze obesity related comorbidities, and identify weight outcomes of patients seen in the UCLA Fit for Healthy Weight Program (Fit Clinic), a multidisciplinary pediatric weight management clinic.

**Methods used** A retrospective chart review was conducted of 153 pediatric patients in the Fit Clinic between August 2014 and September 2016. The mean changes in BMI z-scores over time was evaluated using a mixed effects linear regression model allowing for random intercepts and slopes.

**Summary of results** The average baseline BMI was 31.94 kg/m<sup>2</sup> ± 7.97. In the sample, 11% (n=17) were overweight and 89% (n=136) were obese, including 56% (n=85) who were morbidly obese. The patients had an average of 4 to 5 problem diagnoses per visit. The prevalence of comorbidities was higher in the older age group (figure 1). The most common comorbidities for both older and younger age groups included dyslipidemia (50.0% vs. 45.3%), prediabetes (35.9% vs. 21.3%), and obstructive sleep apnea (10.3% vs. 4.0%). The mean BMI z-score tended to decrease over time, mean slope = -0.05 over 6 months (p=0.05).



**Abstract 231 Figure 1** Obesity-related comorbidity diagnoses of fit clinic patients (N=153)

**Conclusions** Many Fit Clinic patients manifest obesity-related comorbidities and are at risk of adverse health outcomes related to cardiometabolic morbidity. The number of comorbidities increased with age, highlighting that early treatment may be imperative in preventing obesity-related comorbidities in older adolescents and adults. Fit Clinic patients' overall mean BMI z-score tended to decrease over time, demonstrating a promising effect of a multidisciplinary approach to managing pediatric obesity.

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### QUALITY IMPROVEMENT IN THE OUTPATIENT MANAGEMENT OF PEDIATRIC ASTHMA IN THE CENTRAL VALLEY

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10.1136/jim-2019-WMRC.232

**Purpose of study** Fresno County has had higher rates of pediatric emergency department visits for asthma exacerbations compared to the rest of California. Written Asthma Action Plans have been shown to reduce emergency room visits and the need for oral steroids. We aim to use written personalized Asthma Action Plans to reduce asthma-related morbidity and mortality by improving pediatric asthma control in our ambulatory pediatric clinic, as a subset of the multi-site

IMPLEMENT Asthma Collaborative study based out of The University of California, San Francisco.

**Methods used** Retrospective chart reviews of randomized ambulatory clinic pediatric patients with a diagnosis of asthma or reactive airway disease before interventions and after interventions will be used to compare the rates of personalized electronic medical record (EMR)-based Asthma Action Plan provision. This will assess the efficacy of our interventions, which focus on resident-directed education. A portion of the data is included in the IMPLEMENT Collaborative study, however a larger population of patients is included in our dataset. We will also administer pre- and post-surveys to assess for resident awareness and comfort level with outpatient asthma management and to assess for potential areas of ongoing improvement.

**Summary of results** We have seen an overall increase in the provision of personalized Asthma Action Plans compared to prior to the implementation of an EMR-based system. This study began in March 2018. Asthma Action Plans were provided at an average rate of approximately 20% as of June 2018; this has increased to approximately 35% as of August 2019.

**Conclusions** Continuing resident physician education and implementation of a standardized EMR-based system for provision of personalized written Asthma Action Plans has led to an increased rate of utilization of this intervention. With further interventions, we expect to see further increase in the frequency of provision of a personalized Asthma Action Plan.

### 233 CORRECTION OF NEONATAL AURICULAR DEFORMITIES WITH DUODERM®: A SIMPLE TECHNIQUE

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10.1136/jim-2019-WMRC.233

**Case report** Ear molding in neonates has been shown to successfully correct congenital auricular deformities. There are several currently available molding techniques. However, commercially available molding devices (e.g. EarWell and Ear Buddy) can be costly, and their alternatives have limited customizability. We selected illustrative cases seen in the BC



**Abstract 233 Figure 1** Patient presented with bilateral helical rim deformity. First image is the left ear prior to treatment at 2 weeks old. Second image is the splint applied. Third image is the final result after two months of treatment.

Children's Hospital plastic surgery clinic in the past 5 years to present the outcomes of a molding technique using cost-effective and customizable materials for common deformations (Stahl's ear, constricted ear, and prominent ear). DuoDERM® Extra-thin, Steri-strips®, and 3M™ Kind Removal Silicone tape are used to splint the ear in a preferred position. The DuoDERM® is rolled into a putty, placed in the ear, and secured with tapes. This treatment is initiated in the clinic, with weekly splint changes carried out at home by caregivers, and intermittent follow-up appointments. Primary physicians/pediatricians can start this treatment as early as possible in the neonatal period, potentially reducing the need for future surgery. DuoDERM® molding is a safe, inexpensive, highly customizable, and simple way to correct auricular deformities.

## Cardiovascular III

### Concurrent session

8:00 AM

Friday, January 24, 2020

### 234 A RARE PRESENTATION OF EOSINOPHILIC THROMBOTIC MYOCARDITIS

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10.1136/jim-2019-WMRC.234

**Purpose of study** A 62-year-old very healthy gentleman with a history of seasonal allergies presented to the hospital with stroke symptoms. Initial complete blood count showed an eosinophilic count of 44 thousand. The patient's transesophageal echocardiogram showed a left atrial appendage with thrombus. For initial concern of cardiac embolic phenomenon, anticoagulation therapy was started but a subarachnoid hemorrhage soon developed. His course complicated quickly to include renal failure. The patient was transferred to a tertiary center where he was dialyzed and improved significantly. Despite improvements and steroid treatment, he remained in critical condition.

**Methods used** Patient chart and literature review of 'Eosinophilic Myocarditis with Thrombosis'.

**Summary of results** His cardiac magnetic resonance imaging (MRI) and biopsy both suggested confirmatory diagnosis of eosinophilic myocarditis with left ventricular ejection fraction of 35% with acute congestive heart failure symptoms. He received a dose of cyclophosphamide and heart failure medications. Eosinophilic myocarditis with thrombotic phenomena is a very rare condition and presents as a stroke phenomenon and often found to have a left atrial appendage clot. There are 3 stages of eosinophilic myocarditis progression: inflammatory, thrombotic and fibrotic.

**Conclusions** The patient is doing very well on cyclophosphamide to date.

### 235 THE HEART AS A SPRING, THE MEASUREMENT OF MYOCARDIAL BOUNCE TO ASSESS LEFT VENTRICULAR DIASTOLIC FUNCTION ON CARDIAC MR

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10.1136/jim-2019-WMRC.235

**Purpose of study** It is difficult to evaluate diastolic dysfunction on cardiac MR since to date this has required the performance of phase contrast imaging across the mitral valve to generate data similar to echocardiography. The purpose of this study is to determine if the myocardial bounce seen during atrial contraction at end diastole corresponds to diastolic and systolic function, and if loss of the bounce could be predictive of both diastolic and systolic heart failure.

**Methods used** 146 consecutive cardiac MR exams between Sept. and Dec. 2017 were selected for analysis. The bounce was graded by two blinded observers, and the change in LV diameter pre and post bounce was measured. The bounce was defined as the rapid change in LV volume that occurs at the end of diastole during atrial contraction just prior to systolic ejection. Inter-reader agreement was summarized using Cohen's kappa. Spearman's rank correlation coefficient was used to evaluate associations between bounce grade and cardiac physiology parameters.

**Summary of results** Overall agreement was good with unweighted kappa =0.69 (95% CI: 0.60–0.79). Bounce grade was significantly correlated with the average change in LV diameter before and after the bounce (Spearman's rho =0.76,  $p<0.001$ ). Median diameter changes were 0.0, 1.9, and 4.2 mm in grades 0 (no bounce), 1 (small bounce), and 2 (normal), respectively. Bounce grade was significantly correlated with LV EF (Spearman's rho =0.43,  $p<0.001$ ). Median EF was 44%, 51%, and 58% in grades 0, 1, and 2, respectively. Of the 88–89 patients who had E/A ratio or E/e' ratio measured, bounce grade was also significantly correlated with E/A ratio ( $r = -0.24$ ,  $p=0.034$ ) and E/e' ratio ( $r = -0.24$ ,  $p=0.022$ ), with lower grades having higher ratio values on average.

**Conclusions** The simple observation of a myocardial bounce during cine loop review of cardiac MR exams was predictive of diastolic and systolic cardiac function. Lack of myocardial bounce was highly associated with both systolic and diastolic dysfunction. The subpopulation of patients with loss of myocardial bounce and normal EF appear to represent patients with early diastolic dysfunction, but further evaluation will be needed with more patients with known diastolic heart failure.

### 236 MITRALCLIP IN THE SETTING OF CARDIOGENIC SHOCK: BEYOND COAPT

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10.1136/jim-2019-WMRC.236

**Purpose of study** To assess the short- and long-term outcomes of patients undergoing MitraClip for severe MR in the setting of cardiogenic shock.

**Methods used** This was a retrospective observational cohort study of patients who underwent MitraClip at large academic institution between 2013 and 2019. Patients charts were reviewed to identify patients with pre-procedure cardiogenic shock. Patients were considered as having cardiogenic shock if at least 1 of the following were present: 1) documentation of

ongoing cardiogenic shock by a provider, 2) hemodynamic monitoring data (cardiac index  $<2.2$ ) or 3) use of inotropes (Dobutamine, Milrinone or Dopamine) or vasopressors (Norepinephrine, Epinephrine or Vasopressin) within 24 hours of the procedure. Patients were excluded if they lacked a pre- or post-procedure echocardiogram.

**Summary of results** Out of 448 MitraClip patients, 29 (6.5%) were identified as having pre-procedure cardiogenic shock. Compared to patients undergoing MitraClip without cardiogenic shock, those with cardiogenic shock were younger ( $66.5 \pm 16.4$  vs  $77.0 \pm 12.0$ ,  $p=0.001$ ), more frequently male (79.3% vs 57.3%,  $p=0.02$ ) and had a lower left ventricular ejection fraction (35.8% vs 48.1%,  $p=0.004$ ). Of those in cardiogenic shock prior to MitraClip, 26 (90%) were on inotropes and 16 (55%) were on vasopressors. This decreased to 22 (76%) and 15 (52%) post-procedure, respectively, though did not reach statistical significance ( $p=0.80$ ). On pre-procedure echocardiography, MR severity was graded as severe or very severe in 21 (72.4%) of those with cardiogenic shock and 301 (71.8%) of those without shock. Of these patients, MR severity was reduced to moderate or less in 26 (89.7%) of those with shock and 400 (95.5%) of those without shock following the procedure ( $p=0.80$ ). Mortality at 30 days was 20.7% (6 patients) for shock patients, compared with 0% of those without shock.

**Conclusions** Use of MitralClip for the treatment of MR in the setting of cardiogenic shock is feasibility, with noted reductions in the severity of MR and inotropic requirements. Readmissions and mortality rates, however remain high. Prospective studies are needed to determine if MitraClip in the setting of cardiogenic shock offers a benefit over medical therapy alone.

### 237 THE BLACK CLOUD OF SEVERE LEFT VENTRICULAR PRIMARY GRAFT DYSFUNCTION AFTER HEART TRANSPLANTATION

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10.1136/jim-2019-WMRC.237

**Purpose of study** Severe primary graft dysfunction (PGD) is seen in approximately 7% of all heart transplant recipients per the International Society for Heart and Lung Transplantation (ISHLT) PGD grading scale. These patients suffer endothelial cell damage and are known to have increased risk of early mortality. It is not known whether the survivors of severe PGD develop more donor specific antibody (DSA), have more treated rejections, have increased risk of the development of cardiac allograft vasculopathy (CAV), and have increased mortality at 3 years post transplantation. We sought to assess this potential association.

**Methods used** Between 2010–16 we assessed 24 heart transplant patients who developed severe PGD per the ISHLT PGD grading scale. These patients who developed severe PGD were compared to those without severe PGD in a contemporaneous era. Patients were then followed for 3 years and assessed for the following endpoints: 3-year survival, 3-year freedom from CAV, 3-year freedom from non-fatal major adverse cardiac events (NF-MACE, defined as myocardial infarction, percutaneous coronary intervention/angioplasty, new congestive heart failure, pacemaker/implantable cardioverter-

Abstract 237 Table 1

Endpoints	HTx Patients with Severe PGD-LV (n=24)	HTx Patients without Severe PGD-LV (n=572)	P-Value
3-Year Survival	41.7%	88.3%	<0.001
3-Year Freedom from CAV	87.5%	87.6%	0.317
3-Year Freedom from NF-MACE	37.5%	83.2%	<0.001
3-Year Freedom from DSA	87.5%	85.7%	0.365
1-Year Freedom from ATR	79.2%	85.3%	0.038
1-Year Freedom from ACR	100.0%	93.0%	0.301
1-Year Freedom from AMR	91.7%	94.9%	0.221

defibrillator placement, and stroke), and 1-year freedom from rejection, including any treated rejection (ATR), acute cellular rejection (ACR), and antibody mediated rejection (AMR).

**Summary of results** Patients with severe PGD had decreased 3-year survival, 1-year freedom from any treated rejection, and 3-year freedom from NF-MACE compared to those patients who did not have severe PGD. There were no significant differences between the two groups in terms of 3-year freedom from CAV and freedom from DSA.

**Conclusions** Severe PGD appears to have increased mortality and morbidity with more rejection and more NF-MACE. More intense therapies to offset the inflammatory response from severe PGD should be investigated.

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### IS LOWER LOW-DENSITY LIPOPROTEIN CHOLESTEROL AFTER HEART TRANSPLANTATION ASSOCIATED WITH OPTIMAL OUTCOME?

J Thein\*, K Nishihara, A Shen, R Levine, M Hamilton, J Kobashigawa. *Smidt Heart Institute at Cedars-Sinai, Los Angeles, CA*

10.1136/jim-2019-WMRC.238

**Purpose of study** Low-density lipoprotein (LDL) cholesterol has been demonstrated to adversely affect patients with underlying coronary artery disease. In heart transplantation (HTx), LDL cholesterol rises due to the use of corticosteroids and calcineurin inhibitors. From two randomized trials in HTx, it has been demonstrated that statins can lower LDL but also have an immunomodulatory effect by decreasing severe rejection and cardiac allograft vasculopathy (CAV) thus improving survival. It is not been established whether lowering LDL cholesterol to <70 mg/dL can result in improved HTx outcomes.

**Methods used** Between 2010–2016, we assessed 109 HTx patients and assessed their LDL cholesterol at 1-year post-transplant. All patients were on statin therapy and patients were divided into quintiles based on their cholesterol levels. The groups were then compared for subsequent 3-year outcomes, including survival, freedom from CAV (as defined by stenosis  $\geq 30\%$ ), freedom from non-fatal major adverse cardiac events (NF-MACE, defined as myocardial infarction, percutaneous coronary intervention/angioplasty, new congestive heart failure, pacemaker/implantable cardioverter-defibrillator placement, and stroke), and 1-year subsequent rejection including any treated rejection (ATR), acute cellular rejection (ACR), and antibody-mediated rejection (AMR). PCSK9 was not used in this study.

Abstract 238 Table 1

Endpoints	HTx Patients with LDL 27–77 (n=22)	HTx Patients with LDL 80–98 (n=23)	HTx Patients with LDL 99–107 (n=22)	HTx Patients with LDL 108–129 (n=22)	HTx Patients with LDL 134–173 (n=20)	P-Value
3-Year Subsequent Survival	95.5%	95.7%	95.5%	95.5%	95.0%	1.000
3-Year Subsequent Freedom from CAV	90.9%	91.3%	95.5%	86.4%	95.0%	0.837
1-Year Subsequent Freedom from ATR	86.4%	91.3%	95.5%	86.4%	85.0%	0.844
1-Year Subsequent Freedom from ACR	90.9%	100.0%	95.5%	81.8%	85.0%	0.249
1-Year Subsequent Freedom from AMR	95.5%	95.7%	100.0%	95.5%	95.0%	0.913

**Summary of results** Patients in the lowest quintile of LDL cholesterol did not appear to have significantly improved outcomes compared to the other quintiles.

**Conclusions** Lower levels of LDL cholesterol at 1-year post-transplant do not appear to have beneficial outcomes although all patients were on statin therapy. Aggressively lowering cholesterol levels may not be indicated in this patient population. Larger studies are warranted to confirm these results.

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### THE EFFECTIVENESS OF ANTI-THYMOCYTE GLOBULIN FOR SENSITIZED PATIENTS UNDERGOING HEART TRANSPLANTATION

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10.1136/jim-2019-WMRC.239

**Purpose of study** Anti-thymocyte globulin (ATG), has been used as an induction agent in heart transplant (HTx). Early studies suggest that ATG can decrease de novo donor specific antibody (DSA) production after HTx. It has not been established as to the efficacy of ATG in various levels of sensitized pts undergoing HTx.

**Methods used** Between 2010–2018, we assessed 370 sensitized pts who were divided into panel reactive antibody (PRA) groups: Group A: 0% (control); Group B: 1–25%; Group C: 26–50%; and Group D: >50%. Pts received ATG immediately post-transplant x5 days. Blood was drawn for antibody

Abstract 239 Table 1

Endpoints (1-Year)	Group A (Control): PRA 0% (n=158)	Group B: PRA 1–25% (n=55)	Group C: PRA 26–50% (n=57)	Group D: PRA >50% (n=100)
Survival	90.5%	85.5%	91.2%	94%
Freedom from CAV	94.9%	98.2%	93%	94%
Freedom from NF-MACE	82.9%	92.7%	86%	86%
Freedom from ATR	83.5%	89.1%	89.5%	81%
Freedom from ACR	93.7%	92.7%	96.5%	93%
Freedom from AMR	93.7%	94.5%	93%	85%*
Freedom from DSA	88.6%	83.6%	75.4%**	50.0%***

\*Significant with  $p=0.020$  when compared to Control \*\*Significant with  $p=0.024$  when compared to Control \*\*\*Significant with  $p=0.001$  when compared to Control

detection at baseline, 1, 3, 6, and 12 months after HTx. Groups were assessed for freedom from 1-year survival, rejection (any treated rejection (ATR), acute cellular rejection (ACR), and antibody-mediated rejection (AMR)), freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, percutaneous coronary intervention/angioplasty, new congestive heart failure, pacemaker/implantable cardioverter-defibrillator placement, and stroke), and freedom from cardiac allograft vasculopathy (CAV).

**Summary of results** Pts in Groups C and D had decreased freedom from DSA compared to the Control. Furthermore, there was lower freedom from AMR in pts in Group D compared to Control. There were no differences in outcome between each Group and the Control in 1-year survival, freedom from CAV, freedom from NF-MACE, freedom from any treated rejection, and freedom from ACR (see table 1).

**Conclusions** ATG induction did not appear to decrease the development of AMR and DSA in those pts with PRA >50% compared to control. Larger studies and longer follow-up will need to be performed to assess ATG's impact on antibodies and the development of chronic rejection (CAV).

#### 240 IS DESENSITIZATION THERAPY SAFE IN MECHANICAL CIRCULATORY SUPPORT PATIENTS WITH EXISTING DRIVELINE INFECTION?

S Rajkumar\*, K Nishihara, A Shen, R Levine, E Passano, M Hamilton, J Kobashigawa. *Smidt Heart Institute at Cedars-Sinai, Los Angeles, CA*

10.1136/jim-2019-WMRC.240

**Purpose of study** Mechanical circulatory support (MCS) is increasing for patients with advanced heart disease. A common complication is a driveline infection. It is also known that approximately 30% of MCS patients develop circulating antibodies (known as sensitization) due to blood transfusions. Becoming sensitized narrows the donor pool due to incompatible donors. For these patients, desensitization therapy is important to allow transplantation to occur with a compatible donor. There is concern that the use of desensitization therapy might worsen infection in MCS patients with an existing driveline infection.

**Methods used** Between 2007 and 2018, we assessed 45 MCS patients who developed a driveline infection. These patients were divided into those who were sensitized (PRA  $\geq 10\%$ ,  $n=22$ ) and those who were not sensitized ( $n=23$ ). The

Abstract 240 Table 1

Endpoints (at 1-Year)	Driveline Infection, PRA $\geq 10\%$ (n=22)	Driveline Infection, Non-sensitized (n=23)	P-value
Survival	95.2%	100.0%	0.317
Freedom from Readmission	30.4%	4.6%	0.102
Freedom from New Driveline Infection	79.3%	75.9%	0.848
Freedom from Any Infection	49.5%	54.8%	0.911

Abstract 240 Table 2

Endpoints (at 1-Year)	PRA $\geq 10\%$ , Desensitization Therapy (n=7)	PRA $\geq 10\%$ , No Desensitization Therapy (n=15)	P-value
Survival	100.0%	92.9%	0.498
Freedom from Readmission	14.3%	0.0%	0.328
Freedom from New Driveline Infection	83.3%	77.9%	0.727
Freedom from Any Infection	33.3%	71.3%	0.529

sensitized patients were further divided into those that received desensitization therapy ( $n=7$ ) and those that did not ( $n=15$ ). The groups were monitored for the ensuing 1 year after the driveline infection for survival, freedom from readmission, freedom from new driveline infection, and freedom from any infection.

**Summary of results** There was no significant difference between sensitized and non-sensitized MCS patients with a driveline infection in terms of 1-year survival, freedom from hospital readmissions, and freedom from any infection subsequent to the initial driveline infection. Additionally, when comparing the subgroup of sensitized patients who received desensitization therapy and those that did not, there was no difference in outcome.

**Conclusions** Desensitization appears to be safe in MCS patients with an existing driveline infection to potentially expand the compatible donor pool.

#### 241 EFFECTIVENESS OF INTRAVENOUS IMMUNOGLOBULIN VERSUS INFlixIMAB IN PATIENTS WITH REFRACTORY KAWASAKI DISEASE

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10.1136/jim-2019-WMRC.241

**Purpose of study** It is unclear whether the use of Infliximab (IFX) or a second dose of intravenous immunoglobulin (IVIG) is more effective in treating patients with IVIG-resistant Kawasaki Disease (KD). The purpose of this study is to investigate whether retreatment with IFX or IVIG is associated with a greater and more rapid resolution of fever and fewer adverse coronary outcomes in patients with refractory KD.

**Methods used** A literature review using Pubmed and Google Scholar with the keywords Infliximab, IVIG-resistant Kawasaki



**Abstract 241 Table 1** Efficacy of retreatment with IVIG vs. IFX in refractory kawasaki disease

Study	Location of study	# of Patients Studied	Median febrile period (in days)*		# of patients who became afebrile		Response Rate p-value	# of patients with adverse coronary outcomes		Median echocardiogram z-scores		Echocardiogram z-score p-value	Follow-up length
			IVIG	IFX	IVIG	IFX		IVIG	IFX	IVIG	IFX		
Burns 2008	US	24	NR	NR	8/12 (67%)	11/12 (92%)	p<0.05	1/12 (8.3%)	4/12 (33%)	2.2	3.5	NS	Study entry, 1–2 & 6–8 weeks,
Son 2011	US	106	10	8	65/86 (76%)	17/20 (85%)	p=0.030	29/86 (34%)	7/20 (35%)	1.60	1.76	NS	Study entry, 1–10 weeks
Youn 2016	Korea	43	10	8	22/33 (66.7%)	14/15 (93%)	p=0.042	4/33 (12%)	1/15 (6.7%)	NR	NR	NR	Study entry, 2–4 weeks,
Mori 2018	Japan	31	9.3	7.7	6/15 (40%)	12/16 (75%)	p=0.023	3/15 (20%)	1/16 (6.25%)	2.5	1.9	NS	Study entry & 3, 7, 14, 21, and 56 days

\*febrile period following initial IVIG treatment until resolution of fever after retreatment; NS: Not Significant; NR: Not Reported

Disease, and Refractory Kawasaki Disease was conducted. Only studies that directly compared retreatment with IVIG versus IFX were used. Of these studies, only those that evaluated coronary outcomes, response rates, and febrile periods for each retreatment were used.

**Summary of results** Of the 16 articles that we found, only 4 satisfied our inclusion criteria (see table 1 below). Our study was limited due to most studies focusing on treatment for patients with non-refractory KD. Additionally, many studies combined different treatment options together and were thus excluded from this study. All studies that tested IFX found a correlation between Infliximab administration and greater resolution of fever along with shorter febrile periods. The correlation between coronary abnormalities and the administration of IFX or IVIG remains inconclusive.

**Conclusions** Our review suggests that IFX could be more successful in alleviating fevers versus retreatment with IVIG in refractory KD patients. The occurrence of coronary abnormalities and adverse events in retreatment with both drugs was not significant. Further research with larger sample sizes and longer follow up periods must be conducted to fully confirm these results.

## Case reports I

### Concurrent session

8:00 AM

Friday, January 24, 2020

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#### COLON CANCER PRESENTING AS A SPLENIC ABSCESS WITH ASSOCIATED *FUSOBACTERIUM MORTIFERUM* BACTEREMIA

<sup>1</sup>E Fitzsimmons\*, <sup>1</sup>T Torrico, <sup>1</sup>C Donath, <sup>2</sup>S Ragland. <sup>1</sup>Ross University School of Medicine, Bridgetown, Barbados and; <sup>2</sup>Kern Medical Center, Bakersfield, CA

10.1136/jim-2019-WMRC.242

**Case report** *Streptococcus bovis* bacteremia is a well-known classic association for an underlying colorectal carcinoma. However, more rarely, Gram-negative bacteremia's can also be associated with colorectal cancer. This case report documents an underlying colorectal carcinoma with a previously undescribed *Fusobacterium mortiferum* bacteremia. In addition to the bacteremia, this patient presented with a splenic abscess, whose formation generally requires seeding from another primary source of infection. Cultures of the splenic abscess in this case did not grow *Fusobacterium mortiferum* but did grow *Escherichia coli* and *Streptococcus group C beta*. Surgical intervention later confirmed suspicion of direct contact of the distal transverse colon to the spleen due to an expanding colorectal carcinoma as no other primary sources of infection were found. To the best of our knowledge, there are no documented cases of *Fusobacterium mortiferum* bacteremia's associated with colorectal carcinoma in the literature. Additionally, the formation of a splenic abscess by direct contact, rather than by seeding, remains incredibly rare.



**Abstract 242 Figure 1**

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## A RARE CASE OF COCCIDIOIDAL OTOMYCOSES

HK Sandhu\*, G Petersen, A Heidari. *Kern Medical, Bakersfield, CA*

10.1136/jim-2019-WMRC.243

**Purpose of study** Coccidioidomycosis(cocci) Immitis is found abundantly in soil in the Central Valley of California, southern Arizona, west Texas, and southern New Mexico. Around 40% of infections due to coccidioides are asymptomatic with vast majority being self-limited pulmonary infection. 1–2% of cases show dissemination beyond the lungs, most commonly to bones, lymph nodes, joints, and meninges. We here present the only case of coccidioidomycosis dissemination to the mastoid process that we experienced in our data base of over three thousand cases.

**Methods used** Retrospective case study.

**Summary of results** A 22 year old Hispanic male with uncontrolled Diabetes Mellitus type I was diagnosed with pulmonary coccidioidomycosis prior. Cocci complement fixing titer was 1:32. He was placed on fluconazole 800 mg daily. One year later he experienced gradual onset left ear pain with radiation to left jaw and left eye and purulent drainage. He was diagnosed with left otitis externa and was treated medically.

Subsequently, he presented with left sided progressive hearing loss and diffuse pounding headache, nausea and vomiting of 1 month duration. On otoscopic examination, tympanic membrane was erythematous, bulging with middle ear effusion. 512 tuning fork conclusive of conductive hearing loss on the left side. CT of the head showed complete opacification of mastoid air cell system on the left side with fluid in the middle ear. MRI showed left mastoiditis with an extradural collection. He was admitted and started on I.V. antibiotics.

Upon ENT consultation operative management was conducted for left mastoiditis and otitis media with left myringotomy with insertion of tympanostomy tube. Patient remained symptomatic 10 days postoperatively therefore, left mastoidectomy and tympanoplasty was performed for chronic mastoiditis. Mastoid tissue biopsy on culture grew Coccidioides Immitis after 28 days. The tympanic membrane healed well and there was a gradual increase of hearing in his left ear. Patient subsequently completed 12 week course of Liposomal amphotericin B and his treatment was changed to oral posaconazole he improved and followed up in the outpatient setting.

**Conclusions** Clinicians should be aware that coccidioidomycosis could hematogenously disseminate to any foci of body particularly in the immunocompromised host.

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## A CASE OF OCULAR SYPHILIS AS THE INITIAL PRESENTING SYMPTOM IN A PATIENT WITH HIV

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10.1136/jim-2019-WMRC.244

**Purpose of study** Syphilis is a bacterial infection from *Treponema pallidum* that is most commonly transmitted sexually. The disease progresses through many stages and has a broad spectrum of clinical manifestations. All stages are curable with the use of penicillin with route of administration and length of treatment based on stage at diagnosis. Syphilis is more commonly seen in individuals with human immunodeficiency

virus (HIV) and ocular syphilis is an uncommon initial presentation of the infection.

**Methods used** Retrospective case report.

**Summary of results** A 58-year-old Hispanic male with a history significant for HIV presented to his ophthalmologist with complaints of seeing floaters in the previous three months. The floaters were associated with vision changes but no complete loss of vision or pain. Due to the patient's HIV status and the recent vision changes, laboratory studies were performed to assess for a variety of diagnoses. The initial diagnosis of syphilis was confirmed and the patient was sent to the hospital for further management and treatment. On admission, physical exam demonstrated extraocular movements intact, pupils equal and reactive to light and accommodation with no reduction in peripheral vision. Cranial nerves II-XII were tested and intact and sensation to light touch was intact throughout. A lumbar puncture with differential and VDRL along with a serum qualitative syphilis antibody were obtained. The cerebral spinal fluid returned positive for syphilis and the patient was given a PICC line and was treated for 14 days with 4 million units of Penicillin G IV.

**Conclusions** This case demonstrates an uncommon initial manifestation of syphilis that requires high suspicion for diagnosis and further workup to determine how invasive the infection for proper treatment protocol. Syphilis in general is more commonly seen in patients diagnosed with HIV and therefore any patient with HIV presenting with vision changes should undergo initial syphilis diagnostic testing as a delay in treatment may cause a worsening of symptoms. Finally, if ocular syphilis is the initial symptom at diagnosis, a CSF analysis should be done to determine if the patient also has neurosyphilis as this needs more aggressive treatment.

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## A CASE OF ACUTE LIVER INJURY IN THE SETTING OF ANTI-TUBERCULOSIS THERAPY FOR PRESUMPTIVE OCULAR TUBERCULOSIS

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10.1136/jim-2019-WMRC.245

**Purpose of study** Mycobacterium tuberculosis (MTB) is an obligate aerobic bacteria, and is the causative agent in ocular tuberculosis (TB); the oxygen tension of the choroid of the eye is one of the highest oxygen tensions in the body and is attractive for the bacillus to be seeded via hemogenous spread. Ocular TB is more common in the uveal tract, retina, and optic nerve respectively. The diagnosis is essentially clinical as the pulmonary disease is missing.

**Summary of results** A 31-year-old Hispanic female who previously worked in a hospital in Mexico referred from her ophthalmologist with the diagnosis of ocular TB. The patient had been suffering for about 1 year with bilateral panuveitis with bilateral granulomatous inflammation. Her Quantiferon-Gold TB test, was positive with negative chest x-ray. She was initiated with rifampin, isoniazid, pyrazinamide and moxifloxacin. After about 4 months of therapy with clinical improvement with serial ophthalmological examination she was found to have epigastric pain, nausea, vomiting, and non-bloody diarrhea; her AST/ALT were 1,424/1,584 U/L, and Bili T of 4.4 mg/dl. All anti-TB medications were stopped, and the patient was admitted. Her liver injury continued to worsen to levels

as high as 19/1957/2363 (Bili/AST/ALT). MELD as high as 23 and INR as high as 2.

She underwent liver biopsy complicated with intra-abdominal hemorrhage and embolization. Pathology showed periventricular necrosis, ballooning degeneration of hepatocytes, and mild bridging fibrosis, consistent with drug induced necrosis. Her ANA came back 1:160 suggestive of underlying autoimmune process as well. She was transferred to liver transplant center but fortunately, spontaneously start to improve with slow drop in liver injury markers. Plan is to restart her treatment only with 2 least hepatotoxic medications to finish her course of treatment.

**Conclusion** Clinicians should be aware of the potential acute and severe liver injury when treating patients with ant-tuberculosis medications. Due to nature of clinical diagnosis and lacking microbiological data to deescalate treatment the risk of toxicity is higher.

#### 246 RECURRENT HOSPITALIZATION FOR CANNABINOID HYPEREMESIS SYNDROME IN AN ADOLESCENT

K De Leon\*, J Pham, TJ Chinnock. *Loma Linda University, Loma Linda, CA*

10.1136/jim-2019-WMRC.246

**Case report** A 16 year-old male with history of major depressive disorder and attention deficit hyperactivity disorder presented to an outside ED with four days of recurrent episodes of nausea and vomiting associated with weight loss and decreased appetite. He was transferred due to chest pain and shortness of breath attributed to pneumomediastinum identified on chest radiograph. The patient reported at least 2 years of daily use of 'wax' marijuana which he smoked to maintain a constant 'high'.

On admission the patient continued with nausea and non-bilious, non-bloody vomiting. Vital signs were reassuring with normal oxygen saturation. Physical exam was notable for crepitus over his upper left anterior chest wall but normal breath sounds and work of breathing. The abdomen was soft and non-distended but generally tender to palpation. Lab values were normal except for white blood cell count of 23.5 bil/L and slightly low sodium and chloride. Chest x-ray showed mediastinal air and CT scan of the chest, abdomen, and pelvis confirmed pneumomediastinum with subcutaneous air, and ruled out intestinal obstruction. His symptoms were unresponsive to typical antiemetics such as ondansetron and promethazine, but he reported significant relief with hot water bathing. Based on his chronic cannabis use and symptoms he was diagnosed with CHS. Due to persistent symptoms, he was started on haloperidol after which he experienced relief. He was discharged home, but would go on to have multiple further encounters.

Over the course of approximately 18 months he presented eight times to various EDs reporting the same symptoms. Five of these eight ED visits resulted in hospital admission for a total of 23 hospital days. Recurring clinical findings were: pneumomediastinum, leukocytosis (as high as 30.5 bil/L), hypertension, hypokalemia, and hypochloremia. He was treated with ondansetron and promethazine with negligible benefit. He did not tolerate a trial of topical capsaicin. He was given haloperidol on three visits with reported improvement each time. He underwent a total of three abdominal CT scans, two ultrasounds, and numerous x-rays. He received

intravenous antibiotics on two occasions. Upon phone interview with the patient's legal guardian, he has been symptom free for 8 months since he quit using cannabis.

#### 247 ONCE BUT NOT TWICE: RIPE BEFORE SNIP

VF Civelli\*, M Valdez, V Narang, A Heidari, R Johnson. *Kern Medical, Bakersfield, CA*

10.1136/jim-2019-WMRC.247

**Purpose of study** Orchiectomy in the presence of unilateral mass is common practice in Urology; however, histopathology post-resection may be consistent with infectious etiology, such as tuberculosis (TB) or endemic fungal sources. Here we describe a case of presumptive TB of the testicles in a patient who underwent unilateral right orchiectomy followed by spread of symptoms to the contralateral testicle post-procedure.

**Methods used** Retrospective single-patient case report.

**Summary of results** The patient is a 41-year-old Hispanic male who underwent right-orchiectomy, to rule out malignancy, at an outside facility two years prior after he presented with right sided testicular enlargement. He subsequently presented to our facility with new left testicular pain and swelling, which started approximately 6–10 months after the right orchiectomy. Examination revealed a chronic wound with exudative material at the base of an erythematous and edematous scrotum. A firm mass and scrotal tenderness were appreciated. A course of doxycycline was completed due to concern for epididymitis, which provided no relief. The pathology report from the right orchiectomy was obtained and revealed necrotizing granulomatous inflammation with a rare, questionably AFB-stained organism. Additional work-up for coccidioidomycosis, granulomatosis with polyangiitis, sarcoidosis, histoplasmosis, and brucellosis were negative. Urine AFB stains and cultures were also negative. Regardless, empiric therapy with the standard 4-drug anti-tuberculosis medication regimen (RIPE), including rifampin, isoniazid, pyrazinamide, and ethambutol was initiated. The patient completed a 6 month course of RIPE therapy and experienced complete resolution of all symptoms, including left testicular pain, swelling, and erythema.

**Conclusions** Clinicians should be mindful to include infectious etiologies, specifically TB, in the differential diagnosis for orchitis, epididymitis, and solid testicular masses, even in the setting of negative work-up. Although the urology literature describes that orchiectomies occur per standard guidelines for malignancy, in the case of spread of symptoms to the remaining testicle a comprehensive work-up for infectious etiologies and perhaps empiric therapy should be considered prior to resection.

#### 248 A CASE OF HEPATITIS B IMMUNE ESCAPE VARIANT: IS MY SPOUSE SAFE?

A Shah\*, A Heidari, V Bali, M Valdez. *Kern Medical-UCLA, Bakersfield, CA*

10.1136/jim-2019-WMRC.248

**Purpose of study** Immune escape variance in hepatitis B is a rare phenomenon seen particularly in the Asian population. Antigenic escape occurs when the immune system is unable to respond properly to an infectious agent. In the case of Hepatitis B (HBV), this presents as a possibility when the patient has the coexistence of HBsAg and HBsAb. The risk

for malignancy, transmission rate, and other clinical significance of immune escape variance in hepatitis B is not well studied.

#### Methods used Retrospective Study

**Summary of results** 50 year old Phillipino male with a diagnosis of previously treated hepatitis B presented to our clinic for further evaluation after he had a positive hepatitis screening test. He reports no clinical symptoms including weight loss, abdominal pain, jaundice, pruritus. His laboratory result showed hepatitis B viral load of 36, HBsAg reactive, HBsAb 590, reactive HBcAb, nonreactive HBeAg and HBeAb without any clinical symptoms and had elevated liver enzymes (ALT 68, AST 39). Given the contradictory nature of the results, a repeat lab test was requested from the patient, which again showed HBeAg and HBeAb non-reactive, HBsAg reactive, HBsAb 706, Hep B DNA 73 and reactive HBcAb. Liver ultrasound showed coarse echogenicity of the live suggest of cirrhotic liver. The coexistence of HBsAg and HBsAb indicates possible immune escape variants. Additional Hepatitis B genotype study was ordered, however was not able to be performed because the patient had a viral load <600. Since patient showed evidence of cirrhosis by ultrasound based on AASLD guideline he was started on Entecavir 1 mg daily and continued with unknown duration. After being on the medication for 6 months, repeat serology showed HBsAg reactive, HBsAb 726, Hep B DNA not detected.

**Conclusions** A diagnosis of immune escape variant of hepatitis B should be considered when the patient has serological findings of both the surface antigen and antibody. The family screening should be considered and immunization should be done in non-immunized at risk. However, risk of transmission of this variant even to individuals with adequate immunity is unknown and precautions are still warranted.

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#### A CASE OF ESCHERCHIA COLI VULNERIS NECROTIZING FASCITIS

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10.1136/jim-2019-WMRC.249

**Purpose of study** *Escherichia vulneris* is a gram-negative, oxidase-negative, fermentative, motile rod in the family of *Enterobacteriaceae* based on DNA relatedness studies and biochemical reactions. Most isolates of *E. vulneris* have been recovered from wounds and few case studies are available characterizing its pathogenic characteristic. We are presenting a rare case of type I polymicrobial necrotizing fasciitis with of *Escherichia vulneris*, *streptococcus anginosus* and *eikenella corrodens*.

#### Methods used Retrospective case report.

**Summary of results** A 26 year old African American female with schizoaffective disorder, intravenous drug abuse with methamphetamine and hepatitis C presented with right arm redness and swelling for one week, the physical exam revealed a significant area of skin erythema and induration; in addition, the central area of eschar and necrosis noted on the proximal medial aspect of the right upper extremity. CT showed scattered gas bubbles in the right arm. She underwent emergent debridement and was diagnosed with

necrotizing fasciitis of right chest wall and right upper arm. Her course got complicated with pneumothorax. She was started on broad spectrum antibiotics with vancomycin and piperacillin/tazobactam. Her intraoperative cultures repeatedly grew *E. vulneris*, *streptococcus anginosus* and *eikenella corrodens*.

*E. vulneris* was only resistant to ampicillin but sensitive to ampicillin/sulbactam. She underwent multiple debridements and her antibiotic regimen was deescalated to ampicillin/sulbactam. After clinical improvement she underwent successful skin graft.

**Conclusions** Even though *Escherichia vulneris* has been reported to colonize chronic wounds in this case it was isolated from intraoperative deep tissue source and was considered pathogenic. We only found one other case report of fatal *E. vulneris* necrotizing fasciitis.

## Endocrinology and metabolism II

### Concurrent session

8:00 AM

Friday, January 24, 2020

250

#### HIGH PREVALENCE OF METABOLIC SYNDROME IN ADOLESCENTS WITH KLINEFELTER SYNDROME

SI DeKlotz\*, N Tartaglia, M Kelsey, KJ Nadeau, S Davis. University of Colorado, Aurora, CO

10.1136/jim-2019-WMRC.250

**Purpose of study** Klinefelter Syndrome (KS) occurs in 1:600 males and is associated with high morbidity and mortality due to cardiovascular disease and diabetes. Metabolic syndrome (MetS) describes a set of features which confer an elevated risk for cardiovascular disease and diabetes. Previous studies have found that up to 50% of men with KS have MetS, but MetS has not been studied in adolescents with KS. We compared features of MetS in adolescents with KS to controls matched for sex, age and BMI-z score.

**Methods used** This is a matched case-control cross-sectional study in 50 males with karyotype 47,XXY who were 10–17 years of age. Cases were matched 1:1 on age and BMI-z score with healthy male controls. Waist circumference, seated systolic blood pressure (SBP), fasting blood glucose (FBG) and lipid panel were measured. MetS was defined as meeting 3 or more of the following criteria: fasting triglycerides (Tg) ≥100 mg/dL; HDL cholesterol <50 mg/dL if <15 years old or <45 mg/dL if >15 ; FBG ≥110 mg/dL; waist circumference >75th percentile for age and sex; and SBP >90th percentile for sex, age and height. The proportion of participants meeting MetS criteria was compared using a Fisher exact test. Continuous variables were compared using a paired t-test or Wilcoxon matched-pairs signed rank test.

**Summary of results** Participants with KS (n=50) were well matched with controls (n=50) for age (14±1.7 vs. 14±1.5 years) and BMI-z score (0.31±1.3 vs. 0.36±1.2). MetS was present in 32% of adolescents with KS compared to only 12% of controls (p=0.028), correlating to an odds ratio of

3.5 (95% CI 1.3, 9.8). The KS group had significantly lower HDL ( $40 \pm 8$  vs.  $47 \pm 11$  mg/dL,  $p=0.006$ ), higher Tg ( $120 \pm 67$  vs.  $83 \pm 40$  mg/dL,  $p<0.001$ ) and larger waist circumference percentile ( $63 \pm 29$  vs.  $53 \pm 33\%$ ,  $p<0.001$ ). FBG and SBP were similar ( $p>0.05$ ).

**Conclusions** Despite a normal BMI, the prevalence of MetS was strikingly high in adolescents with KS compared to controls, particularly for features of abdominal adiposity and dyslipidemia. Reinforcing healthy lifestyle choices and routine screening for MetS features should begin early for boys with KS. The pathophysiology of this unhealthy metabolic profile in the absence of obesity needs further investigation to facilitate prevention of the high morbidity of cardiovascular disease and diabetes in this population.

### 251 MUSCLE MITOCHONDRIAL FUNCTION IN KLINEFELTER SYNDROME

S Cung\*, KJ Nadeau, D Dabelea, M Cree-Green, S Davis. *University of Colorado, Aurora, CO*

10.1136/jim-2019-WMRC.251

**Purpose of study** Klinefelter Syndrome (XXY) occurs in 1 in 600 males, resulting in testosterone deficiency and a high prevalence of type 2 diabetes. Testosterone deficiency in men is known to cause insulin resistance and mitochondrial dysfunction is hypothesized to mediate this relationship, however mitochondrial function has not been assessed in XXY. The aim of this cross-sectional study was to evaluate mitochondrial function in adolescents with XXY and the relationship with insulin resistance.

**Methods used** Twenty-seven adolescent males with XXY (age  $14.7 \pm 1.8$  yrs) were compared to 75 controls (age  $16.7 \pm 1.3$  yrs). A subset of  $n=13$  XXY boys were receiving testosterone replacement. In-vivo muscle mitochondrial function was assessed via phosphorus MR spectroscopy ( $^{31}\text{P}$ -MRS) of the dominant-leg soleus muscle following 90 seconds of exercise. Fasting serum was analyzed for glucose and insulin to calculate HOMA-IR. Multiple linear regression was used to compare  $^{31}\text{P}$ -MRS outcomes (ADP and Phosphocreatine (PCr) time constants, rate of oxidative phosphorylation (Oxphos), and maximal mitochondrial function relative to mitochondrial density [ $Q_{\max}$ ]) between groups after adjusting for age differences. Within the XXY group, linear regression was used to assess the relationship of mitochondrial function variables with HOMA-IR and testosterone treatment status.

**Summary of results** There were no statistically significant differences in mitochondrial function outcomes between the two groups (ADP  $p=0.95$ , Oxphos  $p=0.19$ , PCr  $p=0.98$ ,  $Q_{\max}$   $p=0.56$ ). HOMA-IR did not have a linear relationship with any of the mitochondrial variables. There were also no differences within the XXY group by testosterone treatment status (ADP  $p=1.00$ , Oxphos  $p=0.20$ , PCr  $p=0.23$ ,  $Q_{\max}$   $p=0.99$ ).

**Conclusions** In-vivo post-exercise muscle mitochondrial function is not impaired in adolescents with XXY compared to controls and treatment with testosterone does not significantly relate to muscle mitochondrial function in XXY. The insulin resistance associated with XXY does not appear to be mediated by muscle mitochondrial dysfunction.

### 252 INCREASED DE NOVO LIPOGENESIS IN HEPATICS STEATOSIS REGARDLESS OF POLYCYSTIC OVARY SYNDROME STATUS

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10.1136/jim-2019-WMRC.252

**Purpose of study** PCOS affects up to 15% of women and is associated with obesity and the metabolic syndrome. Adolescents with PCOS and obesity are more likely to have hepatic steatosis (HS) relative to girls with normal menses of similar age, race/ethnicity and adiposity. Serum markers for de novo lipogenesis (DNL) are increased in PCOS, but it is unknown if DNL was increased in girls with PCOS when controlling for HS status, or how DNL relates to HS in adolescents with obesity.

**Methods used** Adolescents with obesity were selected for similar HS status and then either PCOS (N=11, 5 with HS, 6 without) or Controls with normal menses (N=9, 5 with HS, 4 without) were enrolled. Hepatic fat was measured with MRI utilizing the Dixon method, and  $\approx 50\%$  of each group had HS, defined as  $>5.5\%$  fat. DNL was measured fasting and during an oral sugar tolerance test (OSTT; 76–78 g glucose +25 g fructose) using an intravenous stable isotope  $^{13}\text{C}_2$  acetate infusion with subsequent measurements of incorporation of the tracer into VLDL-triglyceride palmitate. Fasting hormones, lipid and inflammatory markers and OSTT-derived glucose and insulin were measured.

**Summary of results** Percent liver fat was similar regardless of PCOS status (PCOS no HS  $3.5 \pm 0.6\%$ ; Control no HS  $2.7 \pm 0.4$ ; PCOS HS  $8.2 \pm 1.9$ ; Control HS  $8.8 \pm 3.1$ ). The amount of OSTT stimulated VLDL-triglyceride DNL was also similar between PCOS and Controls without HS, and PCOS and Controls with HS (PCOS no HS  $3.5 \pm 1.6$  mg/dL; Control no HS  $8.2 \pm 5.3$ ; PCOS HS  $9.8 \pm 4.1$ ; Control HS  $13.5 \pm 3.8$ ). In the combined PCOS and Controls, OSTT DNL increased as the hepatic fat content increased ( $r=0.19$ ,  $p=0.05$ ). Within the PCOS cohort, OSTT DNL was significantly related to free testosterone ( $r=0.50$ ,  $p=0.02$ ).

**Conclusions** In girls with obesity, PCOS status per se does not increase DNL relative to adolescents with normal menses. However, free testosterone related significantly to DNL within the PCOS group. The 3-fold higher prevalence of HS in girls with PCOS and obesity could perhaps be explained by excess testosterone driving higher rates of DNL in a larger percentage of girls with PCOS, and further work is needed to confirm this hypothesis.

### 253 METABOLOMIC CHARACTERIZATION OF HEPATIC STEATOSIS IN POLYCYSTIC OVARY SYNDROME

H Rahat\*, K Alexander, J Reisz, Y Garcia-Reyes, A Carreau, KJ Nadeau, A D'Alessandro, M Cree-Green. *Univ. of CO Anschutz, Aurora, CO*

10.1136/jim-2019-WMRC.253

**Purpose of study** Polycystic ovary syndrome (PCOS) affects 6–10% of women and is associated with hepatic steatosis (HS). HS is the best predictor of future diabetes and cardiovascular disease, yet the cause of HS in PCOS is unknown, difficult to diagnose, and treatments are limited. We sought to

identify unique serum markers for HS in obese PCOS adolescents.

**Methods used** All participants underwent fasting hormone and metabolic measures and abdominal MRI for hepatic fat, with HS defined as hepatic fat fraction  $\geq 5.5\%$ . Participants were divided into 4 cohorts of obese adolescents: 1) A development cohort of treatment-naïve girls with PCOS and HS (N=11) or PCOS without HS (N=9); 2) a validation cohort similar to cohort 1 (PCOS nonHS N=7, PCOS HS N=7); 3) a non-PCOS cohort with HS (N=6) and without HS (N=14); 4) a PCOS cohort treated with at least 6 months of estrogen therapy with HS (N=3) and without HS (N=7). Serum samples underwent polar metabolite liquid/liquid extraction then global metabolite profiling by ultra-HPLC-MS. Samples from cohort 1 underwent untargeted analysis to determine metabolites that distinguished HS, which were confirmed with targeted analysis. Metabolites in the targeted panel were then assessed in samples from the other 3 cohorts.

**Summary of results** Significant differences in the serum metabolome of cohort 1 HS vs. non-HS were noted in amino acids, lipids, glycolytic, purine and heme metabolites ( $p < 0.05$ ). The most notably different compounds notable amino acids (notably glutamate), long chain fatty acids, biliverdin and sphingosine 1-phosphate (S1P) were confirmed in the targeted panel. In samples from cohort 2, hierarchical clustering analysis of the top 25 metabolites by t-test confirmed results from cohort 1 with S1P, acylcarnitines, free fatty acids. Several amino acids confirmed as specific markers with  $\sim 71\%$  accuracy. These markers were not different by HS status in cohort 3. In cohort 4, estrogen therapy normalized only S1P, but did not resolve the excess long chain fatty acids and glutamate in HS.

**Conclusions** We determined that S1P, glutamate and several long chain fatty acids are uniquely elevated in HS+PCOS and S1P was lower in girls on estrogen therapy. These metabolites may be used as biomarkers to identify HS in girls with PCOS.

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#### EMPLOYING METABOLOMICS AND MICROBIOME DATA TO BUILD ALGORITHMS FOR INTERROGATING HOST-MICROBE INTERACTIONS

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10.1136/jim-2019-WMRC.254

**Purpose of study** The microbiome has been linked to the pathogenesis and salubrious states in the human body. However, recent research has been driven by correlative studies, linking an unfavorable disease state to certain microbes. Untargeted metabolomics approaches have yielded an abundance of datasets but the complexity of the data interpretation remains. We introduce AMON: Annotation of Metabolite Origins via Networks and SCNIC: Sparse Cooccurrence Network Investigation for Compositional data as tools to help address these issues. Both are open source software tools used to label compound origins of certain metabolites, from microbe to host or both, to then build a higher level groups of microbes that co-exist together.

**Methods used** We illustrate the utility of AMON and SCNIC using a dataset (16s rRNA) from the gut microbiome and blood metabolome (LC/MS) of HIV positive individuals. This validation was part of a larger study of differences in fecal microbiomes in HIV and non-HIV populations. AMON uses KEGG Orthology to generate pathway enrichment and a hypergeometric test to verify the prediction of metabolites and their origin. SCNIC uses a microbiome table to build a correlation network to and groups of microbes are clustered together and collapsed into a smaller microbiome table.

**Summary of results** After benchmarking SCNIC, the optimal parameter values were an R-value above 0.5 for the SMD algorithm and for a gamma value above 0.1 for the LMM algorithm. With AMON applied to the data, 40 compounds were produced by bacteria alone, 58 by the host alone and 91 by both. Together, these analyses show that AMON can be used to predict the putative origin of compounds detected in a complex metabolome and SCNIC can help understand microbial dynamics.

**Conclusions** The limitations of integrating metabolomics and metagenomics are stark for complex microbial communities, where there are fewer genes of known function. With these tools, researchers can build a general framework to understand the specific interactions between certain microbes and the host, at a chemical level. Ultimately the understanding of microbiome interactions can influence many aspects of human health and disease through its metabolic activities, and with an understanding we can begin to develop more targeted therapies to mitigate human disease.

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#### RECOGNITION OF DISTINCT FACIAL MORPHOLOGY IN YOUTH WITH CONGENITAL ADRENAL HYPERPLASIA VIA MACHINE LEARNING TECHNIQUES

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10.1136/jim-2019-WMRC.255

**Purpose of study** Classical Congenital Adrenal Hyperplasia (CAH) affects 1:15,000 newborns and involves adrenal (cortisol) insufficiency and androgen excess. These hormonal abnormalities are evident as early as week 7 of gestation and persist throughout the pregnancy. Structural brain abnormalities also are known to occur in CAH youth and adults, with abnormalities of brain and facial structure occurring together in other conditions such as fetal alcohol syndrome and holoprosencephaly. We therefore sought to study facial features using machine learning for the first time in youth with CAH.

**Methods used** We examined frontal images of the face in 63 youth with severe, salt-wasting classical CAH due to 21-hydroxylase deficiency (58.7% female;  $11.5 \pm 7.1$  yr; range 0.02–17.7 yr) and 37 unaffected controls (56.8% female;  $11.1 \pm 6.2$  yr; range 0.06–17.3 yr;  $p = \text{NS}$ ). Images were acquired using an iPad v12.1. We started by automatically detecting face-bounding boxes, which were used to train a neural network to differentiate between CAH and control youth. Due to the small size of our dataset, we employed K-

fold cross validation to obtain reliable statistical results. At each of the K-9 folds, 88% of data was used to train the neural network (including 216 control and 513 CAH images) and the rest was used to evaluate the trained neural network model (including 70 CAH and 29 control images). Test results of the nine folds were validated in terms of the area under the curve (AUC) of the receiver operating characteristic curves (ROCs).

**Summary of results** The AUC of the averaged ROCs over nine folds was  $0.88 \pm 0.07$ , representing strong predictive power as a proxy to correlating facial dysmorphology with CAH. We also produced heat (i.e., saliency) maps showing the effect of CAH on facial features, and 2D visualization of facial features showing well-defined separation between CAH and control group clusters.

**Conclusions** Utilizing machine learning, we have shown that CAH youth have facial features that can reliably distinguish these youth from controls. Further study is merited in regard to the etiology of affected facial morphology in CAH, and associations with other brain and/or behavior abnormalities.

#### 256 EARLY ADIPOSITY REBOUND IN YOUTH WITH CONGENITAL ADRENAL HYPERPLASIA IS ASSOCIATED WITH INCREASED ADIPOSITY AND BONE AGE IN ADOLESCENCE

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10.1136/jim-2019-WMRC.256

**Purpose of study** Youth with Congenital Adrenal Hyperplasia (CAH) have an increased prevalence of obesity. Adiposity rebound (AR) is a rise in body mass index (BMI) that corresponds to an increase in number and size of adipocytes. In the U.K., CAH youth exhibited an earlier mean AR by 3 years (1.7 yr) compared to the general population (~5 yr). Among healthy, unaffected youth, an earlier age at AR is predictive of future obesity and associated with advanced bone age. Our objective was to examine associations among AR, bone age, and adiposity in youth with CAH at our U.S. center.

**Methods used** Data from 19 CAH patients were studied from the first clinic visit (prior to 2 yr), and every 6 months thereafter, until the last clinic visit. BMI ( $\text{kg}/\text{m}^2$ ) was calculated from length/standing height and weight at each visit. Visual inspection (VI) and cubic polynomial (CP) methods were used to determine age at AR. By VI, AR age was located at the point preceding the second rise of BMI after 1 year of age. By CP, AR age was located at the nadir before the second rise in the cubic model. Total fat and lean mass in adolescence were measured by DEXA. Waist circumference (WC), abdominal subcutaneous adipose tissue (SAT) and visceral adipose tissue (VAT) were measured by single-slice CT or 3-Tesla MRI at the umbilicus. Bone age x-ray near the time of imaging was studied for advancement beyond chronological age.

**Summary of results** Average age at AR for CAH youth was  $3.3 \pm 0.3$  yr by VI, and  $3.2 \pm 1.2$  yr by CP ( $p=0.9$ ). Age at AR

(by CP alone) was negatively correlated with total fat mass ( $r = -0.59$ ,  $p=0.01$ ), WC ( $r = -0.52$ ,  $p=0.05$ ), and SAT ( $r = -0.58$ ,  $p=0.02$ ), but not with lean mass or VAT. Age at AR was negatively correlated with bone age advancement by VI ( $r = -0.63$ ,  $p=0.01$ ) and CP ( $r = -0.45$ ,  $p=0.03$ ).

**Conclusions** CAH youth at our center exhibited an earlier AR by 2 years compared to the general U.S. population, and those with earlier AR had increased adiposity in adolescence. AR and bone age advancement could be causally related in CAH or explained by other factors such as glucocorticoid treatment that merit further study.

#### 257 A CASE OF THYROTOXIC PERIODIC PARALYSIS

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10.1136/jim-2019-WMRC.257

**Purpose of study** Thyrotoxic periodic paralysis (TPP) is a rare condition caused by untreated hyperthyroid disease. Patients typically present with lower extremity paralysis and associated hypokalemia. After IV KCl administration, lower extremity strength rapidly resolves, and the patient is often discharged without the causal hyperthyroid state exposed. Incidence of TPP is reported in 2% of patients with underlying thyrotoxicosis.

**Methods used** Retrospective case report

**Summary of results** 32 y.o. Hispanic male with no significant PMH presented to ED with complaints of lower extremity paralysis x 4 hours. Patient endorsed 4 similar episodes over the past 6 years, however, disease was not worked up as the paralysis rapidly resolved with IV KCl in the ER. ROS notable for 10lbs weight loss, exophthalmos, heat intolerance, diaphoresis, tremors and anxiety. His only home medication was 40mEq of KCl daily. He denied any family members sharing similar episodes. Physical exam demonstrated sinus tachycardia and mild exophthalmos.

In the ED, K+ was 2.7 and 40 mEq of IV KCl was administered, followed by another 40 mEq given orally. After three hours, his lower extremity strength recovered completely. Repeat labs showed a rapid response to KCl with K+ rising to 5.8. The working diagnosis was hypokalemic periodic paralysis (hypoKPP), however, with no family history and symptomology consistent with a hyperthyroid picture, a thyroid panel was ordered. Labs were significant for TSH  $<0.008$ , with a free T4 of 3.24. Thyroid U/S demonstrated no masses or nodules; but the gland was diffusely enlarged with increased vascularity. Case was discussed with endocrinologist, who concurred with the diagnosis of TPP. Patient was started on methimazole and propranolol with plans to see endocrinology outpatient. Unfortunately, patient was lost to follow-up.

**Conclusions** TPP is characterized by sudden onset of hypokalemia and subsequent lower extremity paralysis due to thyroid hormone sensitization of Na<sup>+</sup>/K<sup>+</sup>-ATPase channels. Clues that distinguish TPP from familial hypoKPP include a lack of family history of paralytic episodes, male sex, late presentation and signs of thyrotoxicosis. Treatment consists of nonselective beta-blockers, correction of hyperthyroid state and careful potassium supplementation. It is important for physicians to make the correct diagnosis as TPP is curable once euthyroid state is achieved.

## Gastroenterology

## Concurrent session

8:00 AM

Friday, January 24, 2020

**258 MEDICAL THERAPY AND CLINICAL OUTCOMES IN  
ULCERATIVE COLITIS PATIENTS IN A COMMUNITY  
GASTROENTEROLOGY PRACTICE**

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10.1136/jim-2019-WMRC.258

**Purpose of study** Ulcerative colitis (UC) is an idiopathic inflammatory bowel disease characterized by inflammation of the colon and rectum. Medical therapy is recommended to prevent complications and eventual surgery. The aim of this study was to understand the clinical course, medical treatment, and clinical outcomes of UC patients to identify gaps in treatment and plan for future outcome studies.

**Methods used** Over a one year period (1/2017 to 1/2018), 119 UC patients were seen in an outpatient gastroenterology clinic. A retrospective chart review was conducted for demographic information as well as surgical and treatment history, including biologic and corticosteroid use and outcomes.

**Summary of results** A total of 119 patients were reviewed with a mean age of 45 years and mean UC duration of 9.8 years. The majority of patients had pancolitis phenotype (62%). Ten patients (8.4%) had colectomy/j-pouch surgery at an average 75 mo. from diagnosis of UC. Extraintestinal manifestations (EIMs) occurred in 13 patients (11%). UC patients were treated with mesalamine (45.4%), azathioprine/mercaptopurine (30.2%), and biologic (40.3%) therapies. Thirty patients (25.2%) were treated with at least 1 course of prednisone. Six patients (5%) became corticosteroid dependent (prednisone >10 mg per day for >60 days). Biologic treated patients (41.6%) were more likely to

receive treatment with prednisone than patients not treated with biologics (14.1%,  $p=0.001$ ). Ten patients (8.4%) were hospitalized for UC related flaring (mean LOS 8 days, range 4–20). Remission of symptoms was achieved in 88.8% of patients.

**Conclusions** This cohort of UC patients in a community gastroenterology practice were older with more extensive disease phenotype (pancolitis) and had disease with durations longer than expected. Extraintestinal manifestations of UC occurred in 11% of patients and were likely underreported. Forty percent of UC patients were treated with biologic therapy. Corticosteroid use was common with 1 in 4 patients receiving at least 1 course of treatment. Corticosteroid dependent patients were uncommon. Remission was achieved in 89% of patients. No conclusions can be made comparing the effectiveness of different medical therapies due to small patient sample size.

**259 EFFECTIVENESS OF FECAL MICROBIOTA TRANSPLANT  
IN PATIENTS WITH ULCERATIVE COLITIS: A LITERATURE  
REVIEW**

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10.1136/jim-2019-WMRC.259

**Purpose of study** Research suggests that alteration in gut bacterial colonies may play a role in the development of ulcerative colitis and/or its progression. The purpose of this study was to compile the literature regarding the effectiveness of Fecal Microbiota Transplant (FMT) in the management of ulcerative colitis (UC).

**Methods used** A comprehensive search using keywords such as: ulcerative colitis, FMT, and microbiota transplant was performed via Pubmed, Cochrane and checking the references of published articles. Inclusion criteria included prospective studies of adult patients diagnosed with active UC with at least 10 subjects that measured clinical outcome.

**Abstract 259 Table 1** Effectiveness of FMT in refractory UC

1st Author, Year, Country	Control	Intervention (FMT method)	Duration of Intervention	Follow-up Period	Outcome at end of intervention (intervention vs control)
Costello, 2019, Australia	Auto-FMT (n=35)	Via colonoscopy followed by 2 enemas over 7 days (n=38)	8 weeks	12 months	32% vs 9% remission ( $p=0.03$ )
Cui, 2015, China	Self-controlled (n=15)	Via endoscopy (n=15)	3–18 months	3–18 months	57.1% improvement
Ishikawa, 2017, Japan	Antibiotic-only (n=19)	Via endoscopy (n=15)	4 weeks	not recorded	35.3% vs 15.8% remission ( $p=0.18$ )
Jacob, 2017, USA	Self-controlled (n=20)	Via colonoscopy (n=20)	4 weeks	12 weeks	Mayo score* decrease of 1.5 from 8.1 $\pm$ 2.4 ( $p=0.03$ )
Moayyedi, 2015, Canada	Water enema (n=34)	Via enema, weekly for 6 weeks (n=36)	7 weeks	12 months	24% vs 5% remission ( $p=0.03$ )
Paramsothy, 2019, Australia	Placebo enema (n=43)	Via enema, 5 days/week for 8 weeks (n=42)	8 weeks	not recorded	27% vs 8% remission ( $p=0.02$ )
Rossen, 2015, Netherlands	Auto-FMT (n=25)	Via naso-duodenal tube, twice, 3 weeks apart (n=25)	6 weeks	12 weeks	41.2% vs 25% remission ( $p=0.29$ )
Tian, 2019, China	Self-controlled (n=20)	Via gastroscopy, 5 times, 3 weeks apart (n=20)	15 weeks	not recorded	Mayo score* $3\pm 2$ vs $5\pm 2.75$ ( $p<0.05$ )

\*Mayo score is a clinical index used to assess the severity of UC. Lower scores indicate less symptoms



**Summary of results** Of 16 studies found, 8 met our inclusion criteria (table 1 below). Based on the limited data, FMT via enemas and colonoscopies demonstrated significant positive effects, whereas FMT via a nasoduodenal tube yielded insignificant improvement. The timing of data collection was very variable and ranged from 4 weeks to 18 months, and some studies lacked long follow-up periods. Common adverse effects include nausea, borborygmus and discomfort, while less than 10% of participants experienced more serious adverse effects such as intolerance to the FMT procedure and severe worsening of symptoms.

**Conclusions** Our review suggests a possible role in FMT in certain patients who don't respond to conventional therapy. Limitations of this review included variation in the type and frequency of FMTs delivered as well as the timing of assessment in different studies. Future controlled studies with a standard method of FMT and longer follow-up periods are warranted.

## 260 PREVALENCE AND CLINICAL SIGNIFICANCE OF OCCULT HCV INFECTION

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10.1136/jim-2019-WMRC.260

**Purpose of study** HCV infection is one of the major causes of end-stage liver diseases, which account for over 15,000 deaths annually in the US. The eradication of pathogen is the only definitive medical intervention. Currently, the successful clearance of HCV is determined by the undetectable viral genome in serum 12 weeks after the completion of the antiviral therapy, referred to as sustained virological response (SVR). Recently, anti-HCV therapy has revolutionized due to the development of direct-acting antivirals (DAA). DAA therapy offers SVR in nearly all patient with negligible toxicities. In contrast, the previous standard regimen, interferon is associated with intolerable toxicity and offers SVR only 60% of patients. Given this significant improvement, the number of patients who attained SVR is exponentially increased worldwide.

It is known that HCV could maintain dormant lifecycle in the liver tissue or PBMC after achieving SVR. This condition is called 'occult HCV infection' (OCI). The incidence of OCI is extremely rare in patients who achieved SVR with IFN, however, the prevalence of OCI in the population who attained SVR with DAA remain unexplored. Therefore, this study aimed to delineate the prevalence and clinical significance of OCI among patients who attained SVR with DAA.

**Methods used** Total 50 subjects who developed abnormal liver function test, liver cancer, or liver failure after achieving SVR were enrolled. Liver tissue and PBMC were collected and subjected to the detection of HCV genome via RT-qPCR. In addition, histopathological and electron microscopic (EM) analysis of the liver tissue were performed.

**Summary of results** 6 subjects (12%) had detectable HCV genome in the liver tissue. HCV-RNA was also detected in PBMC of 3 subjects (6%). 2 subjects (4%) had detectable HCV genome in both liver tissue and PBMC. The

histopathological analysis did not demonstrate any specific findings associated with the presence or absence of OCI. In contrast, EM analysis of OCI liver tissue showed unique features of cell injury and HCV replication.

**Conclusions** Our study revealed a high prevalence of OCI among patients who achieved SVR with DAA. In addition, EM analysis of the liver tissue indicated that the presence of OCI might lead to the further progression of liver disease, suggesting the potential benefit of reinitiating antiviral therapy in those with evidence of OCI.

## 261 EXAMINATION OF WNT SIGNALING AS A THERAPEUTIC TARGET FOR PANCREATIC DUCTAL ADENOCARCINOMA USING A PANCREATIC TUMOR ORGANOID LIBRARY

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10.1136/jim-2019-WMRC.261

**Purpose of study** Pancreatic ductal adenocarcinoma (PDAC) commonly presents at advanced stages and is refractory to most treatment modalities, making it one of the most lethal cancers. Although the low tumor cellularity and high desmoplastic response convolutes the relationship between genotype and biological phenotypes, gene mutations associated with PDACs have been identified. Wnt pathway mutations are rarely detected in PDAC, but Wnt signaling is activated by pancreatic duct ligation injury and plays a critical role in the proliferation and chemotherapeutic resistance in other cancers. Patient derived pancreatic tumor organoid libraries (PTOL) allow for more accurate investigation of the biological phenotypes that might lead to therapies that further improve survival. This study aims to subclassify PDAC organoids based on Wnt dependency to determine if combinatory treatment with Wnt inhibitors and chemotherapy would serve as a feasible treatment.

**Methods used** Nine PDAC organoids were grown in Human Pancreatic Stem Cell medium. Minimal media conditions required to maintain growth was assessed with depletions of various niche factors. For confirmation of Wnt inhibition, organoids grown in minimal media were treated with three Wnt inhibitors. Growth was assessed with CellTiter Glo 3D.

**Summary of results** Minimal media conditions, growth factor dependency, and Wnt dependency determined via Wnt inhibition were determined as described above. Five organoids demonstrated Wnt dependency. Two organoids demonstrated a Wnt independent phenotype. Minimal growth media was determined for two additional organoids, but Wnt dependency has yet to be assessed.

**Conclusions** Based on the results obtained, each pancreatic organoid demonstrated different niche factor dependencies providing an avenue for targeted therapy, particularly with Wnt inhibition. WES and gene expression analysis of each organoid will allow for correlation between genotype and Wnt (in)dependency observed *in vitro*. Combinatory treatment with Wnt inhibition and chemotherapy will be assessed *in vitro* and confirmed in patient-derived xenograft models.

## 262 ASSOCIATION OF CANNABINOID USE AND HYPEREMESIS SYNDROME

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10.1136/jim-2019-WMRC.262

**Purpose of study** Cannabinoid (marijuana) usage has increased significantly in recent years, especially after its recent legalization. The objective of the study is to determine the association between Cannabinoid use with hyperemesis or cyclic vomiting syndrome (CVS).

**Methods used** A literature-based review of articles was performed through PubMed, Cochrane, and Google Scholar database using key words such as 'Cannabinoid' 'Hyperemesis Syndrome', and 'Cyclical Vomiting Syndrome'. The studies included took into account the confounding variables or excluded patients with other illnesses that could lead to hyperemesis.

**Summary of results** We found 6 studies that matched our inclusion criteria (See table 1). Duration of cannabinoid use was variable among the studies. Studies showed that cannabinoid use has increased in recent years. In addition, cannabinoid users were more likely to be hospitalized or visit Emergency Department (ED) due to hyperemesis in comparison to non-users. Some studies noted that patients with cannabinoid associated vomiting reported compulsive hot showering to relieve vomiting. The reports suggested that the symptoms of hyperemesis stopped after discontinuation of cannabinoids.

**Conclusions** Our literature review suggests that cannabinoid use is associated with hyperemesis syndrome. As the workup for diagnosis of hyperemesis syndrome could be very costly, healthcare professionals should have a high index of suspicion for cannabinoid use in patients who present with hyperemesis.

## Genetics I

### Concurrent session

8:00 AM

Friday, January 24, 2020

## 263 CHARACTERIZATION OF CTCF AS A RARE CAUSE OF INTELLECTUAL DISABILITY

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10.1136/jim-2019-WMRC.263

**Purpose of study** Pathogenic variants in the CTCF gene have been recently associated with autosomal dominant mental retardation type 21 (MRD21). The main features of patients with MRD21 are intellectual disability, short stature, acquired microcephaly, hypermetropia/strabismus and mild dysmorphic facial features. We aim to further describe the phenotype of patients with MRD21 by presenting two patients with pathogenic variants in the CTCF gene found on whole exome sequencing (WES).

**Methods used** We performed a retrospective chart review and a literature review.

**Summary of results** We describe two patients with MRD21. Patient 1 is a male with mild intellectual disability, ptosis, hyperopic astigmatism, macrocephaly, hammertoes, pes planus, arrhythmogenic right ventricular cardiomyopathy and anxiety. He had mild dysmorphic facial features such as long palpebral fissures and low set ears. WES detected a de novo pathogenic variant in the CTCF gene (c.1094A>G). Patient 2 is a female with global developmental delay, esotropia, hypermetropia, hearing loss, decelerating head circumference,

**Abstract 262 Table 1** Association of cannabinoid use and hyperemesis syndrome

First Author, Year, Location	Method of study/Variable Measured	Number of Cases vs Controls, and Age Range	Frequency of variable in Subjects vs Controls	P value/(other stats)
Hernandez, 2019, Canada	Compared use of cannabis in patients who presented to ED with hyperemesis	37 cannabis users vs. 336 control (18–55 yrs)	Hyperemesis in 16 (43.2%) of users 62 (18.5%) of non-users	0.001
Venkatesan, 2019, U.S.	Compared cannabis use in patients with CVS	140 patients with CVS (37±13 years)	41% percent of patients with CVS were current cannabis users, with 21% reported regular use	Not Reported
Bhandari, 2018, U.S.	Compared cannabis use in hospitalized patients with CVS vs non-CVS	4715 CVS vs 2,359,247 non-CVS Hospitalizations, all ages (mostly between 18–45 yrs)	Cannabis use in 13% of CVS vs 1.7% of non-CVS	p<0.001
Patel, 2015, U.S.	Compared use of cannabis in patients hospitalized with persistent vomiting (PV) vs no-PV	47,753,472 no-PV vs 55,549 with PV, (15 to 54 yrs)	Cannabis use risk no-PV=3.9 vs PV=20.8	p<0.001
Kim et al. 2015, U.S.	Comparison of CVS pre and post-liberalization of marijuana in patients seen in ED	41 visits for CVS Pre-liberalization vs 87 visits Post-liberalization CVS (>18 yrs)	Cannabis use in 7 (17%) Pre-liberalization vs 37 (43%) Post-liberalization	P<0.05
Habboushe, U.S. 2019	Survey to identify Cannaboid Hyperemesis (CH) according to cannabinoid use	2127 patients (18–49 year old). were surveyed for marijuana usage.	51 (32.9%) of frequent cannaboid users (>20 days/month) met the definition of Cannaboid Hyperemesis Syndrome	Not Applicable

FTT, umbilical hernia, 5th finger clinodactyly, fragile nails and skin. Her dysmorphic features include epicanthal folds, blue sclera, mild synophrys, flat nasal bridge, downturned corners of the mouth and low set posteriorly rotated ears. WES detected a de novo likely pathogenic variant in the CTCF gene (c.1079G>A).

**Conclusions** MRD21 should be considered in the differential diagnosis of any patient with intellectual disability. There is a wide spectrum of additional manifestations in this disorder. Features that were noted in our patients but not in previously reported cases include hearing loss, nail and skin fragility, macrocephaly, preauricular tags and arrhythmogenic right ventricular cardiomyopathy, further expanding the phenotype.

### 264 A LARGE COHORT OF *CNKSR2*-RELATED DISEASE PROVIDING INSIGHTS INTO NATURAL HISTORY AND THE MUTATIONAL SPECTRUM

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10.1136/jim-2019-WMRC.264

**Purpose of study** A pathogenic variant in *CNKSR2* (connector enhancer of kinase suppressor of Ras-2) was uncovered in a boy with a seizure disorder and delays especially in language. We have subsequently recruited the largest known cohort that doubles the number of affected individuals, and triples the number of suspected pathogenic variants, with the aim of improving our understanding of the neurodevelopmental and seizure characteristics of *CNKSR2*-related disease and its mutational spectrum.

**Methods used** The proband was analyzed by clinical whole exome through a commercial laboratory. Clinical and molecular information from additional cases were provided through parents active in a *CNKSR2* family support group.

**Summary of results** *CNKSR2*-related disease is an X-linked disorder that results in a neurobehavioral phenotype consisting of intellectual disability and seizures. The delay in developmental progression can be severe, particularly so in language skills. There are characteristic EEG patterns during sleep that categorize this disease as part of the electrical status epilepticus during slow-wave sleep/epileptic encephalopathy with continuous spike-waves in sleep/epilepsy-aphasia spectrum. Since its initial recognition and characterization in 2011, there have been 13 affected males published in the medical literature representing 7 families. We have recruited an additional 14 affected males, each from a different family. The phenotypic spectrum is slightly broader than that previously reported, but there is still at least a moderate degree of developmental delay primarily affecting speech, and the seizures are poorly controlled. Continuing the trend of published cases, the presumed pathogenic variants are almost always loss-of-function (small out-of-frame deletions, splice site variants, nonsense mutations, whole gene deletions).

**Conclusions** *CNKSR2*-related disease is a severe epileptic encephalopathic syndrome with characteristic EEG patterns, poorly controlled seizures, and a developmental delay profile significantly affecting speech. The responsible molecular mechanisms continue to be almost exclusively loss-of-function variants.

### 265 DOCUMENTATION OF *IFT172* AS THE NINETEENTH GENE CAUSATIVE OF ORAL-FACIAL-DIGITAL SYNDROME UNDERSCORES THE IMPORTANCE OF CILIARY TRAFFICKING IN ITS PATHOGENESIS

M Yamada\*, K Kosaki. *Keio University School of Medicine, Tokyo, Japan*

10.1136/jim-2019-WMRC.265

**Case report** Oral-facial-digital syndrome [OFD] is a part of ciliopathy-related disorder and is characterized by multiple frenula, hamartoma of the tongue, and digital defects. Mutations in 18 genes cause OFD. Currently, ciliopathy-related disorders including Joubert syndrome, Bardet-Biedl syndrome, isolated retinal degeneration, and short-rib thoracic dysplasia are ascribed to biallelic variants in *IFT172*, which plays critical roles in intraflagellar transport. Here we report a male 3-year-old male with a unique combination of ciliopathy-associated features including post-axial polydactyly, laterality defects of the heart tube, and multiple oral frenula that were highly suggestive of OFD. An exome analysis of the patient and his parents showed compound heterozygous variants of the *IFT172* gene: Chr2(GRCh37):g.27712477C>T, c.39+5G>A and Chr2(GRCh37):g.27695163A>C, c.1478T>G (NM\_01566.2) p.(Leu493Arg). RNA-seq of the peripheral blood indicated that only the c.1478T>G variant was observed at the transcriptome level. Since the patient was heterozygous for the c.1478T>G allele, the apparent monoallelic expression indicated that the transcript derived from the c.39+5G>A allele was subject to nonsense-mediated mRNA decay. The other variant, p.(Leu493Arg) was located within the 8th WD-40 repeats domain which is highly conserved. The amino acid residues surrounding variants VDWLELN is conserved down to *Chlamydomonas* with the CADD score of 29.2. We suggest that the *IFT172* gene represents a 19th ciliopathy-related gene that causes the OFD phenotype. Ciliopathy-related genes have been classified into several categories: genes required for i) ciliogenesis, ii) ciliary compartmentalization, and iii) ciliary trafficking. Most of the genes causative of OFD have been classified as genes responsible for ciliogenesis or ciliary compartmentalization. The recognition of *IFT172*, which plays a critical role in ciliary trafficking as the causative gene of OFD, underscores the importance of ciliary trafficking in the pathogenesis of OFD.

### 266 *RAF1* DUPLICATIONS

<sup>1</sup>M Palma\*, <sup>2</sup>J Lores, <sup>1</sup>D Stevenson, <sup>1</sup>J Bernstein, <sup>1</sup>L Calderwood, <sup>2</sup>H Pachajoa, <sup>3</sup>C Prada. <sup>1</sup>Stanford University, Palo Alto, CA; <sup>2</sup>Universidad ICESI – Fundación Valle del Lili, Cali, Colombia; <sup>3</sup>Cincinnati Children's Hospital Medical Center, Cincinnati, OH

10.1136/jim-2019-WMRC.266

**Purpose of study** Disruption of genes involved in the RAS/MAPK pathway is associated with well described conditions, including Noonan syndrome. However, phenotypes associated with a duplication of *RAF1* are incompletely described and a unifying phenotype has not emerged. We describe two cases with duplications of *RAF1*. The underpinning mechanisms of this phenotype will be further explored in functional studies involving a zebrafish model.

**Methods used** Review of medical records and literature; over-expression of *raf1* in a zebrafish model.

**Summary of results** The first individual is a 4yo female who presented in infancy with hypertonia, developmental delay, small PFO, pseudostrabismus, hypertelorism, mild ptosis, mild pectus excavatum, and plagiocephaly. Over time, gross motor delay improved but speech delay persisted. Chromosomal microarray showed a 921 kb duplication resulting in a trisomy of 3p25.2, which included *RAF1* in addition to *SYN2*, *TIMP4*, *PPARG*, *TSEN2*, *MKRN2OS*, *MKRN2*, *TMEM40*, *CAND2*, *RPL32*, *SNORA7A* and *IQSEC1*. The second individual is a 13mo male with neonatal feeding issues and respiratory difficulties requiring mechanical ventilation. CT-angiogram with 3D reconstruction identified an aberrant subclavian artery. He underwent surgery and g-tube placement. Clinical features included short stature (<3rd centile), short neck, low hairline, right facial palsy, and minor facial anomalies. Chromosomal microarray identified a small duplication (180kb) including only the *RAF1* and *TMEM40* genes. Overexpression of wild type *raf1* in a zebrafish model is underway and results will be presented.

**Conclusions** We present two patients with microduplications that include *RAF1*, but neither exhibited a typical Noonan syndrome phenotype. The findings of these two patients suggest that increased gene dosage of *RAF1* results in phenotypes that do not completely exhibit all of the classic Noonan syndrome features. To date, no functional studies have been performed to determine the impact of a duplication of *RAF1* and whether there is a reproducible constellation of clinical findings. Results of the effects of *raf1* overexpression in zebrafish from pending studies will help provide additional information.

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#### CHARACTERIZATION OF FRACTURES AND THEIR ETIOLOGY IN PRE AND EARLY AMBULATORY CHILDREN

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10.1136/jim-2019-WMRC.267

**Purpose of study** As children become ambulatory, the incomplete development of motor and balance skills may predispose them to injury. These injuries are less likely to present in pre-ambulatory children and may indicate a genetic condition, metabolic disorder, or non-accidental trauma. The purpose of this study was to identify fracture etiology and determine the incidence of metabolic and genetic disorders that predispose to fractures in these patients.

**Methods used** A retrospective chart review was completed of patients presenting to Rady Children's Hospital San Diego and its affiliated providers between July 2011 and December 2012. Encounters for fractures in EPIC for all children ages 18 months and younger were analyzed by a team of reviewers and revised with specialty faculty if required. Etiologies were classified as Accidental, Inflicted, Genetic/Metabolic Disorder, Other Predisposing Factor, and Undetermined. Exclusion criteria included dental fractures, imaging without evidence of fracture, or imaging not associated with an encounter. Statistical analysis was completed using Stata 16 (College Station, TX). Fisher's Exact Test was used for comparisons of demographic and clinical factors among etiologic groups. Cases of Undetermined etiology were excluded from group-wise comparisons.

**Summary of results** 606 encounters were analyzed with a mean presenting age of 10.6 months (range: 3 days to 18

months). Etiologies of fractures by research team review were as follows: 516 cases (85.1%) of Accidental injury; 30 (5.0%) of Inflicted injury; 5 (0.8%) due to a Predisposing Factor; 4 (0.7%) due to a Genetic Disorder known to predispose to fracturing; and 51 (8.4%) of Undetermined cause. The Genetic Disorders included hypophosphatasia, osteopetrosis, osteogenesis imperfecta, and hereditary sensory and autonomic neuropathy. Interestingly, in 86 cases (14.2%), there was discrepancy between the initial clinical impression and the research team review of fracture etiology.

**Conclusions** Though the number was small, there were children with genetic disorders who presented with fractures in early age. The discrepancy between initial and review team etiologies requires further analysis into factors that may have affected these conclusions.

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#### TANGO2 DEFICIENCY: A CASE SERIES HIGHLIGHTING INTRAFAMILIAL VARIABILITY AND REVIEW OF THE LITERATURE

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10.1136/jim-2019-WMRC.268

**Purpose of study** Bi-allelic pathogenic variants in *TANGO2* (transport and Golgi organization 2 homolog) have been recently identified as causing a rare metabolic disorder characterized by susceptibility to recurrent rhabdomyolysis, hypoglycemia, lactic acidosis, hyperammonemia, hypoglycemia, seizures, and life-threatening cardiac tachyarrhythmias. To date, 49 cases have been reported in the literature (Kramer 2016, Lalani 2016, Dines 2018, Nadja 2019, Jennions 2019). *TANGO2* deficiency is proposed to affect mitochondrial fatty acid oxidation, OXPHOS, and ER-Golgi function, including the processing of secreted and plasma membrane proteins (Nadja 2019).

**Methods used** We report 4 individuals from 2 families with bi-allelic pathogenic variants in the *TANGO2* gene identified by whole exome sequencing.

**Summary of results** In our first family, a homozygous deletion affecting exons 3–9 (coding exons 2–8) was identified in 3 siblings with clinical presentations ranging from mild intellectual disability to recurrent metabolic decompensation with arrhythmias and transient paraplegia. In our second family, compound heterozygous variants (c.460G>A [p.G154R]; exon 3–9 deletion) were identified in a child with global developmental delay who initially presented at 15 months of age with metabolic decompensation characterized by encephalopathy, ketotic hypoglycemia, and lactic acidosis during a febrile illness.

**Conclusions** In this study we review the current literature on *TANGO2*-related disease and further define the phenotype of this life-threatening disorder. Our case series highlights a striking array of clinical variability ranging from mild intellectual disability to life threatening metabolic decompensation, arrhythmias, and variable neurologic symptoms. Furthermore, our family provides additional evidence for intrafamilial variability and offers a case example of a milder phenotype that may be underreported within this syndrome.

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### CLINICAL GENOMICS AND RAPID TARGETED MOUSE MODELING: A NOVEL PROGRAM TO ELUCIDATE VARIANTS AND GENES OF UNCERTAIN SIGNIFICANCE AND ADVANCE TRANSLATIONAL RESEARCH

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10.1136/jim-2019-WMRC.269

**Purpose of study** Whole Genome Sequencing (WGS) has revolutionized gene discovery for many inherited disorders, yet majority remains elusive. We report of a novel program using whole genome sequencing and rapid targeted mouse modeling to perform *in vivo* functional analysis and accelerate precision medicine.

**Methods used** Comprehensive clinical workup including WGS in 70 individuals with Diagnostic Odysseys. Development of a novel interdisciplinary approach to *in vivo* modeling and functional analysis of: 1) variants of unknown significance and 2) pathogenic variants in known disease-causing genes, to advance translational research, understand disease mechanisms and develop therapeutic interventions.

11 variants (4 pathogenic and 7 VUS) were selected for rapid and precise modeling in mice using CRISPR/Cas9 genome editing and targeted phenotyping.

**Summary of results** 45 of 70 WGS test results were reported: 15 positive, 23 VUS and 7 negative. Of the 11 variants chosen for mouse models, 10 have been successfully recapitulated in mice, 4 are being phenotyped, and 1 (*CHAMP1*) completed. The *CHAMP1* variant mouse model exhibits a number of structural and behavioral abnormalities similar to the patient's presentation, including dysmorphic craniofacial features, delayed growth, increased startle response, anxiety, and social/object novelty.

**Conclusions** WGS provided a definitive genetic diagnosis in 28–33% of patients, >50% of patients were reported as VUS, warranting expedited mouse modeling. Findings from *in vivo* functional analysis as for *CHAMP1* will achieve a definitive diagnosis, contribute to clinical decision-making, and potentially accelerate implementation of an effective management plan. The UC Davis Precision Genomic Program and Mouse Biology Program have together successfully established a process for clinicians and researchers to nominate variants for expedited production of mice, recapitulating genetic variants and, catalyzed targeted phenotyping to accelerate disease diagnosis. These small animal avatars enable rapid determination of variant pathogenicity and inform clinical case management serving to advance precision medicine.

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### A NEW MALE CASE OF KAGAMI-OGATA SYNDROME CAUSED BY PATERNAL UNIPATERNAL DISOMY 14 RESULTING FROM ROBERTSONIAN TRANSLOCATION

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10.1136/jim-2019-WMRC.270

**Introduction** Kagami-Ogata syndrome (KOS) is a rare imprinting disorder characterized by skeletal abnormalities, dysmorphic facial features, growth retardation and developmental delay. More than 60% of the cases are caused by uniparental parental disomy 14 [upd(14)pat]. Of about sixty reported

cases of KOS, only 6 have upd(14)pat from a Robertsonian translocation (ROB) and all are female. We report a newly identified male case.

**Case description** This naturally conceived male infant was born at 36 weeks by a cesarean section due to congenital anomalies and polyhydramnios. Mother had a history of miscarriage. Family history was negative without consanguinity. BW and HC were >97th percentile with length <10th percentile. He had narrow forehead, frontal bossing, short palpebral fissures, depressed nasal bridge, anteverted nares, elongated philtrum, low-set posteriorly rotated ears, and micrognathia. Omphalocele, short neck, bell-shaped chest, elongated fifth finger with flexion contractures, deep sacral dimple, bilateral undescended testes, right hydrocele, PDA, left-sided mild hydronephrosis, 11 pairs of ribs and bell-shaped thoracic cavity with coat hunger looking ribs were identified. Chromosome analysis revealed male karyotype with a balanced ROB:45,XY,der(13;14)(q10;q10). Parental karyotyping indicated that this ROB was inherited from his father. Concern for KOS caused by upd(14)pat was raised. The subsequent microsatellite analysis demonstrated that the patient inherited two homologous chromosome 14 from his father, confirming a paternal uniparental heterodisomy of 14q. SNP array revealed two ROH and no CVN. The results are consistent with the diagnosis of KOS caused by upd(14)pat.

**Discussion/Conclusion** The potential mechanisms leading to UPD are multiple. Our case is considered to be trisomy rescue as the consequence of ROB. In the clinical setting, for neonates with characteristic features and ROB, further parental study and molecular analysis for UPD should be considered.

## Neonatology general III

### Concurrent session

8:00 AM

Friday, January 24, 2020

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### NEONATAL HEMOLYSIS RISK ASSESSMENT IN THE ERA OF UNIVERSAL BILIRUBIN SCREENING

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10.1136/jim-2019-WMRC.271

**Purpose of study** Umbilical cord Direct Coombs' testing (DCT) is commonly used to screen for risk of hemolytic disease of the newborn (HDN) and development of hyperbilirubinemia, particularly when there is concern for ABO or Rh incompatibility between mother and neonate, or if mother is known to be antibody positive. Since 2001, our institutional policy has been to complete DCT in these scenarios and, if positive, screen the neonates' total bilirubin (TB), complete blood count, and reticulocyte count at 12 hours of life (HOL). In 2004, our institution also started universal serum TB testing in all neonates at 18–24 HOL. The aim of this study was to analyze the utility of early testing in at risk neonates in the era of universal TB screening.

**Methods used** We queried the electronic health record (Epic Systems, Madison Wisconsin) for all late-preterm and term

newborns discharged from the newborn nursery at University of California, San Diego Health between May 14, 2011 and May 15, 2018. Data was analyzed for presence and result of DCT, TB levels and if phototherapy was started during admission.

**Summary of results** We identified 14,764 newborns, of whom 1,051 (7.1%) received phototherapy. A total of 6,622 (44.9%) subjects had DCT and 781 had a positive result (25.0%). Of subjects with DCT, 592 (8.9%) received phototherapy (OR: 1.64, 95% CI: 1.45–1.86). Of subjects with positive DCT, 195 (25.0%) received phototherapy (OR: 4.53, 95% CI: 3.73–5.49; positive predictive value: 24.97%, 95% CI: 22.47–27.65%). In subjects who eventually required phototherapy during admission, the average TB level at 24 HOL was 7.4 mg/dL (SD 1.5) compared to 5.2 (SD 1.2) in subjects who did not receive phototherapy.

**Conclusions** In patients who qualified for DCT, there was a small, increased need for phototherapy overall, and as expected, a positive DCT resulted in an even greater likelihood for phototherapy treatment. However, the average TB level for both phototherapy and non-phototherapy groups at 24 hours of life did not meet treatment thresholds based on the American Academy of Pediatrics guidelines. Therefore, 24 HOL screening was acceptable to help risk stratify patients, and escalated screening of TB at 12 HOL may not be essential in the setting of universal TB screening.

## 272 EARLY HYPERBILIRUBINEMIA IN NEONATES WITH DOWN SYNDROME

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10.1136/jim-2019-WMRC.272

**Purpose of study** To compare total serum bilirubin levels, phototherapy usage, and hospital readmission for jaundice treatment, among neonates with Down syndrome vs. controls.

**Methods used** We collected first total serum bilirubin (TSB) values, phototherapy administration, and readmission for jaundice on neonates  $\geq 35$  weeks gestation born at Intermountain Healthcare hospitals from 2004 through 2018. We created reference intervals for TSB during the first 48 hours after birth, from control neonates who *did not* have Down syndrome, a positive DAT, an eventual diagnosis of G6PD deficiency, or hereditary spherocytosis. We then determined the proportion of neonates with Down syndrome whose TSB exceeded the 95th percentile control interval, the percentage receiving phototherapy in each group, and the rate of readmission to the hospital for jaundice treatment in each group.

**Summary of results** We compared 357 neonates with Down syndrome with 377,368 controls. Those with Down syndrome had 4.7 times the risk (95% CI: 3.9–5.7;  $p < 0.0001$ ) of an initial TSB exceeding the 95th percentile control interval, 8.9 times (95% CI: 8.1–9.8;  $p < 0.0001$ ) the phototherapy usage, and 3.6 times (95% CI: 1.6–8.2;  $p = 0.0009$ ) the readmission rate for jaundice treatment.

**Conclusions** Neonates with Down syndrome have increased risk of early hyperbilirubinemia and need for phototherapy when compared to controls. Clinicians caring for neonates with Down syndrome are advised by the AAP to obtain an early screening CBC. We submit that simultaneously obtaining a TSB is also advisable.

## 273 IMPACT OF A PARENT VIDEO VIEWING PROGRAM IN THE NEONATAL INTENSIVE CARE UNIT

<sup>1</sup>J Weber\*, <sup>1</sup>H Sauers-Ford, <sup>2</sup>K Sohn, <sup>3</sup>A Hanhauser, <sup>1</sup>JP Marcin, <sup>1</sup>D Tancredi, <sup>1</sup>K Hoffman. <sup>1</sup>UC Davis Health, Sacramento, CA; <sup>2</sup>University of Nevada, Reno School of Medicine, Reno, NV; <sup>3</sup>University of California, Davis, Davis, CA

10.1136/jim-2019-WMRC.273

**Purpose of study** Parents of neonates in the NICU report high levels of stress and anxiety and feelings of lack of control and involvement. To address this, many NICUs have begun using bedside video cameras to facilitate virtual visits by family members. This study aimed to examine parents' self-reported perceptions regarding various aspects of the NICU experience.

**Methods used** Using a prospective study design, families were enrolled following informed consent and were asked to complete two identical surveys, the first survey at enrollment (S1) and the second survey at discharge from the NICU (S2). The survey consisted of 14 questions each with a scale of 1 (strongly disagree) to 7 (strongly agree). In addition to parent surveys, demographic data were collected on subjects, including breastmilk at discharge and use of video visits. The Welch-Satterthwaite T-test was used to compare for each survey item the mean changes from survey 1 to survey 2 between those who used the video camera and those who did not. This test was chosen because of unequal variance between groups.

**Summary of results** One hundred respondents who completed the set of both initial and follow up surveys were included for analysis. 30% of parents utilized video visits. Of the 14 questions, 2 differed between parents using video (N=30) and parents not using video (70). The median responses to these two questions are summarized in the table. Babies were also more likely to receive breastmilk at discharge in the group of parents using video visits,  $\chi^2 (2, N=87) = 4.2$ ,  $p < 0.05$ .

**Conclusions** Participation by parents in video viewing of their infant in the NICU was associated with sustained intention to breastfeed over the time of the NICU stay, higher likelihood of breastmilk at discharge, and perhaps improved self-perception of involvement in care. These findings justify further study of video viewing in this high-risk population.

**Abstract 273 Table 1** Survey responses for variables of interest

Question	Video S1	Video S2	No video S1	No video S2	P value
I plan to breastfeed	7 (7–7)	7 (7–7)	7 (6–7)	6 (3–7)	0.01
I feel involved in my baby	6 (5–7)	7 (7–7)	6 (6–7)	7 (6–7)	0.08

Median (IQR).  
Video N=30 and No video N=70.

## 274 TEACHING IN THE NICU: CAN WE DO BETTER?

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10.1136/jim-2019-WMRC.274

**Purpose of study** A needs assessment revealed pediatrics interns received variable teaching on core neonatology topics. We proposed a flipped classroom (FC) approach to promote active learning through engagement in case-based discussions. FC may improve knowledge acquisition and increase pediatric trainee competency with management of critically ill neonates.

**Methods used** The intervention involves pediatric interns rotating through one Level III NICU. Interns complete pre-surveys of self-reported competency and knowledge in FC and non-FC topics prior to the rotation as they serve as their own matched control. Competency is scored on a scale of one to five, with five being the most competent. During their two-week rotation, interns review six brief, online digital presentations addressing core NICU topics. All six topics are discussed in the form of case-based learning in the NICU. Interns are assessed on other critical NICU topics not included in the FC curriculum to compare the impact of FC knowledge acquisition and competency with traditional teaching. Instruction of these additional subjects is at the discretion of the attending neonatologist. At the end of the rotation, interns complete the same surveys of competency and knowledge to assess change. A general evaluation to assess satisfaction with the FC curriculum is completed.

**Summary of results** Scores are reported as means  $\pm$  standard deviation. 13/14 interns agreed the FC approach improved decision-making, but 11/14 reported no preference for the FC curriculum over didactics. Matched-pairs T-Test showed average change in self-reported competency was greater for FC ( $10.8 \pm 2.93$ ) than non-FC topics ( $5.4 \pm 4.21$ ) ( $p < 0.01$ ). Knowledge scores showed an increase from start ( $58.91 \pm 16.56$ ) to end ( $86.27 \pm 6.82$ ) of the rotation for all topics ( $p < 0.01$ ). At the end of the rotation, the number of FC questions missed was lower than non-FC topics missed ( $p < 0.01$ ). Non-FC topics were inconsistently taught in the NICU. Overall, residents reported positive satisfaction levels with FC.

**Conclusions** Our study demonstrates potential efficacy of a FC approach to promote knowledge and competency among physicians-in-training. Pediatric interns reported positive satisfaction levels. Use of FC throughout other training programs may enhance graduate medical education.

## 275 HIDDEN COSTS OF TIME: A COST COMPARISON OF CREATING VERSUS UPDATING EDUCATIONAL MATERIALS IN NEONATOLOGY FELLOWSHIP

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10.1136/jim-2019-WMRC.275

**Purpose of study** The flipped classroom (FC), compared to traditional didactics (TD), is an increasingly popular educational

method. The Organization of Neonatal-Perinatal Medicine Training Program Directors (ONTPD) National Neonatology Curriculum (NNC) consists of peer-reviewed educational materials for FC learning of neonatal physiology and is free to fellows and educators. Potential cost savings of shared national resources for education materials is largely unstudied. We aim to: (1) define the costs of creating versus updating existing TD materials (data presented below) and (2) perform a cost comparison of TD and FC methodologies (data collection in process).

**Methods used** As part of a randomized controlled trial comparing the effectiveness of TD versus FC methods, an IRB-approved survey was sent to faculty querying the time required to create versus update pre-existing TD materials and costs were calculated accordingly. A follow-up survey querying the time required to develop FC materials will be evaluated similarly and compared with TD data.

**Summary of results** Ninety-six percent (298/309) of educators responded. The time spent creating new TD materials was significantly different from updating pre-existing materials (6 hrs vs 1 hr,  $P > 0.0001$ ). There was a four-fold difference in the cost to develop versus update TD materials (\$692.28 vs. \$115.38), with a higher cost per learner in smaller fellowships. Similar calculations will be conducted for developing FC material.

**Conclusions** There is a greater cost associated with creating TD materials compared to updating existing materials, and the observed difference is highest in smaller-sized fellowships. A detailed analysis of how time is spent on developing FC materials for the NNC can provide insight as to how nationally shared peer-reviewed educational materials can potentially decrease the overall cost of education amongst fellowship programs.

## 276 REDUCING LENGTH OF STAY IN NEONATAL ABSTINENCE SYNDROME THROUGH QUALITY IMPROVEMENT

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10.1136/jim-2019-WMRC.276

**Purpose of study** Neonatal abstinence syndrome (NAS) is characterized by abrupt drug withdrawal at birth in infants exposed to chronic in-utero opioids, and its frequency over the past decade has tripled due to rising opioid use and misuse. The use of standardized protocols for treatment of NAS can optimize outcomes, reduce opioid exposure, and reduce length of stay (LOS). Our current setting is a hospital system with seven Level II-IV NICUs caring for patients with NAS. There is significant variability and lack of standardization in treatment for our NAS population with an elevated length of stay. Our specific aim is to reduce LOS in infants with NAS from 22 days to 18 days by June 2020.

**Methods used** A multidisciplinary taskforce was established and monthly meetings with nursing, physicians, pharmacy, and ancillary staff were held. Baseline data on LOS for infants with NAS requiring pharmacologic treatment were collected from all sites. LOS for infants requiring pharmacologic treatment are tracked as a primary outcome measure.

PDSA cycles:

1. Implementation of a standardized pharmacologic guideline with transition from morphine to methadone, and phenobarbital to clonidine. Creation of an electronic order set.
2. Establishing NAS care champions at each site to facilitate nursing re-education through training videos and learning modules.
3. Creation of a non-pharmacologic care bundle and testing of individual components at different sites.
4. Prenatal consultation for at-risk mothers.

**Summary of results** Baseline length of stay for 108 infants in the pre-intervention period (January 2015 – February 2019) was 22 days. Length of stay for 7 infants in the post-intervention period (March 2019 - present) is 18 days. Post-intervention data collection is ongoing. PDSA cycles have been implemented for a pharmacologic treatment protocol, staff education on NAS, and a non-pharmacologic care bundle.

**Conclusions** We have successfully established a multidisciplinary team focused on improving care for infants with NAS, implemented a standard treatment protocol, established NAS care champions for our units, and created learning modules for re-education. We have applied QI methodology to improve care and reduce LOS in infants with NAS by 15% from baseline.

## Neonatology – perinatal biology I

### Concurrent session

8:00 AM

Friday, January 24, 2020

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#### ROLE OF ALPHA-1 RECEPTORS IN THE CEREBRAL BLOOD FLOW RESPONSE TO ACUTE HYPOXEMIA IN FETAL SHEEP

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10.1136/jim-2019-WMRC.277

**Purpose of study** Acute hypoxemia is a common fetal stressor during gestation and labor. In response, the fetus increases cerebral blood flow (CBF) and decreases flow to the periphery. During systemic hypoxemia, peripheral vasoconstriction is mediated by catecholamines acting on alpha-1 receptors (a1R). a1R are also present in cerebral arteries where they mediate vasoconstriction. We hypothesized that a1R in the fetal brain counteract increases in CBF during acute hypoxemia.

**Methods used** Near term fetal sheep (0.9 gestation) were chronically instrumented with central arterial and venous catheters and a composite laser doppler flow/tissue PO<sub>2</sub> (tPO<sub>2</sub>) probe in the parietal cortex. After 4 days of recovery, by lowering the ewe's FiO<sub>2</sub>, fetuses underwent 40-min of isocapnic hypoxia (PaO<sub>2</sub> 10 to 12 mmHg) while receiving an intravenous infusion of prazosin (a1R antagonist) dissolved in methanol or methanol alone (vehicle controls). Mean arterial pressure

(MAP), heart rate (HR), CBF, cerebral vascular resistance (CVR) and tPO<sub>2</sub> were continuously recorded and arterial blood gas samples collected.

**Summary of results** 13 experiments were conducted in 10 lambs (5 prazosin and 8 vehicle controls). Baseline tPO<sub>2</sub> was similar between the control and prazosin groups (7.5±1.4 and 8.5±2.6 mmHg) and fell during hypoxemia to a nadir of 1.7±0.8 and 2.1±1.0 mmHg, respectively (mean ± SEM). Prazosin infusion resulted in a downward trend in MAP (from 50±1 to 40±1 mmHg) and CBF (by 13±4%) with no effect on CVR. In response to hypoxemia, CBF increased as much as 34±8% above baseline in the controls and 17±7% above the pre-prazosin baseline in the prazosin group. During hypoxemia, MAP increased and HR decreased in both groups, although the decrease in HR was attenuated by prazosin. Following hypoxemia, CBF decreased due to an increase in CVR in both groups. 2-way ANOVA determined that prazosin treatment resulted in significantly altered CBF, MAP, CVR, and HR, but post-hoc analyses did not identify timepoints when differences existed.

**Conclusions** Blocking a1R during acute hypoxemia did not result in increased CBF or decreased CVR, suggesting that a1R do not counteract increased CBF during hypoxemia. CVR is elevated following hypoxemia and this is not mediated by a1R.

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#### IUGR, DEVELOPMENT, AND DHA SUPPLEMENTATION ALTER RAT HEPATIC PEMT EXPRESSION

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10.1136/jim-2019-WMRC.278

**Purpose of study** Intrauterine growth restriction (IUGR) reduces neonatal circulating docosahexaenoic acid (DHA), an ω-3 fatty acid essential for organogenesis and favorable neonatal outcomes. Mechanisms by which IUGR decreases circulating DHA are not completely understood. However, one potential mechanism involves hepatic metabolism of DHA and other long-chain fatty acids by the phosphatidylethanolamine methyltransferase (PEMT) phospholipid methylation pathway. Impaired PEMT activity reduces circulating DHA by increasing hepatic DHA accumulation in the form of phosphatidylethanolamine (PE) containing lipid droplets. We previously demonstrated that IUGR increases hepatic lipid droplet accumulation in weaning male, but not female, rat pups. However, the temporal changes in hepatic PEMT expression and the effects of IUGR and DHA supplementation on hepatic PEMT are unknown.

We hypothesized that hepatic PEMT expression varies with neonatal hepatic development and that at weaning, IUGR causes sex-divergent changes in hepatic PEMT expression.

**Methods used** We measured mRNA in control rat liver at birth and day 4, 7, 10, 12, 14, and 21 after birth, using real-time RT PCR. IUGR was induced by bilateral uterine artery ligation. Control and IUGR rats received a regular diet or a 0.1% DHA diet throughout pregnancy and lactation. At post-natal day 21 (D21), hepatic PEMT mRNA and protein were measured using real-time RT PCR and western blot.

**Summary of results** Both male and female IUGR rat pups weighed less than sex-matched control pups at birth and at D21. Hepatic PEMT mRNA levels were detectable from birth



to D21, with expression peaking at D12 for both sexes. IUGR did not alter hepatic PEMT mRNA levels in either sex. However, IUGR increased hepatic PEMT protein levels in both female and male rats. DHA supplementation normalized female hepatic PEMT protein levels, but not male hepatic PEMT protein levels.

**Conclusions** We conclude that IUGR increases PEMT protein levels in female and male rats. However, DHA supplementation normalizes PEMT levels only in female rats. As PEMT expression rises early in development, PEMT-driven DHA export from the liver may be occurring earlier than D21. Ongoing studies are evaluating the effect of IUGR on PEMT and hepatic PE-lipid droplets at earlier developmental time points.

### 279 PREDICTION OF BRONCHOPULMONARY DYSPLASIA ON POSTNATAL DAY ONE BY GRADIENT BOOSTING, AN ENSEMBLE MACHINE LEARNING ALGORITHM

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10.1136/jim-2019-WMRC.279

**Purpose of study** Bronchopulmonary dysplasia (BPD) continues to be a significant contributor to morbidity and mortality in premature infants. Despite improvements in neonatal care, the ability to reliably predict BPD development remains limited, especially early in clinical course.

Machine learning can be used to build predictive models that outperform traditional predictive approaches. Here we use Gradient Boosting (GB), a powerful ensemble machine learning algorithm, to predict BPD development on postnatal day one of life.

**Methods used** This is a single center [Harbor-UCLA Medical Center Neonatal Intensive Care Unit (NICU)] study. 60 variables available within the first 24 hours of life in the California Perinatal Quality Care Collaborative database were extracted on all admissions to Harbor-UCLA NICU from 2005–2018. Variables missing data for more than 25% subjects were excluded. Infants with a major congenital anomaly (n=325) were also excluded. A total of 1832 infants were included for analysis.

A GB model was developed using the pandas, scikit-learn and XGBoost libraries in the Python programming language. Hyperparameter optimization to increase model performance was done using Exhaustive Grid Searching. Stratified K Fold (K=20) cross-validation was performed to train and test the model. Model performance was evaluated from the resultant confusion matrix.

**Summary of results** For the trained and cross-validated model, accuracy was 91.1%. Sensitivity was 70.3%, and specificity was 93.4%. Area Under Receiver Operating Curve (AUROC) was 0.944. The accuracy and AUROC of our model exceeded that of a logistic regression by around 4.5% and 0.082, respectively. According to the model, variables that contributed most towards the final prediction (maximal *information gain*) were surfactant administration, post-delivery room high frequency ventilation, and postnatal steroids.

**Conclusions** Our GB model yielded a high specificity for prediction of BPD in a heterogeneous population of infants. These data can be utilized for risk stratification and prognostication even on postnatal day one of life.

### 280 PLACENTAL PROTEINS: A NEW APPROACH TO PREMATURITY

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10.1136/jim-2019-WMRC.280

**Purpose of study** Extreme prematurity continues to be a leading cause of infant morbidity and mortality and increases the risk of significant long-term sequelae such as cerebral palsy, respiratory, and neurodevelopmental disease. Emerging evidence from animal experiments indicate that factors secreted by the placenta are critical for normal fetal organ development. One fundamental difference between fetal and postnatal life is the instantaneous discontinuation of the umbilical circulation, depriving the premature infant of placental factors potentially critical for fetal organ development. We recently reported that 341 proteins are secreted by the term human placenta into the fetal circulation, however, it is currently unknown if they are secreted by the placenta earlier in gestation. Our objective was to identify proteins secreted by the premature placenta by determining the proteome of umbilical venous blood and neonatal blood to uncover proteins that rapidly decrease after birth given these are likely to be of placental origin and may be important for organ development in the premature baby.

**Methods used** Venous cord blood was collected at delivery and neonatal blood at 48–72 hours of life from preterm infants (range 24.2 to 31.6 weeks; N=10) after informed consent. Plasma was collected and stored at -80°C until quantification of proteins was performed using the SomaLogic platform which uses modified aptamer-protein complexes which quantify protein abundance by fluorescence. Paired t-test was used to determine significant differences between cord blood and neonatal blood from the same infant.

**Summary of results** The plasma concentrations of 70 proteins were higher and 92 were lower in the neonate as compared to umbilical circulation (p<0.05). Bioinformatics approaches (Reactome) demonstrated that the proteins that decreased significantly are involved in the immune system, angiogenesis, and developmental processes including axon guidance.

**Conclusions** Our findings suggest that the late second trimester human placenta secretes proteins that are predicted to be involved in vital developmental processes such as neurogenesis and angiogenesis which are not produced by the neonate. We speculate that the loss of placenta-derived factors that participate in development of fetal organs contributes to poor outcomes in premature infants.

### 281 HEPATIC POSTNATAL INDUCTION OF SELENIUM AND ZINC ASSOCIATED ANTIOXIDANT ENZYMES

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10.1136/jim-2019-WMRC.281

**Purpose of study** Oxidative stress is central to the etiology of many diseases of prematurity. Lower antioxidant defenses render premature infants vulnerable to oxidative damage secondary to infection and oxygen therapy. Antioxidant enzymes (AOE) increase perinatally in the blood and lungs. Many AOE

require a micronutrient such as selenium (Se) or zinc (Zn) to function at maximum efficacy. These trace elements are low in neonates compared to adults.

The liver is an important immune surveillance organ where antioxidant defense is critical for host response. It also plays a major role in micronutrient processing. However, the developmental regulation and expression of AOE in the liver is incompletely described. We hypothesized the neonatal liver would have decreased Se and Zn associated AOE.

**Methods used** C57BL/6 mice were sacrificed at P0, P7, P21 and 8–12 weeks. mRNA and protein expression for key AOE (SOD1, SOD2, SOD3, Gpx1, Gpx4, Msrb1, TrxR1) and factors for Se processing (Seps2/Sps2, Scly) were measured by qPCR and Western blot. Activity level pending.

**Summary of results** Hepatic selenoenzymes Gpx1 and Msrb1 were developmentally regulated, with mRNA low at P0 and increased by adult ( $p < 0.05$ ,  $n = 5-6$ ). Gpx1 protein increased 9-fold and Msrb1 protein increased 6-fold from P0 to adult ( $p < 0.0001$ ,  $n = 2-4$ ). Gene expression of Zn related SOD1 and SOD2 increased postnatally, low at P0 and increased in adult ( $p < 0.01$ ,  $n = 5-6$ ). Protein expression for each increased 3-fold from P0 to adult ( $p < 0.001$ ,  $n = 4$ ). The mRNA and protein expression for Gpx4, TrxR1, TrxR2 and SOD3 remained constant postnatally.

As the greatest induction was observed in selenoenzymes, factors for Se processing were evaluated. Seps2 and Scly mRNA increased from P0 compared to P21 and adult ( $p < 0.05$ ,  $n = 4-6$ ). Protein expression for Sps2 and Scly increased postnatally ( $p < 0.01$ ,  $n = 4$ ).

**Conclusions** The liver experiences a postnatal induction in essential Se and Zn associated AOE. Additionally, the hepatic machinery for Se processing is low in neonatal mice. We speculate that the neonatal liver is vulnerable to oxidative stress secondary to low AOE defense. We also speculate states that decrease neonatal micronutrient status may further impair the hepatic redox state.

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#### DYSRUPTION OF CALCIUM HOMEOSTASIS AMPLIFIES TLR9 MEDIATED IL-1 EXPRESSION: IMPLICATION FOR STERILE INFLAMMATION

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10.1136/jim-2019-WMRC.282

**Purpose of study** Sterile inflammation and IL1 expression is central to the pathogenesis of ischemia reperfusion injury. Mitochondrial stress is thought to be involved in initiating sterile inflammation. With injury, CPG rich mitochondrial DNA leaves the mitochondria and acts as a TLR9 ligand initiating pro-inflammatory signaling. Studies have used synthetic CpG oligodeoxynucleotides to study this process; however, mitochondrial stress also disrupts calcium homeostasis. How this affects CPG-mediated TLR9 activation is unknown. Understanding the relationship between calcium and CPG-mediated TLR9 activation could identify therapeutic targets to reduce tissue injury linked to sterile inflammation.

**Methods used** RAW 264.7 macrophages were exposed to CpG DNA (3  $\mu$ M 0–4 hours) to interrogate innate immune

signaling. To assess intracellular calcium effects on CpG mediated innate immune signaling, RAW 264.7 were exposed to CpG DNA (3  $\mu$ M 0–4 hours) and a) calcium ionophore A23187 (10  $\mu$ M) b) calcium chelator EGTA/AM (250  $\mu$ M) or c) calcineurin inhibitor FK-506 (10  $\mu$ M). TLR9 mediated NF $\kappa$ B activation was assessed by cytosolic degradation of NF $\kappa$ B inhibitory proteins and NF $\kappa$ B subunit nuclear translocation by Western blot. IL1 $\alpha$  and IL1 $\beta$  expression was assessed by qPCR.

**Summary of results** Exposing RAW 264.7 to CPG led to cytosolic degradation of I $\kappa$ B NF $\kappa$ B inhibitory proteins, NF $\kappa$ B subunit nuclear translocation, and increased IL1 $\alpha$  and IL1 $\beta$  expression. Exposure to calcium ionophore significantly increased CPG-induced IL1 $\alpha$  and IL1 $\beta$  expression which was associated with enhanced degradation of NF $\kappa$ B inhibitory proteins. In contrast, both EGTA/AM and FK-506 with CpG DNA led to decreased expression of CPG-induced IL1 $\alpha$  and IL1 $\beta$  and was associated with attenuated CPG-mediated degradation of I $\kappa$ B NF $\kappa$ B inhibitory proteins.

**Conclusions** A combination of CpG DNA release and increased intracellular calcium accelerates TLR9 signaling which synergistically increases IL1 $\alpha$  and IL1 $\beta$  expression causing an increased inflammatory response. Based on these results, the targeting of disrupted calcium homeostasis in addition to CpG DNA poses an interesting opportunity for synergistic therapies to reduce tissue injury linked to sterile inflammation.

## Surgery III

### Concurrent session

8:00 AM

Friday, January 24, 2020

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#### RISK FACTOR ASSESSMENT ANALYSIS FOR PATIENTS UNDERGOING BREAST CANCER RECONSTRUCTION TO ENHANCE RECOVERY

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10.1136/jim-2019-WMRC.283

**Purpose of study** Rates of mastectomy followed by breast reconstruction as a treatment plan for breast cancer have risen significantly in the past few years. However, patients undergoing immediate reconstruction at the time of mastectomy tend to have a much higher rate of complications. Variables such as history of hypertension, depression, anxiety, diabetes mellitus, obesity, asthma and anemia have multiple systemic consequences and could potentially contribute to a higher risk of complications in this population. This study aims to better identify possible risk factors that may predispose a patient to complications post breast reconstruction.

**Methods used** This is a retrospective study that collected data from July 2014 to June 2019 of patients who underwent breast reconstruction in a single institution. Comorbidities were gathered and statistical analysis was performed to analyze commonalities shared between patients predisposing them to higher rates of complications.

Abstract 283 Table 1

Comorbidity	patients who had the comorbidity and returned with complications (n=99)	patients who had the comorbidity and underwent breast reconstruction (n=1817)	odds ratio
Hypertension	46	854	0.979
Obesity (BMI>30)	48	941	0.876
Anemia	20	127	3.369
Asthma	19	113	3.581
Diabetes	15	491	0.482

**Summary of results** The results of this study are summarized in the table 1 below. Those with complications had a much higher incidence of anemia and asthma compared to the general population of patients undergoing reconstruction. In those with complications hypertension and obesity occurred at a similar incidence, while diabetes occurred at a lower incidence to the overall population undergoing this procedure.

**Conclusions** Patients undergoing breast cancer reconstruction who also had asthma and anemia had relative risks of 3.36 and 3.58 to suffer complications. In patients with complications, hypertension and obesity were observed in the same proportion as those without complications. However, diabetes mellitus was observed less often than expected in patients with surgical morbidities. This data provides additional guidance in the development of enhanced recovery after surgery protocols for the population of breast cancer reconstruction patients.

#### 284 ETIOLOGY OF CHRONIC EXERTIONAL COMPARTMENT SYNDROME AND A NON-SURGICAL TREATMENT

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10.1136/jim-2019-WMRC.284

**Purpose of study** Chronic exertional compartment syndrome (CECS) occurs when increased intramuscular pressure produces severe, sometimes debilitating pain and neurologic complications. Due to incomplete understanding of the pathophysiology, both diagnostic criteria and treatments options for CECS are lacking in reliability and efficacy.

The purpose of this study is two-fold. First, to investigate the theory that CECS results from functional venous outflow obstruction due to muscular compression. Second, to investigate the treatment of CECS through an image guided botulinum toxin injection targeted at the site of functional muscular compression.

**Methods used** Retrospective case study of 284 patients (age 15–77, mean: 27) with exertional lower leg pain. Patients were assessed for CECS and areas of functional venous outflow obstruction using lower extremity MRI at rest and after exertion and CT Angiography at rest and with plantar flexions against resistance using the MVP Flex device.

Using both ultrasound and CT imaging guidance, a targeted injection of botulinum toxin was administered into the muscles at the site of venous compression. Patients were followed up at fixed time points over several years to track their treatment response.

**Summary of results** 260 of the 284 patients demonstrated both CECS and functional venous outflow obstruction on pre-treatment stress imaging. Active plantar flexion caused venous obstruction, in the absence of active CECS symptoms.

Following botulinum toxin treatment, venous compression diminished with most patients demonstrating symptom resolution and normal imaging studies. Return of symptoms occurred at an average of  $6.9 \pm 2.4$  months (range 2–24 months). Repeat treatments were performed in 167 patients.

**Conclusions** 91.5% of patients displayed both CECS and functional venous obstruction. The results of this study suggest CECS results from functional venous outflow obstruction due to muscular compression.

Targeted botulinum toxin injections at the site of venous outflow obstruction resulted in significant symptom improvement, with a short recovery period. This treatment provides a viable non-surgical alternative to treat CECS by improving venous outflow.

#### 285 METAPHYSEAL CLAMSHELL OSTEOTOMY FOR LONG BONE DEFORMITY

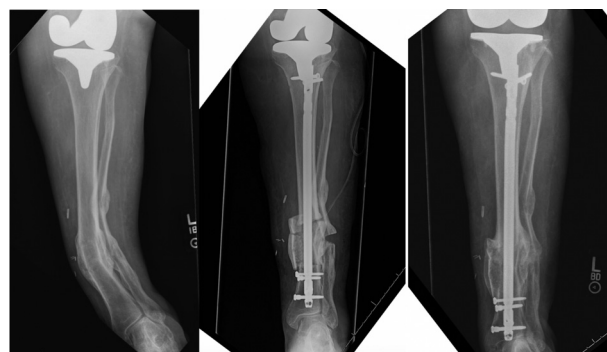
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10.1136/jim-2019-WMRC.285

**Purpose of study** Metaphyseal malunions and nonunions pose a challenge especially in the setting of complex deformity. Common options have significant limitations, especially in poor quality bone and when deformity centers are near the joint. The clamshell osteotomy has been described as treatment for complex diaphyseal malunions and provides efficient acute multiplanar correction and allows for early weight bearing. The purpose of this study is to report union and complication rates of metaphyseal and meta-diaphyseal clamshell osteotomies.

**Methods used** After obtaining IRB approval, patients were identified using CPT codes from 01/01/2010 to 09/30/2018. Inclusion criteria were age >18 and a metaphyseal or meta-diaphyseal clamshell osteotomy of the tibia or femur, indicated by malunion or nonunion. Exclusion criteria were <6 mos of follow up. Chart and radiograph review was used to determine time to union and complications.

**Summary of results** 15 patients met inclusion criteria. 12 of 15 patients achieved union by 16 mos (union rate of 80%). 10 of 15 (66.7%) patients healed after the primary procedure, at



Abstract 285 Figure 1

an average of 8.75 mos. 4 of 15 (26.7%) patients required a secondary procedure (exchange intramedullary nailing). 2 of these 4 patients went on to union, while the other 2 did not have union at final follow up. 1 of 15 (6.7%) patients was lost to follow up at 8 mos without union. 2 patients had a post-op PE, 1 had a draining wound that required a sinus tract excision, and 1 developed a non-displaced fracture from the RIA.

**Conclusions** The clamshell osteotomy is one potential tool for treating complex multiplanar deformities in the meta-diaphyseal and metaphyseal portion of lower extremity long bones. A high union rate can be seen using modern nail designs and atraumatic technique; however, union times can be long and some patients will require secondary procedures.

### 286 DETERMINANTS OF CAREGIVER SATISFACTION IN PEDIATRIC ORTHOPEDICS

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10.1136/jim-2019-WMRC.286

**Purpose of study** With healthcare transitioning from volume-based to value-based, patient satisfaction is becoming increasingly tied to physician reimbursement as well as publicly reported. Aside from its use as a quality metric, it is also a key component of patient-centered care. This study investigates determinants of pediatric orthopedic patients' parent or guardian (caregiver) satisfaction with the provider as measured by the Clinician and Group Consumer Assessment of Healthcare Providers and Systems (CG-CAHPS).

**Methods used** This was a prospective cross-sectional study of 200 English-speaking caregivers of pediatric patients that checked into the Phoenix Children's Hospital orthopedic clinic from March 1, 2017 to November 1, 2018. All patients saw the same attending physician. Questionnaires given in clinic included the Newest Vital Sign (NVS) and the Literacy in Musculoskeletal Problems (LiMP) survey to measure general and musculoskeletal health literacy, respectively, demographic information, wait time, Consultation and Relational Empathy Measure (CARE) to measure perceived physician empathy, and CG-CAHPS.

**Summary of results** Of the factors measured, perceived physician empathy correlated the strongest with the caregiver's overall physician satisfaction. Pearson correlation coefficient yielded an  $r$  of 0.740 and a  $p$ -value of  $<0.0001$ . Using multivariable modeling, physician empathy alone accounted for 53% of the variation in satisfaction scores. Other factors such as health literacy as measured by the NVS ( $r=0.004$ ;  $p=0.964$ ), LiMP ( $r=0.013$ ;  $p=0.879$ ), wait time ( $r= -0.003$ ;  $p=0.974$ ), and time spent with the physician ( $r=0.016$ ;  $p=0.866$ ) did not independently affect satisfaction.

**Conclusions** The main determinant of caregiver satisfaction with the provider in a pediatric orthopedic setting is perceived physician empathy, accounting for over half of the variation in satisfaction. Health literacy, wait time, and time spent with the physician do not significantly affect satisfaction. This highlights the importance of quality over quantity patient-physician interactions. This is the first study, to our knowledge, that directly correlates pediatric caregivers' perceived physician empathy with provider satisfaction.

### 287 DOES ULTRASOUND-GUIDED OSTEOTOMY IMPROVE THE AESTHETIC OUTCOME OF PATIENTS UNDERGOING RHINOPLASTY SURGERY?

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10.1136/jim-2019-WMRC.287

**Purpose of study** General ultrasound imaging is a widely available, easy-to-use, and cheaper alternative to other advanced imaging methods. Furthermore, it is noninvasive, painless, and safe as it does not have harmful radiation. However, ultrasound is not frequently used intraoperatively because of its inability to penetrate bone and large amounts of tissue to produce a clear image. In thin areas such as the nose where these restrictions can be eliminated though, this method could be highly beneficial intraoperatively by guiding nasal osteotomies during rhinoplasty to improve patients' aesthetic outcome with enhanced visualization of symmetry.

**Methods used** This is a case series using ultrasound to assist osteotomies for patients undergoing nasal surgery. A SonoSite ultrasound is specifically used with the L25 13–6 probe and under the musculoskeletal exam. The nose is seen superficially at a depth of 2.0 cm and examined longitudinally for optimal view. Gain may be adjusted for a more advantageous assessment. Ultrasound gel is placed on the patient's nose as well as on the probe underneath the sterile wrap to provide a clear image. After confirming the bony landmarks, the plastic surgeon performs the closed osteotomy with visualization, and the ultrasound is continuously utilized to check correction and symmetry.

**Summary of results** Ultrasound-assisted osteotomy was used for 5 patients undergoing nasal surgery. No complications arose during the surgery. Cartilage was clearly demarcated. Seven plastic surgeons and plastic surgery residents were surveyed regarding the potential for this technology to enhance their rhinoplasty outcomes. Comments were collected from the users and observers to guide further implementation.

**Conclusions** Intraoperative ultrasound imaging for patients undergoing nasal surgery has so far been successful in ensuring symmetry compared to the naked eye alone. Furthermore, it has enabled surgeons to visually confirm precision and accuracy beyond the skin surface and has accordingly provided a stronger outlook on the aesthetic result for the patients. Thus, with sufficient learning and skill, intraoperative ultrasound can be a highly advantageous tool in aesthetic and reconstructive plastic surgery.

### 288 SELF-REPORTED HEALTH MEASURES IN BURN SURVIVORS UNDERGOING BURN SURGERY FOLLOWING ACUTE HOSPITALIZATION

<sup>1</sup>DE Luna\*, <sup>2</sup>C Shekter, <sup>1</sup>G Carrougher, <sup>1</sup>B Stewart, <sup>3</sup>J Schneider, <sup>3</sup>C Ryan, <sup>4</sup>R Holavanahalli, <sup>1</sup>D Amtmann, <sup>1</sup>N Gibran. <sup>1</sup>University of Washington, Seattle, WA; <sup>2</sup>Stanford, Stanford, CA; <sup>3</sup>Harvard, Boston, MA; <sup>4</sup>UT Southwestern, Dallas, TX

10.1136/jim-2019-WMRC.288

**Purpose of study** Perception of mental and physical function in adult burn survivors is decreased following injury. Individuals who undergo post hospitalization reconstructive surgery may have lower Health Related Quality of Life (HRQoL) that is influenced by the severity of their burns. We sought to characterize self-reported health perceptions in burn survivors

undergoing surgery post-hospitalization within 24 months of injury.

**Methods used** Patient Reported Outcomes Measurement Information System (PROMIS)-29 Profile v2.0 data were collected from participants from a multi-center longitudinal study at 6, 12, and 24 months post-injury. Surgical operations performed within the 24-month follow-up period were classified as: wound closure, contracture release or scar revision. PROMIS-29 domain scores were compared for those undergoing surgery (surgical participants) versus those who did not (non-surgical participants) using linear regression, adjusting for age, burn size, range of motion limitation, number of operations during acute treatment, and insurance/payer.

**Summary of results** 727 participants provided complete PROMIS-29 data, of which 227 (31.2%) underwent >1 operative procedure within 24 months post-injury (Table). PROMIS-29 anxiety and depression scores were worse at 6 months post-injury for participants who underwent contracture release and scar revision compared to non-surgical peers ( $p<0.05$ ). At 12 months after injury, individuals who underwent wound closure at any time post initial hospitalization reported worse anxiety, depression, and pain interference ( $p<0.05$ ). Participants in the contracture release and scar revision categories reported lower PROMIS-29 scores in all domains 24 months after injury ( $p<0.05$ ), even after adjusting for confounders.

**Conclusions** Burn-related reconstructive surgery has the potential to improve the lives of patients including promoting functional recovery and improving cosmetic appearance. Our data suggest that participants who undergo reconstruction surgery after hospital discharge, report worse self-reported indicators of health compared to participants who do not undergo surgery after adjusting for known confounders.

### 289 C-REACTIVE PROTEIN LEVEL AT TIME OF DISCHARGE IS NOT PREDICTIVE OF RISK OF REOPERATION OR READMISSION IN CHILDREN WITH SEPTIC ARTHRITIS

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10.1136/jim-2019-WMRC.289

**Purpose of study** C-reactive protein (CRP) level is used at our tertiary pediatric hospital in the diagnosis, management, and discharge evaluation of patients with septic arthritis. The purpose of this study was to evaluate the efficacy of a discharge criterion of CRP <2.0 mg/dL for patients with septic arthritis in preventing reoperation and readmission. We also aimed to identify other risk factors of treatment failure.

**Methods used** Patients diagnosed with septic arthritis between January 1, 2007 and December 31, 2017 were identified with ICD 9/10 and related CPT codes. Systematic chart reviews were performed to obtain demographic data, infection characteristics, and treatment details. Bivariate tests of associations between potential risk factors and readmission and reoperation were performed. Quantitative variables were analyzed using Mann-Whitney tests and categorical variables were analyzed using Chi-square tests.

**Summary of results** One hundred and eighty-three children with septic arthritis were included in the study. Seven (3.8%) were readmitted after hospital discharge for further management, including six who required reoperation. Mean CRP at discharge for single-admission patients was 1.71 mg/dL ( $\pm 1.07$ ) and 1.96 mg/dL ( $\pm 1.19$ ) for the readmission group ( $p=0.664$ ). Forty-eight children (25.9%) had CRP values greater than the recommended 2.0 mg/dL at discharge. Only three of these patients (6.2%) were later readmitted. The only common variable of the readmitted children was an antibiotic-resistant or atypical causative bacteria.

**Conclusions** CRP levels are useful in monitoring treatment efficacy of septic arthritis in children but are not reliable as a discharge criterion to prevent readmission or reoperation. We recommend determining discharge readiness on the basis of clinical improvement and down-trending CRP values. There was a higher risk of readmission in children with an antibiotic-resistant or atypical causative bacteria. Close monitoring of these patients and those with negative cultures at time of discharge is suggested to identify signs of persistent infection.

### 290 ELEMENTS OF 0% LEAK RATE IN SLEEVE GASTRECTOMY

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10.1136/jim-2019-WMRC.290

**Purpose of study** Laparoscopic sleeve gastrectomy is a widely utilized and effective surgical procedure for weight loss and diabetes reversal in obese patients. Reducing complications is critical to enabling greater acceptance of metabolic surgery. Leak at the sleeve staple line remains the most serious complication of this procedure, occurring in <1–3% of cases. Techniques to minimize the risk of sleeve gastrectomy leaks have been published, although no universally agreed upon set of techniques exists. This report describes a single-surgeon experience with a specific 10-point approach to sleeve leak prevention resulting in a progressive decrease in leak rate over 8 years.

**Methods used** 2,139 consecutive sleeve gastrectomy cases between 2016–2019 were reviewed retrospectively. The 10 technical steps include:

- Use of 40–French calibration tube.
- Allowing generous volume around calibration tube at curve of incisura.
- Avoiding disruption of cardiobulbosity branch arteries serving as the blood supply to posterior proximal stomach in cardia region.
- Angling linear stapler to left and >15 mm away from true GE junction.
- Use of blue or 3.5 mm tissue stapler cartridges in proximal stomach without staple line reinforcement.
- Fibrin glue sealant application to staple line.
- Hand-sewn, interrupted sutures to invert staple line at proximal 4 cm of sleeve.
- Apposition of omentum to rest in proximity to completed staple line.
- Suturing omentum back to mid and lower staple line to prevent a potentially obstructing ‘windsock’ deformity.

- Avoidance of 1-stage revisional sleeves concomitant with band removal.
- Patient characteristics, sleeve leaks, staple line hemorrhage, and percent body weight loss at 6 months were reported for each year.

**Summary of results** Implementing the described techniques of the sleeve gastrectomy, rate of sleeve leaks fell from 4% (2012) to 0% (2015) and have remained at 0% (2016–2019) without a significant change in weight loss, as depicted by 6 month change in body weight and percent excess BMI lost.

**Conclusions** In this single-surgeon experience, sleeve gastrectomy leak rate has fallen to 0% since the implementation of 10 specific technical modifications in the procedure. It is plausible that these specific 10 points, or a similar specific technique for each step, could be taught to surgical trainees to reduce the incidence of leaks at earlier stages of the experience learning curve.

## Behavior and development I

### Concurrent session

10:15 AM

Friday, January 24, 2020

#### 291 SPEECH AND LANGUAGE DEVELOPMENT, AUTISM SPECTRUM DISORDERS AND SEIZURES: WOULD WHOLE GENOME SEQUENCING PROVIDE A CONNECTING LINK?

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10.1136/jim-2019-WMRC.291

**Purpose of study** Many studies have shown a correlation between autism spectrum disorders (ASD), neurodevelopmental disorders and epilepsy/seizure disorders. We evaluated whole genome sequencing (WGS) results in a subset of patients with limited speech/nonverbal, with or without ASD, neurodevelopmental disorders and seizures to find common genetic variants/network.

**Methods used** Clinical whole genome sequencing was performed and relevant genetic variants were analyzed to identify recurring pathways or genes.

**Summary of results** We found 15 individuals in our cohort with this combination of phenotypic characteristics. Four had pathogenic or likely pathogenic variants in *SLC16A2*, *PHF6*, *ERCC8* (relevant to phenotype), and *MME* (incidental finding), 10 patients had one or more variants of unknown significance (VUS) and 1 had a negative test result reported. VUSs included autosomal dominant inheritance in genes consistent with the phenotypes in our cohort. Additionally, some patients had multiple VUSs in causative genes suggesting oligogenic gene effects.

**Conclusions** WGS provides an opportunity to evaluate regions of the genome that are not picked up by traditional genetic testing. Overall, we identified many changes that have been reported as VUS. Some of these variants are likely contributing to these patients' phenotypic findings. However, given the novelty of WGS, a direct correlation requires additional patients with WGS testing and phenotypic correlation to determine significance.

#### 292 CONTROLLED TRIAL OF LOVASTATIN AND LANGUAGE INTERVENTION IN CHILDREN WITH FRAGILE X SYNDROME

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10.1136/jim-2019-WMRC.292

**Purpose of study** To carry out a controlled trial of lovastatin (10 to 40 mg per day), a targeted treatment for Fragile X Syndrome (FXS), in children with FXS ages 10 to 18 combined with an open label of Parent Implemented Language Intervention (PILI) to both groups delivered by Skype into the families' homes.

**Methods used** The randomized-double blind controlled trial lasted 4 months and our primary outcome measure was the number of different words (NDW) used during a parent-child narrative task. Our secondary outcome measures included total utterances, the ADAMS, the Abberant Behavior Checklist, VAS and the CGI-I.

**Summary of results** There was no significant difference in age or sex between groups (n=14 on lovastatin vs n=16 on placebo). IQ (44.00 vs 43.13), ADOS-2 comparison score and parent education were not significantly different between groups. Baseline and outcome verbalizations were 38.61 (±35.24) and 118.75 (±66.86) on lovastatin and 50.02 (±32.91) and 108.94 (±56.22) on placebo so both groups had significant improvements (P<0.0001), but there was no significant difference between groups (p=0.54). Significant improvements occurred in the secondary outcome measures including the CGI-I and the VAS for spoken language and social impairment for both groups but no significant difference between the groups, but both cholesterol and low-density lipoprotein dropped significantly lower on lovastatin vs. placebo (134.67 to 104.75 vs 132.27 to 134.13; p<0.001; and 73.75 to 47.33 vs. 70.47 to 73.87; p<0.0002, respectively). Interestingly, although improvements in parental use of the PILI-targeted strategies utilization was observed in both the groups, parental use of PILI-targeted strategies was correlated with the child's improvement in NDW, in the placebo group and not in the lovastatin group.

**Conclusions** Children treated with placebo or lovastatin made significant language gains when also give PILI intervention over a 4 month period. Lovastatin did not add significantly to the language gains compared to placebo but lovastatin may have compensated for the variation in the parent's use of PILI-targeted strategies to enhance the child's improvement in NDW.

#### 293 DEVELOPMENTAL DELAY AND PSYCHIATRIC ISSUES IN AN UNDER-STIMULATED DEAF CHILD

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10.1136/jim-2019-WMRC.293

**Introduction** In the United States, about 10,000 infants are born with sensorineural hearing loss, 95% of which have hearing parents. These children experience barriers to communication with their families. The lack of proper communication and stimulation in the first years of life can be detrimental to mental development. This leads to a lack of abstract thinking and problem-solving skills, ability to form

peer relationships, and healthy self-esteem. 9% of deaf children have learning disabilities and 5% have severe developmental delays. Emotional and behavioral problems are twice as prevalent.

**Case description** A 15-year-old female born deaf and mute was brought in to the Behavioral Medicine Center (BMC) after recovering from an overdose on ibuprofen, famotidine, and ranitidine. The parents did not understand the patient's actions and could not communicate effectively with her. They knew very little sign language and spoke mainly Spanish. The patient attends a school for deaf children and can communicate in American Sign Language (ASL) while at school. However, her interaction with family is severely limited due to both a Spanish/English communication barrier and the lack of knowledge of sign language.

Her social skills were minimal both with staff and other patients on the unit. She consistently presented as indifferent and guarded. She responded to most questions with a shrug or nod whether or not the question warranted it.

The patient showed symptoms of depression including suicidality, hypersomnia, anhedonia, low energy, decreased appetite, poor mood, and psychomotor retardation. Social workers were able to connect the family and patient to helpful mental health resources in the community. The patient was placed on Fluoxetine (40 mg) for long-term management of depression.

**Discussion** The importance of awareness campaigns for developmental health of deaf children cannot be ignored. In this case of the 15-year-old female, we see what the unfortunate effects are of lack of proper care for deaf children. Educating parents about these long-term effects may motivate them to be more proactive in caring for their deaf children. Furthermore, the support community for deaf people should be connected with the mental health community. These individuals have unique needs and life experiences that deserve careful attention in all healthcare settings.

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#### CROSSFIT KAMP: AN INTERVENTION TO IMPROVE PEER RELATIONSHIPS AND EXERCISE CAPACITY IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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10.1136/jim-2019-WMRC.294

**Purpose of study** Peer relationships and social skills (SS) are core challenges for those with autism spectrum disorders (ASD). Exercise is a modality that has been examined as a means to improve some core symptoms of ASD. CrossFit Kids provides a scalable structured group exercise program that could potentially improve the core challenges for children with ASD; however, it has not been previously studied.

**Methods used** CrossFit KAMP (Kids with Autism Making Pals) is a pilot waitlist randomized control trial. 19 children (17 boys/2 girls) ages 8–11 years with ASD participated in a 14-week twice weekly CrossFit Kids exercise program. Parent and child social & behavioral functioning rating scales were administered at baseline, after each 14-week session, and 8 weeks post-intervention. The same workout was video recorded at week 1 & 14 of intervention to assess exercise capacity. Treatment effects evaluated by Wilcoxon signed rank test and rank sum test.

**Summary of results** Group 1 (n=10) attendance rate was 85% and group 2 (n=5) was 81%. Group 1 had significant improvements in peer relationship on the Promis Parent Proxy Peer Relationship Measure (PPPRM) ( $p=0.004$ ) and SS on the SRS Communication subscale t-score ( $p=0.03$ ). Compared to the group 2 waitlist, group 1 had better parent and child rated Peer Relationship Measures ( $p=0.04$  and  $p=0.05$  respectively) at the end of the first 14 weeks. The 8 week follow up from group 1 showed significance of SRS total t-score ( $p=0.04$ ) and SRS Restricted and Repetitive Behaviors (RRB) t-score ( $p=0.02$ ). Qualitatively, 11/15 participants wanted to do another exercise group like KAMP and 12/15 made a friend. Parent report shows 12/15 children verbally conveyed that they enjoyed participating in KAMP, and 11/15 made a friend. Overall both groups increased exercise capacity by an average of 23 seconds.

**Conclusions** Results of this pilot study demonstrate that CrossFit KAMP is feasible, can help improve peer relationships/SS, possibly reduce RRB, and improve exercise capacity. Qualitatively, both parents and children reported enjoyment in participating, wanting to continue exercising in a group like KAMP, along with making a friend. CF KAMP may be a promising intervention to help improve peer relationships, SS, and stereotypical behaviors for children with ASD while also providing improved health through exercise.

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#### A GENDER BIAS CURRICULUM: EMPOWERING OUR LEARNERS IN THE #METOO ERA

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10.1136/jim-2019-WMRC.295

**Purpose of study** The incidence of gender bias (GB) and sexual harassment (SH) is prevalent among medical students and residents. Challenges such as unfair treatment due to gender, discomfort while listening to sexual humor, and unwanted sexual advances are common, especially to female learners. These negative encounters are experienced as early as the preclinical years for many medical students and can lead to avoidance, withdrawal, ethical/moral distress, and burnout. Though some interventions involving educational workshops that focused on issues of GB/SH in medicine have shown to decrease GB/SH in various settings (including clinical and academic), there has yet to be data on effects of such methods in the earlier years of training.

**Methods used** In this study, we conducted a 120-minute workshop with third year medical students that focused on promoting awareness of GB and SH including a gender privilege walk and a discussion of the root causes of gender bias and sexual harassment. Students were also introduced to the bystander approach and the reality that gender bias, harassment and violence are everyone's problem to solve. Students then broke into small groups to discuss cases from actual learner experiences. Our workshop concluded by providing the medical students with strategies to empower all genders to respond to inequities that they observe. A survey was issued to the students immediately following the workshop, as well as at the end of the year to assess long-term impact.

**Summary of results** Third year medical students who participated in our curriculum showed a significant and sustainable improvement, compared to before the workshop, in their

knowledge of gender bias and sexual harassment ( $p=0.001$ ) as well as their ability to confront these issues in the learning environment when they personally experience GB/SH themselves ( $p=0.001$ ) or when they witness GB/SH ( $p<0.0001$ ). Students also reported feelings of validation, awareness and empowerment as well as appreciation for the process of information sharing, faculty facilitation, and practical techniques gained from the workshop.

**Conclusions** Our study suggests that students exposed to a 120-minute workshop are better equipped to recognize and respond to GB/SH. This workshop is the first step in empowering our learners.

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### SIMULATION TRAINING WITH STANDARDIZED PATIENT VERSUS HIGH-FIDELITY MANIKIN INCREASES ACTIVE LEARNING FOR MEDICAL STUDENTS

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10.1136/jim-2019-WMRC.296

**Purpose of study** Clinical case simulations using standardized patients (SP) or high-fidelity manikins (HFM) are implemented into medical school curriculums in order to cultivate clinical competence in aspiring physicians. It is unclear whether SP or HFM are superior in creating a realistic simulation. The purpose of our study is to evaluate active participation when interacting with SP vs HFM.

**Methods used** We conducted a non-blinded randomized control trial with year-3 medical students on the internal medicine clerkship at Loma Linda University. The study period was from February 2017 to February 2018. During pulmonary simulation training, randomized students interacted with SP versus HFM voiced by an SP. A post-training survey using a 5-point Likert scale assessed perceived participation. The SP reported interpersonal communication skills (ICS) demonstrated by participants during simulation using a modified SEGUE scoring system. Statistical analysis was performed using Stat12.1 statistical software. Differences were analyzed via the Mann-Whitney U test.

**Summary of results** Of the 130 students (75 in SP arm, 65 in HFM arm), the SP arm showed significantly greater participation when compared to the HFM arm with 98% agreeing/strongly agreeing to have 'actively participated' vs. 88% ( $p<0.05$ ). Additionally, students in the SP arm reported greater levels of confidence in their ability to transfer the knowledge gained into a real clinical situation with 97% vs. 89% agreeing/strongly agreeing ( $p<0.05$ ). They also reported greater confidence in performing physical exams practiced during the simulation on an actual patient, with 88% vs. 80% agreeing/strongly agreeing ( $p<0.05$ ). Post-simulation surveys completed by the SPs with results of the modified SEGUE showed higher ICS in the SP arm. ( $p<0.05$ ).

**Conclusions** Our study demonstrates that during simulation training, year-3 internal medicine clerkship students felt they were more active participants, had greater levels of confidence in their ability to transfer knowledge gained into a real clinical situation, and demonstrated improved ICS when interacting with SP versus HFM. We believe this study suggests that directly interacting with SP creates a more realistic simulation experience than interacting with HFM, which leads to an improved learning environment.

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### THE ASSOCIATION BETWEEN SOCIAL MEDIA USE AND THE DEVELOPMENT OF DISORDERED EATING: A CLOSER LOOK AT THE LITERATURE

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10.1136/jim-2019-WMRC.297

**Purpose of study** The prevalence of social media is widespread and its effect on the etiology of eating disorders is unclear. The objective of this study is to investigate the effects of social media use on eating pathology.

**Methods used** A literature review utilizing PubMed and Google Scholar with the keywords Social Media Use, Instagram, Facebook, Eating Disorders, and Disordered Eating was

**Abstract 297 Table 1** Association of social media use and disordered eating

First Author & Year	# of Subjects & Age (yrs)	Frequency and duration of social media use in subjects	Method of evaluation/measurement	Eating pathology outcome
Smith 2013	N=232; Mean age=18.72	Not Reported	The effects of maladaptive FB use on body dissatisfaction and bulimic symptoms	Maladaptive FB usage predicted increases in bulimic symptoms ( $p<0.05$ )
Mabe 2014	N=84; Mean age=18.39	Mean time reported/FB session=20.06 min mean total time/day on FB=76.28 min	The relationship between FB use and disordered eating	Participants with the greatest disordered eating had higher FB scores $p<0.001$
Sidani 2016	N=1765; Age 19–32	Median time/day=61 minutes median visits/week=30	The relationship between volume and frequency of social media use and eating concerns	Participants with greatest volume and frequency of use had greater odds of having eating concerns Volume: AOR=2.18 $p<0.001$
Turner 2017	N=680; Mean age=24.70	Range between 0–450 minutes/week	The correlation between time spent on each social media channel and Orthorexia Nervosa symptoms	More time spent on Instagram is associated with greater Orthorexia Nervosa symptoms Instagram: -0.10**, FB: 0.04, Twitter:0.12*, Pinterest: -0.06, and Tumblr: 0.10
Saunders 2018	N=637; Mean age=21.3	Range between 0 min-3 hours/day	The relationship between social networking site rating, body image, and disordered eating	FB, Instagram and Snapchat users demonstrated a positive relationship between comparisons, body dissatisfaction, and disordered eating, $p<0.05$

FB = Facebook, p



conducted. Only studies published after 2012 were included and studies that did not focus on eating pathology were excluded.

**Summary of results** Of the 15 articles, only 5 satisfied our inclusion criteria. Each of the articles summarized in the table 1 below incorporated a self-report survey design. Of the 5 articles, each one found a significant association between social media use and disordered eating. Three of the articles found that body dissatisfaction plays a role in the relationship between social media usage and disordered eating outcomes. Limitations of some of the studies included the self-report nature and lack of control for confounding variables leading to disordered eating.

**Conclusions** This review suggests a correlation between social media use and disordered eating outcomes but a causal relationship cannot be determined. Prospective controlled studies that account for confounding variables are warranted in order to make causal inferences regarding social media usage and its effects on the development of eating disorders.

## Community health

### Concurrent session

10:15 AM

Friday, January 24, 2020

#### 298 ADVERSE CHILDHOOD EXPERIENCES AND POVERTY: COLLABORATIVE PARTNERSHIPS TO IMPROVE SELF-EFFICACY AND RESILIENCE IN IMPOVERISHED MINORITY YOUTH

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10.1136/jim-2019-WMRC.298

**Purpose of study** Children growing up in poverty can face a variety of adverse childhood experiences (ACES) which can negatively impact their ability to succeed in life. According to the American Psychological Association, resilience ‘is the process of adapting well in the face of adversity, trauma, tragedy, threats, or significant sources of stress’. Although impoverished adolescents want to become healthy and successful adults, they may need assistance to develop their own self-efficacy and resilience. High-risk impoverished minority adolescents thus partnered with UCSF Fresno Pediatrics and the Fresno Community Health Improvement Partnership (FCHIP) to increase self-efficacy and resilience in their fellow youth.

**Methods used** Students explored the effect of poverty on ACES and anonymously surveyed 155 fellow high school students about their ACES exposures. They collaborated with FCHIP’s Trauma and Resilience Network to educate themselves on how to build self-efficacy and resilience within their own community, and used the information they had gathered to educate their fellow students.

**Summary of results** 42% of high school students surveyed had been the victim of violence, 54% had experienced violence within their own families, 35% reported food insecurity, 57% had divorced or separated parents, 49% had a household member with substance abuse issues, 46% had a household

member who had been in prison, and 15% had experienced homelessness or foster care. Students collaborated with FCHIP and UCSF Fresno to create an annual Health Careers Job Shadow Day to educate students on how to develop their own community action research partnerships, were the closing speakers for the 2nd annual FCHIP breakfast, and developed an interactive lunchtime session at their school to educate their fellow students on how to build resilience and decrease stress.

**Conclusions** Although impoverished minority youth have significant exposure to ACES, they can successfully develop community partnerships to help them identify and address issues of concern within their own communities, while helping them build resilience to mitigate the effects of these ACES on their own lives.

#### 299 HOMELESS TO HOUSED: HOW DOES STABLE HOUSING AFFECT HEALTHCARE UTILIZATION AND PERCEPTIONS IN RESIDENTS OF THE FORGET-ME-NOT MANOR, A HOUSING FIRST PROGRAM IN JUNEAU ALASKA

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10.1136/jim-2019-WMRC.299

**Purpose of study** Housing first (HF) is a solution to chronic homelessness demonstrated to reduce public service utilization in urban populations but less is known about rural areas. In October of 2017 Juneau Alaska, a town of 32,000 opened the Forget-Me-Not Manor to house Juneau’s most vulnerable. In five months after opening, 22 of the 32 residents experienced impressive reductions in ER visits (73% reduction), recovery center sleep off visits (99% reduction), and contacts with police officers (77% reduction) compared with 6 months prior (Heidi Brocius, UAF). However, little is known about why residents use less services and the reasons residents seek healthcare. This study examines resident’s relationship to healthcare services before and after joining HF through qualitative interviews and healthcare records analysis.

**Methods used** Two qualitative 30-minute interviews were conducted 3 months apart exploring resident’s definition of health, barriers to improving health, and role housing first plays in their health. Additionally, resident’s healthcare records were collected from three of the most frequently visited healthcare organizations during the period of December 1st, 2015 – December 1st, 2018. The modality of each interaction (clinic, hospital, etc.), diagnosis codes, and summary category (acute illness, maintenance of chronic disease, etc.) associated with each healthcare is recorded.

**Summary of results** Total participants are 17. Interviews were recorded with 17 and 15 residents respectively. Participant responses to standardized interview questions are summarized and compared in pre-defined categories. 636 Medical records are collected from 17 of 17 participants and three healthcare organizations. The data is analyzed for usage patterns by location, diagnosis codes, and summary category relative to the date residents joined housing first.

**Conclusions** The combination of quantitative and qualitative data is used to discuss the relationship between healthcare services and the study participants before and after joining HF. Resident’s most common diagnoses are compared with the general population and HF programs in urban populations. Differences between HF in rural and urban regions are

discussed. Limitations of this study and avenues for future research are proposed.

**300 A NOVEL PROGRAM AT THE SCIENCE MUSEUM TO INCREASE THE INTEREST AND KNOWLEDGE OF A DIVERSE POPULATION OF YOUTH TOWARDS HEALTHCARE**

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10.1136/jim-2019-WMRC.300

**Purpose of study** Increasing the number of underrepresented individuals in healthcare fields is critical to meeting the needs of an increasingly diverse society. The purpose of this study is to evaluate the effectiveness of an interactive health exhibit in enhancing the knowledge of youth towards healthy habits and garnering their interest towards healthcare.

**Methods used** Through a partnership between the UC Irvine School of Medicine and the Discovery Cube in Santa Ana, CA, we have established an interactive exhibit where trained volunteers teach the young visitors about the hazards of smoking using models, introduce them to basic life support, and teach them intubation using a simulator. A feedback survey is distributed to the visitors for any qualitative feedback.

**Summary of results** 526 feedback surveys were collected since 2016. When visitors were asked if their interest in healthcare had increased, 378 (72%) responded and 28% left it blank or said they 'don't know'. Of 378, 279 (74%) gave a positive response. When asked what they liked most about the exhibit, 103 (61%) of the 170 underrepresented (UR) and 181 (55%) of the 327 non-underrepresented (NUR) provided comments (Table). Of 284 respondents, 33% liked the hands-on nature, 28% liked the knowledge gained, and 27% liked the interaction with knowledgeable mentors. Interestingly, the underrepresented were more likely to comment that their knowledge had increased (UR=39% vs NUR=23%) and the non-underrepresented were more likely to enjoy the interactive nature of the exhibit (NUR=37% vs UR=25%).

**Conclusions** Our interactive exhibit was effective in garnering the interest of a diverse population of youth towards healthcare. Such interactive models can be used to enhance the knowledge and stimulate the interest of youth in school and non-school settings.

**Abstract 300 Table 1** Results of survey based on themes

Themes	NUR, N(%) N=181	UR, N(%) N=103	p-value
Interactive and Demonstrative Models	67 (37%)	26 (25%)	p=0.0487
Increased Scientific Knowledge	41 (23%)	40 (39%)	p=0.004
Engaging and Knowledgeable Mentors	53 (29%)	25 (24%)	p=0.41
Increased Health Awareness	18 (9%)	9 (9%)	p=0.83
Ideal Environment	5 (2%)	3 (3%)	p=1.0

NUR=Non-Underrepresented, UR=Underrepresented

**301 PRENATAL VACCINE AWARENESS AMONG PREGNANT WOMEN AND PARTNERS**

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10.1136/jim-2019-WMRC.301

**Purpose of study** Whooping cough and influenza viruses disproportionately affect babies under 6 months of age given that they cannot be fully immunized. Thus, vaccination is recommended for all contacts of a newborn. This study sought to estimate Tdap and flu vaccine awareness of pregnant women and their partners.

**Methods used** After oral consent was obtained, a survey of vaccine knowledge was administered on a one-to-one basis in English and Spanish at Harbor-UCLA Prenatal Clinic. A Chi square analysis of possible associations was used to calculate statistical significance with p<0.05. The study was IRB approved.

**Summary of results** Of 293 respondents, 40% and 81% were aware of the need in pregnancy for Tdap and flu vaccines, respectively. Both gender and language were associated with Tdap awareness, whereas only gender was predictive of flu awareness. Age, previous pregnancies, gestational age, and education were not associated. The table 1 displays awareness percentages of subgroups.

**Abstract 301 Table 1** Displays awareness percentages of subgroups

	Total	Gender		Language	
		Female	Male	English	Spanish
% Aware					
Tdap & Flu Vaccine	32.4%	40.4%	22.1%	36.4%	10.9%
p-Value		p<0.001		p<0.001	
Tdap Vaccine Only	40.3%	54.2%	22.1%	45.3%	13.0%
p-Value		p<0.001		p<0.001	
Flu Vaccine Only	80.9%	75.3%	88.2%	79.8%	87.0%
p-Value		p<0.05		p>0.05	

**Conclusions** Overall, vaccine awareness was low, driven mostly by ignorance of the Tdap vaccine, as more participants knew of the flu than Tdap vaccine. More women than men were aware of the Tdap vaccine, whereas men were slightly more aware of the flu vaccine. Nearly double the number of women were aware of both vaccines than men. Additionally, Spanish speakers were less aware of the Tdap vaccine than English speakers and awareness of both vaccines by Spanish speakers was less than a third of that of English speakers. To increase vaccine awareness and decrease infection, recommendations for pregnant women to encourage their partners and baby's contacts to receive both vaccines should be made. Also, vaccine education initiatives should be enhanced for Spanish-only speaking populations.

### 302 AN ASSESSMENT TO REDUCE SMOKING DURING PREGNANCY IN PARK COUNTY, WYOMING

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10.1136/jim-2019-WMRC.302

**Purpose of study** Powell, Wyoming is an agricultural community with a mean household income and education level below the national average. Through interviews with local physicians and community organizations, a lack of education and resources for mothers were found to be public health concerns. Specifically, smoking during pregnancy was identified. Data collected found that 16.1% of women in the county smoked during their pregnancy, which is above the national average.

**Methods used** An asset-based approach was used to determine available resources for mothers in Powell. The Serenity Pregnancy Resource Center and the Public Health Office were identified as organizations providing education and services for mothers. Using information gathered from community-based interviews, a literature review was conducted to identify possible ways to reduce smoking in pregnant women using the resources available within the town.

**Summary of results** Five literature review articles that proposed interventions to help with smoking cessation during pregnancy were evaluated for their potential efficacy in Powell. One of the most promising interventions proposed initiating a text-message based support group for mothers. An additional study evaluated the use of smoking cessation therapy in pregnancy. Both of these studies have realistic uses in a rural setting and are able to use resources and assets that already exist in Powell. The Serenity Pregnancy Resource Center provides education for mothers and already has a database that could be used for the text messaging program. The Public Health office provides many services to pregnant and new mothers and could potentially implement a medication cessation service.

**Conclusions** The assessment to help pregnant women quit smoking was aided through the use of a strength-based framework. Available resources within the community were identified and information about this public health concern were shared with local providers and community organizations. Next steps include establishing a Mother Child Health Coalition with the Public Health Office. The development of this coalition has been initiated and is pending input from providers in Park County who treat pregnant women and new mothers. Maternal smoking will be one area of focus and evidence-based interventions from this research will be assessed to decide which is most applicable for the Powell community.

### 303 SUPPORTING SAFE AND SUSTAINABLE EMPLOYMENT AMONG RESIDENTS IN PROTECTED HOMES FOR PEOPLE WITH SERIOUS MENTAL ILLNESS IN IQUITOS, PERU

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10.1136/jim-2019-WMRC.303

**Purpose of study** As part of a national reform towards community-based mental health services, a network of protected homes for people with serious mental illness were

introduced in Iquitos, Peru starting in 2012. While these homes are intended to serve a transitional role, challenges in obtaining employment and independent living for the residents have persisted since the protected homes were first established. Staff in one home proposed the introduction of an employment program in the form of a self-maintaining shop within one of the homes. However, there was initially no evaluation tool specifically for monitoring residents' progress in occupational capacities, and tools to promote workplace health and safety as well as best practices were also missing.

**Methods used** A survey focused on occupational development was developed, using a variety of existing tools, for ongoing evaluation of residents participating in the employment program. An informal health and safety checklist for use by staff was developed based on tools from PAHO and the Peruvian government and piloted with staff and residents in the shop location. In addition, a team-based best practices checklist for administration of occupational programs for people with serious mental illness was developed, based on existing literature.

**Summary of results** After feedback from staff and residents, the evaluation survey was streamlined into 5 short domains including Employment Functioning, Role and Identity, Self-Efficacy, Skills, and Quality of Life. The survey used a consistent numerical scoring system throughout, with optional prompts for further discussion between the evaluator and resident. The Health and Safety checklist was successfully employed with staff at the planned project site and used to inform the introduction of safety infrastructure in the home. The Best Practices checklist was reviewed and approved by staff on multiple levels.

**Conclusions** The employment program is equipped with tools to evaluate progress of individual residents, conduct ongoing internal reviews of workplace health and safety, and promote best practices through team discussion. These tools should be employed before and during official implementation of the program.

### 304 COMMUNITY-BASED STRATEGIES TO REDUCE DIABETES INCIDENCE THROUGH EDUCATIONAL GARDENING IN GRAND COULEE, WASHINGTON

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10.1136/jim-2019-WMRC.304

**Purpose of study** Grand Coulee, WA is a rural community located in a USDA food desert. It is home to Coulee Medical Center (CMC), a critical access hospital that serves 7,000 patients from surrounding counties including Lincoln, Douglas, Grant, and Okanogan and has a 21% Native American patient population. These counties have obesity rates 2-7% higher than the state average. Community conversations revealed a concern for obesity in young people. Health care providers cited diabetes management adherence concerns, which includes lifestyle modifications such as obesity. One primary factor contributing to obesity is unhealthy food choices, with selected secondary risk factors including lack of healthy food access and limited healthy food knowledge.

**Methods used** Using an asset-based approach, community resources working to address secondary risk factors were evaluated. The Care and Share food bank and the local

Senior Center Meals program identified less nutritious food choices in a free food setting. For example, the selection of white bread rather than multigrain bread. Local individuals cited high food prices in general as a concern. Food education is currently addressed at CMC and the local senior center by CMC staff. The Chamber of Commerce has established a plot of land which can be utilized for a community garden. Therefore, community gardening strategies and their efficacy in improving obesity risk was the literature review focus.

**Summary of results** A successful clinic-based community gardening program includes provider encouragement, nutritional and gardening-based educational components, and utilization of volunteers. Such programs have been shown to be a strong educational addition to communities, with increases in quantity of purchased produce, regardless of income. Community gardening itself will not alleviate food insecurity, but can serve to strengthen awareness of the local food bank and senior center, which aim to meet this need.

**Conclusions** This project highlights how a community's concerns can be addressed by utilizing its strengths. Next steps include lease of land by CMC, gardening expert-informed establishment of layout and rules, garden promotion, and securing funding for supplies via food desert-based grant funding and/or local business donations.

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### CORRELATION BETWEEN PARENTAL MEAL PLANNING HABITS AND CHILDHOOD OBESITY

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10.1136/jim-2019-WMRC.305

**Purpose of study** Childhood overweight (BMI>85%) and obesity (BMI>95%) status is a serious health epidemic crisis in the United States. In San Bernardino County, childhood obesity rates more than double the national rate of 18.5%. Because obesity can lead to serious health concerns, it is important to address and understand the complexity of environment, behavior, and parental attitudes influencing unhealthy weight in children. This study aims to determine if a correlation exists between parental meal planning habits and children's BMI.

**Methods used** At-risk San Bernardino County children ages 9-15 years participated in Operation Fit, a week-long day camp focused on healthy lifestyle, nutrition, and physical exercise. Primary care physicians from a university associated federally qualified health center referred 115 pediatric patients for their unhealthy weight (BMI>85%). At the beginning and end of

camp, parents and children completed surveys for lifestyle practices. One survey question asked parents to disagree or agree with the statement: 'I take time to plan meals for the coming week.'

**Summary of results** A logistic regression with N=115 showed a statistically significant ( $p<0.0144$ ) relationship exists between parental meal planning habits and elevated BMI in their children. Parents who disagreed with taking time to plan meals were 0.35 times as likely to have overweight children than parents who did take time to plan meals, with a confidence interval of 0.151-0.811.

**Conclusions** It appears that there is a correlation between a non-habit of parental meal planning and childhood obesity. This outcome is reasonable because parents who do not plan meals ahead of time may not shop for groceries beforehand or thoughtfully address healthy food choices containing necessary nutrients. Further exploration is needed to determine exactly what aspect of not taking time to plan meals earlier is correlated to increased children's BMI.

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### BARRIERS TO HEALTHCARE IN STUDENTS ON AN INDIVIDUALIZED EDUCATION PLAN IN RURAL OREGON

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10.1136/jim-2019-WMRC.306

**Purpose of study** According to a 2013 report, the number of Oregon children on Medicaid who received an annual wellness exam by their pediatrician was 41%. We suspect that the number of adolescents who visit their primary care provider annually may be lower in rural Oregon for students who are on an Individualized Education Plan (IEP, indicating some form of learning disability). Previously published literature specifically linking students on an IEP and annual wellness exams was not found. The purpose of our project was to determine what barriers, if any, exist to healthcare for students on an IEP in rural Oregon.

**Methods used** Parents of students ages 14-18 who qualified for an IEP per district guidelines were given an 8-question survey to complete during an annual IEP meeting. Results were analyzed with a Chi-Square test after all surveys had been completed.

**Summary of results** 46 out of 140 parents filled out the survey (33%). 82% of respondents indicated that they had seen a provider in the past year. There was no significant difference in male vs. female students ( $p=0.6131$ ) or in age groups ( $p=0.9761$ ). 40% responded that they had sought mental health resources for their child. Of those that had sought mental health resources, 77.7% were able to see a mental health provider. There was no significant difference between male vs. female in seeking mental health resources ( $p=0.3295$ ) or being able to see a provider ( $p=0.2521$ ).

**Conclusions** We found that IEP students in this rural Oregon population were receiving annual wellness checks at a higher rate than the state Medicaid average of 41%. We suspect that our study had significant selection and non-response bias. Further study is needed to determine if these findings are generalizable.

Abstract 305 Table 1

Variable	P-value	OR	95% CI
Age	0.0927	0.818	(0.647 - 1.034)
Gender	0.2103	1.668	(0.749 - 3.714)
Race	0.6108	1.314	(0.459 - 3.757)
Language	0.4188	0.695	(0.288 - 1.679)
Pln_meals_wk**	0.0144*	0.350	(0.151 - 0.811)

\*Significant at p

## Healthcare delivery research II

## Concurrent session

10:15 AM

Friday, January 24, 2020

**307 SUSTAINED IMPACT OF A BRONCHIOLITIS HOME OXYGEN THERAPY CARE PROCESS MODEL**

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10.1136/jim-2019-WMRC.307

**Purpose of study** Beginning with the winter 2010-11 season, we implemented a care process model (CPM) to encourage hospital discharge with oxygen therapy for patients with bronchiolitis and mild hypoxemia without other indication for continued hospitalization. A previous study suggested initial reductions in length of stay and cost of hospitalization in the first year after implementation.

**Methods used** We conducted a retrospective cohort study of children aged 2-24 months old discharged from 17 hospitals within the Intermountain healthcare system with a diagnosis of bronchiolitis. Patients with diagnosis codes for chronic lung disease, tracheostomy dependence, or pulmonary hypertension were excluded, as were encounters that occurred outside of winter respiratory season (May-October). The primary outcome was mean length of stay. Balancing measures included 7-day readmission rate and mean cost per episode of care, defined as the total cost of all hospital visits within 7 days of initial hospital discharge. Costs were adjusted for inflation to 2017 dollars. Outcomes were compared before and after CPM implementation using linear regression models in an annual interrupted time series approach, adjusted for patient age, gender, race, ethnicity, and insurance type.

**Summary of results** A total of 9,887 patients met inclusion criteria (3,033 pre-implementation; 6,854 post-implementation). Implementation of a home oxygen therapy CPM was associated with immediate decreases in mean length of stay (difference -11.1 hours, 95% CI -12.8 to -9.5 hours) and mean cost per episode of care (difference -\$768, a 7.8% decrease, 95% CI -\$1,262 to -\$273), without an immediate change in readmission rate (difference 0.2%, 95% CI -0.3 to 0.7%). These findings have been sustained for 7 years after implementation and represent more than \$5 million in hospital cost savings.

**Conclusions** The home oxygen therapy CPM has demonstrated sustained decreases in hospital length of stay and cost without an increase in readmissions.

**308 IMPROVING TRANSITION HOME FROM THE NEONATAL INTENSIVE CARE UNIT USING A DISCRETE CHOICE EXPERIMENT: THE CLINICIAN PERSPECTIVE**

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10.1136/jim-2019-WMRC.308

**Purpose of study** Discharge from a neonatal intensive care unit (NICU) requires significant medical and social support.

Discrete choice experiments (DCE) are based in economic theory and are used to estimate an individual's preferences when faced with a choice scenario. We used a DCE to identify key features of a NICU transition-of-care (TOC) program among NICU clinicians nationally.

**Methods used** We designed a DCE survey containing 6 attributes of various levels based on qualitative focus groups with families of NICU infants: follow-up duration (3-24 months), financial support (\$500-4000/month), medical communication (appointment reminders, printed care plan, or directory of specialists), resource information (nutrition, housing, transportation, and financial aid), social support (peer, nursing, social work, or mental health), and medical information (durable medical equipment, diagnoses, medications, or early intervention services). Clinicians chose a preferred TOC program from 2 alternatives composed of varying levels of each attribute. Responses were analyzed via mixed logit models, and odds-ratios and willingness-to-pay for each attribute was estimated.

**Summary of results** 234 clinicians completed the survey. Each month of follow-up was worth \$113. Appointment reminders were preferred vs. care plans or directory of specialists (OR=1.03, p=0.08 and 2.33, p<0.0001 respectively). Compared to housing, transportation, and financial aid information, nutrition information was more preferred (OR=1.35, 1.39, and 1.92 respectively, p<0.05). Nursing and social work support were preferred over peer support (OR=1.24 and 1.43, p<0.05) and worth \$2,368 and \$3,911, but mental health support was not (OR=0.93, p=0.06). Compared to durable medical equipment information, medication and early intervention services information were preferred (OR=1.19 and 2.08 respectively, p<0.05) and worth \$1855 and \$7992 while diagnosis information was not (OR=0.68, p=0.01).

**Conclusions** Clinicians value longer duration of follow-up, nursing and social work support, and information about medications and early intervention services. Future work will compare results with those of patients' families.

**309 READMISSION RISK FACTORS AFTER HOSPITALIZATION FOR PNEUMONIA IN DIABETIC ADULTS**

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10.1136/jim-2019-WMRC.309

**Purpose of study** Readmissions to the hospital are considered an indicator of quality of care. Pneumonia is a common cause of hospitalization, and diabetes (DM) is a known risk factor for both admission and readmission in patients with pneumonia. However, there is a lack of studies specifically evaluating readmission risk factors and fatal readmission risk factors in patients with DM originally admitted for pneumonia. Determining these risk factors may direct efforts in decreasing readmission for these common diagnoses. In this project we determined the risk factors for readmission in patients with pneumonia and DM.

**Methods used** The 2013 National Readmission Database (NRD) was used to identify DM adults discharged alive after hospitalization for pneumonia (weighted N=229849), whether these adults were readmitted within 30 days of discharge, and mortality during the readmission. We identified readmission risk factors including comorbidities, procedures, and

demographics. We also determined risk factors specifically for readmissions resulting in mortality.

**Summary of results** Overall, 18.1% of DM patients were readmitted. Top three readmission reasons were pneumonia (14.7%), heart failure (9.4%), and septicemia (8.7%). This differed from non-DM patients in which the top three readmission reasons were pneumonia (17.2%), septicemia (9.2%), and COPD (6.5%). In DM patients, independent risk factors for readmission included metastatic cancer (adjusted OR 1.68), solid tumor (aOR 1.61), drug abuse (aOR 1.56), and hemodialysis (aOR 1.38). Independent protective factors included private insurance (aOR 0.78). Independent risk factors for mortality during readmission included metastatic cancer (aOR 3.62), solid tumor (aOR 2.36), age >65 (aOR 2.03), blood transfusion (aOR 1.96), lymphoma (aOR 1.72), and weight loss (aOR 1.65).

**Conclusions** Our study demonstrates that pneumonia is the leading reason for readmission in both DM and non-DM patients. In addition, patients with DM are at higher risk for readmission due to heart failure compared to non-DM. The risk factors could be used to identify patients who are at higher risk such as focused specific post discharge support. Since drug abuse is a modifiable risk factor, interventions to decrease drug abuse in DM patients may decrease readmission rates.

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**TIMING OF ADDICTION CONSULTATION IN HOSPITALIZED PATIENTS STARTING BUPRENORPHINE**

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10.1136/jim-2019-WMRC.310

**Purpose of study** A growing body of evidence supports initiation of medications for OUD, including buprenorphine, during hospitalization. It is unclear what factors during hospitalization are associated with likelihood of linkage with ongoing addiction treatment after discharge. This study explores the associations between early addiction consultation and medication initiation during hospitalization and successful linkage with outpatient treatment.

**Methods used** A retrospective chart review was completed at an urban, academic hospital for hospitalized patients with opioid use disorder. All hospitalized patients with opioid use disorder who were evaluated by the addiction medicine consult service from January 2018 to June 2019 and agreed to start buprenorphine were included. Timing of consultation was determined based on the proportion of hospitalization completed (days from admission to consult ÷ length of stay). Binary logistic regression was used to compare timing of consultation with inpatient buprenorphine initiation. An additional logistic regression was used to compare the odds of successful linkage (defined as any outpatient follow up within 30 days of discharge) between patients initiated on buprenorphine during hospitalization with those receiving a prescription at discharge. All analyses were completed with Stata, version 16.

**Summary of results** During the study period, 145 patients met eligibility criteria. Individuals with earlier addiction consultation were more likely to start buprenorphine during hospitalization compared to those evaluated closer to discharge (p=0.000, OR=0.04). There was no significant difference in successful linkage between the 115 patients with inpatient buprenorphine induction versus 30 patients that started at discharge (p=0.15, OR=1.89).

**Conclusions** Hospitalized patients with OUD who have earlier addiction consultation are more likely to have inpatient buprenorphine induction. Additional engagement with clinicians and opportunities to discuss treatment goals may allow patients to start buprenorphine early. Inpatient initiation of buprenorphine is not associated with increased odds of linkage within 30 days of discharge compared to providing a prescription of buprenorphine at discharge.

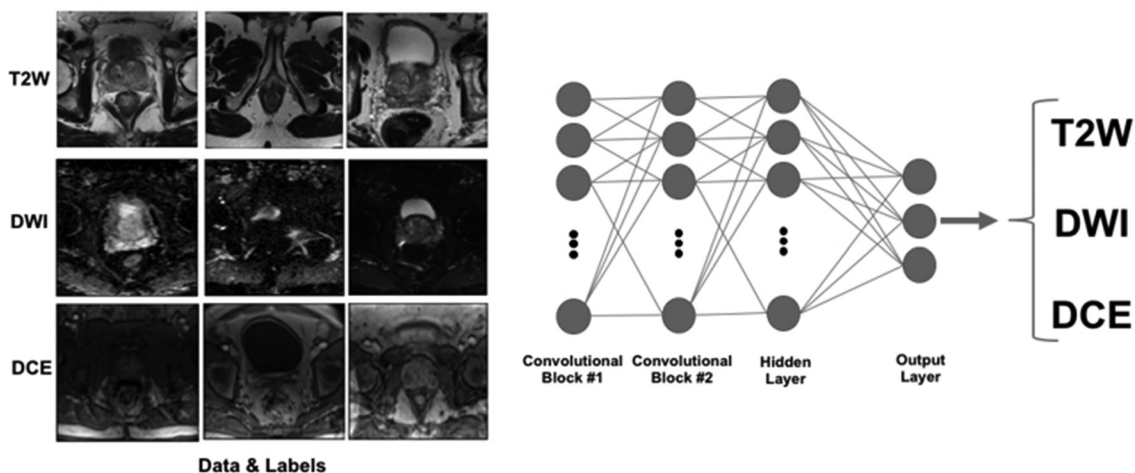
311

**DEEP LEARNING CLASSIFICATION OF PROSTATE MRI SEQUENCES**

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10.1136/jim-2019-WMRC.311

**Purpose of study** An early imaging preprocessing step involves uniformly labeling data sources. For MRIs, this represents a



**Abstract 311 Figure 1** Convolutional neural network for prostate mpMRI sequence classification. The images were fed into the neural network and categorized as either T2W, DWI or DCE

challenge due to the (1) heterogeneity in vendors, sequences, and protocols, and (2) potential mislabeling that has been reported to be as high as 10%. Furthermore, for multiparametric assessment for prostate MRIs, this can be a hurdle for research and clinical studies that rely on comparisons. Therefore, we develop a neural network that can automatically label sequences.

**Methods used** This retrospective study included patients who had a prostate MRI and an ultrasound MRI fusion transrectal biopsy between September 2014 and August 2018. For this study, the DICOM header information was used to classify 57,063 images as either T2W, DWI, or DCE. The number of T2W, DWI, and DCE images used were 17,195, 23,576, and 5,918 respectively. The convolutional neural network (CNN) used 46,689 images for training and 11,412 images for validation. The two-layered convolutional neural network was then trained for 8,000 iterations (figure 1). A fully connected layer with one hidden layer was used before the output layer. The softmax cross entropy loss function was used to adjust the weights during training.

**Summary of results** In validation, the CNN accurately classified 11,410 out of 11,412 images for an accuracy of 99.2%.

**Conclusions** A CNN can be accurately used to identify the sequences of T2W, DWI, or DCE. By using a CNN to complete the series identification, the process of automatically examining a prostate mpMRI and determining the PI-RADS score for a lesion will be expedited. The time needed to classify the series will be reduced and the DICOM header descriptions that are entered by the technologists can be ignored.

### 312 CRANIAL COMPUTED TOMOGRAPHY UTILIZATION AND PECARN COMPLIANCE AMONG PEDIATRIC HEAD TRAUMA PATIENTS

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10.1136/jim-2019-WMRC.312

**Purpose of study** Cranial computed tomography uncovers a variety of injuries in pediatric blunt head trauma patients. However, cranial CT poses many risks for these children and compliance with the Pediatric Emergency Care Applied Research Network (PECARN) recommendations seeks to reduce the number of CT scans ordered without missing significant traumatic brain injuries. The aim of this project is to assess the degree of compliance with the PECARN criteria following blunt head trauma among children in a single emergency department and identify the common findings that prompted cranial CT utilization over observation.

**Methods used** This is an observational cross-sectional study looking at patients under the age of 18 who received cranial CT scans over 6 months in a single county emergency department. Via retrospective chart review, we determined whether or not PECARN criteria were met and identified symptoms common among patients in the category in which either CT or observation would be acceptable.

**Summary of results** 253 head CTs were obtained in the pediatric emergency department from January to June of 2019—68 without head trauma, 24 with unknown head trauma, and

137 with recorded head trauma. Among the 137 patients with head trauma, 69.3% of the patients were categorized as ‘CT vs. observation’ under PECARN criteria, 21.2% as PECARN negative, and 10.2% as PECARN positive. 7 out of 95 CT vs. observation patients were discovered to have traumatic brain injuries such as subdural hemorrhages and fractures on CT, although none required neurosurgical intervention. Among these 95 patients, we identified the most common presenting symptoms of headaches, loss of consciousness, vomiting, nausea, and lethargy. Headaches were reported in 55% of the CT vs. observation cases, loss of consciousness in 40%, and vomiting in 26%.

**Conclusions** In accordance with PECARN criteria, cranial CT may be over-utilized in pediatric head trauma patients presenting to this hospital site, as there were a number of patients who did not meet PECARN criteria but had a cranial CT performed. We will use quality improvement methodology to decrease the utilization of cranial CT in those who do not meet PECARN criteria. We will additionally look to discover what drives decision-making processes for providers when a patient is in the CT vs. observation category.

### 313 COMPARISON OF COMPUTER AND FACE TO FACE DELIVERY OF THE SPORT CONCUSSION ASSESSMENT TOOL SYMPTOMS

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10.1136/jim-2019-WMRC.313

**Purpose of study** With an increase in sport-related concussions and heightened accessibility of technology, computer-based assessments via direct entry have become widely used among sports medicine professionals. The advantages of direct participant entry via computer over person to person interview protocols include instantaneous results and a greater capacity to gain larger study populations via ease of response entry and removal of the need for a qualified interviewers. In addition, privacy among participants via the direct computer entry may limit some bias as a consequence of threat of disclosure and social desirability related to in person interviews. Currently no studies exist which compare the validity of results of SCAT using computer-based vs in person interview, thus the aim of this study was to compare the differences between collection methods.

**Methods used** Three hundred and eighty-five (N=385) National Collegiate Athletic Association Division III student-athletes from CLU completed the SCAT symptoms via face to face interviews and a direct entry platform. Correlations and KAPPA statistics were used to compare the results of the assessment protocols.

**Summary of results** Spearman’s rank correlation coefficient ranged from  $r=0.189 - 0.775$  ( $P<0.001$ ) for the total group;  $r=0.142 - 0.788$  ( $P<0.001$ ) among males; and,  $r=0.093 - 0.743$  ( $P<0.001$ ) among females. KAPPA statistics for the total group ranged from 0.089-0.586 ( $P<0.001$ ), demonstrating poor-to-good strength, for males ranged from 0.130 – 0.620 ( $P<0.001$ ), demonstrating poor-to-good strength, and for

females ranged from 0.091 – 0.529 ( $P < 0.001$ ), demonstrating poor-to-moderate strength.

**Conclusions** Overall, these results demonstrate a significant relationship between direct computer entry and face to face delivery of the SCAT for both group and gender. In addition, these findings suggest that the direct computer entry platform is as accurate as the in-person interviews, and either method of SCAT administration would be reliable for use by medical practitioners in determining athlete concussion symptoms and status.

### 314 THE ROLE OF DO NOT ATTEMPT RESUSCITATION DIRECTIVES IN TREATMENT OF PATIENTS WITH OUT-OF-HOSPITAL CARDIAC ARREST

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10.1136/jim-2019-WMRC.314

**Purpose of study** A Do Not Attempt Resuscitation (DNAR) directive is a physician order that conveys patient wishes to not be resuscitated from a cardiac arrest. Emergency medical services (EMS) providers encounter DNAR orders when managing out-of-hospital cardiac arrest (OHCA). Little is known about their prevalence or how they might affect care provided.

**Methods used** We retrospectively analyzed all treated adult OHCA patients in 2018 that had DNAR orders per EMS in a large urban community. Data were abstracted from EMS PCR, 911 dispatch audio recordings, and defibrillator ECG and audio recordings. We compared patients who received full resuscitative efforts to those with some limitation of their resuscitation.

**Summary of results** Of the 98 included patients, the average age was 80 years (SD  $\pm 10.6$ ), 54 (55%) were male, 54 (55%) had their OHCA at home, and 53 (54%) received bystander CPR. Twenty-three patients (23.5%) received full efforts, while 75 (76.5%) received limited efforts. The full efforts group were more likely to have an initially shockable rhythm (17% vs. 7%), and twice as likely to have a witnessed arrest (70% vs. 33%,  $p < 0.05$ ). Twenty patients (87%) who received a full resuscitation had limited or no interventions on their DNAR. DNAR orders were onsite in 78% of cases and obtained by EMS on average 6.5 minutes (SD  $\pm 4.6$ ) and 7.1 minutes (SD  $\pm 6.1$ ) after their on-scene arrival in the full efforts and limited efforts groups, respectively. Family confusion/contradiction of DNAR orders occurred in the full efforts group in 9 patients (39%) compared to 10 patients (13%) in the limited efforts group. Nineteen patients (83%) receiving full efforts and six patients (8%) in the limited efforts group achieved ROSC.

**Conclusions** Delays in the presentation of DNAR orders during OHCA are common. This delay combined with family member confusion/contradiction of the DNAR orders results in undesired resuscitation. How DNAR directives are best operationalized and implemented requires further evaluation.

### 315 COEXISTING CHRONIC DISEASE INCREASES THE RISK OF MISCLASSIFICATION OF TYPE 1 DIABETES

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10.1136/jim-2019-WMRC.315

**Purpose of study** An accurate of diagnosis of diabetes type in the Electronic Medical Record (EMR) is essential for effective treatment, prevention of medical errors, and the validity of research that depends upon these large databases. We hypothesize that Type 1 Diabetes (T1D) patients with chronic comorbidities will be more likely to be misclassified as having Type 2 Diabetes (T2D) compared to those without such comorbidities.

**Methods used** Data were collected from HealthFacts<sup>®</sup> from 2006 to 2017 from patients diagnosed with T1D or T2D using ICD-9/10 codes. Of those, 9,676 patients were coded for T1D alone and were compared to 271,428 patients who were coded for both T1D and T2D. Patients coded for T2D alone were excluded from analysis. Multiple logistic regression was used to estimate the odds of misclassification for patients with coexisting comorbidities, including hypertension, cardiovascular disease (CVD), asthma, chronic obstructive pulmonary disease (COPD), chronic kidney disease (CKD), alcohol use disorder (AUD), and depression as compared to those without such comorbidities. The model is adjusted for age, sex, race, urban place of residence, marital status, and health insurance.

**Summary of results** Of 3.3 million diabetes patients, 8.3% were misclassified at least once. Of 281,104 T1D patients, 47.9% had coexistent hypertension, 54.4% had CVD, 1.1% had asthma, 13.4% had CKD, 6.7% had COPD, 9.0% had depression and 1.8% had AUD. In general, patients with chronic disease were at higher risk for misclassification of diabetes (see table 1). For example, patients with a history of CVD or depression had significant 2.24-fold and 2.20-fold increases, respectively, in the odds of diabetes misclassification compared to those without such a history.

**Abstract 315 Table 1** Patients with chronic disease at higher risk for misclassification of diabetes

Comorbidity	Adjusted OR for Misclassification of T1D (95% CI)
CVD	2.24 (1.98-2.54)
Depression	2.20 (1.96-2.46)
CKD	1.94 (1.74-2.15)
AUD	1.65 (1.31-2.08)
COPD	1.50 (1.29-1.74)
Hypertension	1.25 (1.10-1.43)
Asthma	1.13 (0.99-1.30)

**Conclusions** A history of comorbid hypertension, CVD, COPD, CKD, AUD, and/or depression significantly increases the risk of misclassification of T1D.



## Hematology and oncology II

## Concurrent session

10:15 AM

Friday, January 24, 2020

### 316 FUSION-NEGATIVE ONCOGENES RESCUE FUSION-POSITIVE RHABDOMYOSARCOMA FROM GATOR2 DEPENDENCE

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10.1136/jim-2019-WMRC.316

**Purpose of study** Rhabdomyosarcoma (RMS), the most common pediatric soft-tissue sarcoma, is comprised of two genetic subtypes. Fusion-positive (FP) RMS is characterized by *PAX3-FOXO1* or related translocations, while fusion-negative (FN) RMS harbors mutations in the RAS/PI3K pathway. Patients with high-risk RMS have poor outcomes. Characterizing the molecular connections between genomic drivers and cellular fitness may enable future therapeutic advancements in RMS.

Using a CRISPRi screen, we identified two components of the GATOR2 signaling complex, an activator of mTOR, as necessary in FP RMS but not FN RMS. We hypothesize that FN oncogenes are sufficient to overcome dependence on GATOR2 for mTOR-regulated proliferation.

**Methods used** To characterize the effects of FN oncogenes on GATOR2 loss, we conducted competition growth assays using FP RMS cells, and FP cells transduced with the FN oncogenes *NRASQ61H* and *FGFR4V550E*. We used CRISPRi to knockdown GATOR2 components in these cells and compared the growth of parental and oncogene-modified cell lines. We measured mTOR activation in these conditions by immunoblotting for p70S6K phosphorylation and 4EBP1 binding to m7-GTP sepharose beads.

**Summary of results** We confirmed that knockdown of GATOR2 components in FP RMS cells decreased their growth compared to control cells. However, introduction of FN oncogenes partially rescued cells from GATOR2 loss. This was also seen with inactivation of the negative mTOR regulator TSC1. Immunoblots showed that FN oncogenes did not rescue p70S6K phosphorylation after GATOR2 loss. By contrast, they did induce dissociation of 4EBP1 from m7-GTP, suggesting a restoration of cap-dependent translation.

**Conclusions** Our data demonstrate that loss of GATOR2 in FP RMS limits mTOR activation by environmental amino acid signaling. However, we find that FN oncogenes are sufficient to rescue cells from GATOR2 loss. Additionally, our data indicate that reduced cap-binding by 4EBP1, but not phosphorylation of p70S6K, is tied to the survival and proliferation of FP RMS. Based on our findings, we plan future investigation of the specific roles of 4EBP1 in RMS. Our work provides molecular insights into the pathways upstream (eg, GATOR2) and downstream (eg, 4EBP1) of mTOR which are critical for RMS survival.

### 317 EXPLORING T2-FLAIR MISMATCH AMONG IDH-MUTANT ASTROCYTOMAS: PATTERNS OF EVOLUTION AND FURTHER CHARACTERIZATION

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10.1136/jim-2019-WMRC.317

**Purpose of study** The T2-FLAIR mismatch sign (T2FM) is a newly defined biomarker on MRI which demonstrates high predictive value for isocitrate dehydrogenase (IDH) mutant astrocytomas among lower grade gliomas, helping facilitate early diagnosis and treatment planning. The purpose of this study is to further explore T2FM by characterizing tumors which display the sign, evaluating the predictive value of its various definitive criteria (T2 homogeneity and hyperintense FLAIR rim), and describing patterns in its temporal development.

**Methods used** Medical records from 64 patients with astrocytomas treated at the Alvord Brain Tumor Center were assessed for age at diagnosis, gender, WHO grade, molecular status, seizure history, tumor characteristics on pre-treatment CT, MRI, and pathology, documentation of T2FM, treatment course, and temporal changes in tumor appearance. Cases were divided into those meeting 'classic' T2FM definitive criteria (homogenous T2, FLAIR rim positive), those considered 'ambiguous' and not fulfilling all criteria (heterogeneous T2, FLAIR rim positive), and those which were T2FM negative (FLAIR rim negative). Groups were compared using Chi square and qualitative analyses.

**Summary of results** Including 'ambiguous' tumors increased T2FM sensitivity for IDH mutant astrocytomas 30% without decreased specificity. Tumors with T2FM characteristics were more cystic, less enhancing, and affected younger patients. T2FM was 100% persistent in subtotally resected residual tumors and disappeared with radiotherapy, persisted in 5/8 recurrent tumors which were originally T2FM positive, and was identified in tumors with high grade characteristics. Trends were identified among patient age, tumor location, mismatch status, and IDH status.

**Conclusions** A hyperintense FLAIR rim, regardless of T2 appearance, demonstrates high predictive power for IDH mutation among astrocytomas and may be used to determine T2FM status. Additionally, T2FM evolves in predictable patterns and may be seen in higher grade gliomas, findings which have not been previously described. Lastly, trends among patient age, tumor location, and T2FM may allow inference of IDH status when sequencing information is not available, further expanding its clinical utility.

### 318 EPHRINB2 AND EPHB4 MODULATES INVASION AND PROLIFERATION PATHWAYS IN GLIOBLASTOMA MULTIFORME

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10.1136/jim-2019-WMRC.318

**Purpose of study** The aggressive nature of Glioblastoma Multiforme may be attributed to the complex invasive and proliferative pathways that these tumors commandeer to promote tumorigenesis. EphrinB2, a receptor tyrosine kinase, has

recently emerged as a therapeutical target responsible for modulating those pathways, but is embedded in controversy. The literature is contradictory with tumor-promoting and suppressive roles of ephrinB2, depending on the model used. This study was initiated with a goal to decipher the true role of ephrinB2 in GBM.

**Methods used** GBM cell lines were modified to overexpress or knockdown ephrinB2. Upon implanting these tumor cells orthotopically in mouse brains or flanks, tumor volumes and survival were monitored. Whole brains were harvested to examine via immunohistochemistry.

**Summary of results** Transcript levels of ephrinB2 in gliomas showed that ephrinB2 was overexpressed in GBM, correlating with poor survival outcomes. Hypothesizing an oncogenic role for ephrinB2, we initiated *in vivo* studies with analysis using imaging systems like CT scans. In contrast to our initial hypothesis, our data showed that ephrinB2 was decreasing tumor volumes ( $p=0.0003$ ) and enhancing survival ( $p=0.027$ ). Therefore, we examined ephrinB2's receptor, EphB4. We dissected this bidirectional axis of signaling and identified downstream effects on invasion and proliferation. Consistent with the literature, we found a dichotomous relationship. Our data show that activating or inhibiting forward EphB4 receptor versus reverse ephrinB2 ligand signaling have opposing effects on GBM tumor invasion and proliferation.

**Conclusions** We illustrate that the activation of EphB4 by ephrinB2 produces an anti-proliferative and pro-invasive effect, based on activating either forward or reverse signaling, in GBM. These data highlight the importance of considering the signaling of both the receptor and ligand, rather than either in isolation, to truly understand the downstream effects of ephrinB2 on GBM behavior, explaining the controversial results. This is of particular gravity when designing therapeutic interventions targeting the EphB4-ephrinB2 signaling complex in GBM, as the downstream effects of inhibiting or activating ephrinB2 must be considered, as it also affects the signaling function of EphB4 in the adjacent cell.

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#### CYTOKINE AND GROWTH FACTOR PROFILING FOR THE DIFFERENTIATION OF MULTIPLE MYELOMA PATIENTS FROM THOSE WITH MONOCLONAL GAMMOPATHY OF UNKNOWN SIGNIFICANCE

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10.1136/jim-2019-WMRC.319

**Purpose of study** To determine if we could differentiate individuals with multiple myeloma (MM) from those with monoclonal gammopathy of unknown significance (MGUS) based on bone marrow (BM) and peripheral blood (PB) plasma cytokine and growth factor profiles. MM is a disease of dysplastic plasma cells that localize to bone marrow, producing high levels of immunoglobulin heavy and light chains, which can lead to hypercalcemia, renal disease, anemia, and bone lesions. MM is often preceded by increased immunoglobulin production but no clinical symptoms referred to as MGUS. IL-16 is an important growth factor in the development of myeloma with B cell activating factor (BAFF), and IL-17 related to the increase in IL-16.

**Methods used** A multiplexed assay was developed for IL-2r, IL-6, IL-8, IL-16, IL-17, VISTA (V-domain Ig suppressor of T

cell activation) and BAFF. Bone marrow and plasma samples obtained from 154 diagnosed multiple myeloma and 16 MGUS patients were tested.

**Summary of results** BAFF expression was significantly elevated in MM compared to MGUS patients in both BM (3,529 vs 1430 pg/mL,  $p<0.05$ ) and PB (2,167 vs 948 pg/mL,  $p<0.05$ ). IL-16 and IL-2r were also more strongly expressed in MM vs MGUS, but statistical differences were only observed in the BM samples. IL-16 BM (378 vs 124 pg/mL,  $p<0.05$ ) and IL-2r BM (1001 vs 124 pg/mL,  $p<0.05$ ). Matched BM and PB samples from the MM patients demonstrated no strong correlation for BAFF (Slope 0.349,  $r^2$  0.362), IL-16 (Slope 0.014,  $r^2$  0.029) or IL-2r (Slope 0.313,  $r^2$  0.244).

**Conclusions** IL-16 and BAFF, known tumor promoting factors, and IL-2r, an immune inflammatory marker, were significantly increased in multiple myeloma when compared to MGUS patients. All markers investigated were expressed in greater concentrations in the BM than the peripheral blood, but no direct correlation was observed. Monitoring IL-16, BAFF and IL-2r marker profiles of MGUS patients may allow us to predict the onset of Multiple Myeloma and may potentially lead to anti-cytokine therapy for this malignancy.

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#### THE EFFECT OF PREVIOUS CHEMOTHERAPY TREATMENT ON OVARIAN FOLLICLE COUNT IN OVARIAN TISSUE CRYOPRESERVED FOR FERTILITY PRESERVATION

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10.1136/jim-2019-WMRC.320

**Purpose of study** In the last several years, ovarian tissue cryopreservation (OTC) has become a more widely accepted method of fertility preservation for children and young adults who are at high risk of infertility as a result of cancer treatment but who are not unable to store mature eggs. In some fertility preservation programs, prior exposure to chemotherapy is an absolute exclusion criterion. In the Oxford Programme, patients are eligible for tissue storage if they have undergone chemotherapy prior to collection. This abstract presents the result of comparative analysis of follicle counts across this cohort of patients.

**Methods used** The pathology data from 306 female patients enrolled in the Oxford Reproductive Tissue Cryopreservation Programme (ORTC) between September 2013 to June 2019 was analyzed. This cohort included patients between the ages of 2 months to 38 years old who fulfilled the ORTC eligibility criteria. Follicle counts were analyzed by age, prior exposure to chemotherapy and diagnosis.

**Summary of results** All patients regardless of age, diagnosis or previous exposure to chemotherapy had follicles within the tissue analyzed in the pathology laboratory. Age, across all data sets, had the most significant effect on follicle numbers. For patients who had previously been exposed to chemotherapy, while the follicle count across the age range was lower than age matched patients who had not had pre-chemotherapy treatment, the effect of previous chemotherapy was most significant in the older patient cohort. Diagnosis as an independent variable did affect follicle numbers per se.

**Conclusions** These results demonstrate that ovarian tissue collected from patients both pre- and post-chemotherapy contains significant numbers of primordial follicles. Age had a more

significant effect on follicle numbers than previous exposure to chemotherapy. This data supports the inclusion of patients who have had non sterilizing treatment in ovarian tissue cryopreservation programs for children and young adults.

### 321 ABSTRACT WITHDRAWN

### 322 USE OF AROMATHERAPY AS A COMPLEMENTARY THERAPY IN ALLEVIATING CHEMOTHERAPY RELATED ADVERSE EFFECTS IN CANCER PATIENTS

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10.1136/jim-2019-WMRC.322

**Purpose of study** Use of aromatherapy in relieving anxiety and pain in different settings has been reported but its use in alleviating the side effects related to chemotherapy or radiation therapy in cancer patients is less clear. The purpose of this study was to investigate the effectiveness of aromatherapy in alleviating the adverse effects related to chemotherapy or procedures in cancer patients.

**Methods used** A literature review using online resources including Pubmed and Google Scholar with the keywords ‘cancer aromatherapy’ was performed. Only studies of adult

cancer patients with a control group published after 2005 were included in our analysis.

**Summary of results** Of the 20 articles, only 7 met our inclusion criteria (table 1 below). The primary reason for exclusion was the lack of a control group. The types of essential oils and length of aromatherapy treatment was variable among the studies. In 5/7 studies, aromatherapy showed improvement in symptoms, such as nausea, vomiting or pain but the beneficial effect on vital signs was less clear. In addition to the included studies, we searched for reports of side effects associated with aromatherapy. Allergic reactions were seen in minority of patients, and one study found an association between nosocomial outbreak of drug resistant *Pseudomonas* infections and use of inhalation aromatherapy.

**Conclusions** Our review suggests aromatherapy may have a role in alleviating some of the symptoms associated with chemo/radiation therapy in adult cancer patients. However, due to potential serious side effects, caution should be taken in the use of aromatherapy in cancer patients. Larger studies that control for the type of aromatherapy and other confounding variables are needed.

### 323 ONLINE HEPATOCELLULAR CARCINOMA PATIENT RESOURCES – MEANINGFUL IMPACT OR POOR ‘DELIVERY’?

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10.1136/jim-2019-WMRC.323

**Abstract 322 Table 1** Summary of studies on use of aromatherapy in cancer patients

1st Author; Year	Variable Studied	Aromatherapy (AR) Used	Patient's Type of Cancer	Length/Frequency of Treatment	Number of Control and Number of Aromatherapy (AR) Subjects	Results
Heydarirad; 2019	Quality of Sleep	Rosa Damascena (Inhalation)	Any Type of Cancer	2 weeks; AR treatment nightly	18 control 18 oil 5% 18 oil 10%	Duration and quality of sleep better in AR groups*
Nakayama; 2016	Salivary gland damage measured by scintigraphy	1.0 mL Citrus Limon and 0.5 mL Zingiber Officinal (Inhalation)	Thyroid Cancer	2 weeks inhalation; AR treatment 10 minutes before each meal	36 control 35 AR group	Higher rate of accumulation/secretion in parotid and submandibular glands in AR*
Iter; 2019	Vital signs, pain during port insertion	Diluted orange, chamomile, and lavender oil in 70 mL water (Inhalation)	Any Type of Cancer	AR inhalation treatment during procedure	30 control 30 AR group	- Significantly decreased pain experienced during the procedure* - Effect on vital signs not statistically significant
Tamaki; 2018	Quality of life, vital signs, & sleep quality	Aroma oils including ylang-ylang, orange, & lavender (Inhalation)	Breast Cancer	Aroma oil placed for inhalation for 9 hours prior to surgery	52 control 110 AR group	Results showed no effects of aromatherapy on quality of life, vital signs, or sleep quality
Wilkinson; 2007	Anxiety & depression	Choice of 20 essential oils (Topical - massage)	Any type of cancer	4 weeks; 1 hour weekly sessions of AR massage	144 control (usual care alone) 144 supportive care + AR massage	AR improves anxiety/depression for 2 weeks* but had no long-term benefits
Zorba; 2018	Nausea & vomiting	Essential oil mixture of peppermint, bergamot, and cardamon in almond carrier oil (Inhalation & Topical - massage)	Breast cancer	20 minute AR foot massage (massage group) & 3 minute inhalation aromatherapy (inhalation group) before each patient's chemotherapy cycles	25 control 25 massage AR 25 inhalation AR	Both inhalation and massage aromatherapy treatment before chemotherapy cycles showed to significantly decrease nausea compared to control*
Rostami; 2019	Peripheral Nephropathy	Topical Citrullus extract oil (Massage)	Breast Cancer	2 months; 2 massages to hands and feet per day	15 control 17 AR group	No significant difference in placebo and AR group

\* p<0.05

**Purpose of study** Hepatocellular carcinoma (HCC) is the fourth-leading cause of cancer-associated death, claiming 800,000 lives each year globally. At the same time, an increasing number of patients are using the Internet as a source of health information. However, limited research has been done on assessing the quality of HCC websites. Therefore, we aim to systematically evaluate the quality of online HCC information.

**Methods used** The term 'hepatocellular carcinoma' was searched using the search engine Google and the meta-search engines Dogpile and Yippy. The overall highest-ranked 100 websites were extracted based on pre-specified inclusion and exclusion criteria. A previously validated tool was used to evaluate quality based on several parameters including affiliation, accountability, interactivity, structure & organization, readability, and content quality.

**Summary of results** The search yielded over 1,100 websites. Of the top 100, 53% were commercial. Although 95% disclosed ownership and sponsorship, other measures of accountability were poor – only 30% identified their author (s), 42% cited sources, and 33% were updated within the past two years. Average readability was judged to be at a grade 11.8 level using the Flesch-Kincaid grading system, which is significantly higher than the recommended grade-six level ( $p < 0.0001$ ). Definition and symptoms were the most commonly covered topics, while prognosis and prevention were the least covered. Content accuracy was high among covered topics, except for incidence, for which 23% had mostly inaccurate information. Overall, non-commercial websites were higher in quality compared to commercial ones ( $p < 0.002$ ).

**Conclusions** Although website contents are generally accurate, authorship, attribution, currency, and coverage are currently deficient among many HCC websites. Additionally, difficult readability may pose a barrier for patient comprehension. Despite high public demand for information regarding prevention and prognosis, very few websites cover those topics. Healthcare professionals should be aware of the limitations of online HCC information, so they can be proactive in guiding patients to reliable resources to address their specific needs.

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#### A RARE CASE OF ABDOMINAL PAIN:RELATED TO IDIOPATHIC LEFT OVARIAN VEIN THROMBOSIS

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10.1136/jim-2019-WMRC.324

**Purpose of study** Ovarian vein thrombosis(OVT) first described in 1956 is a rare thrombotic condition with an incidence of 60-fold lower compared with leg DVT, yet could be potentially life threatening. Upon literature review, OVT cases are most often seen on the right ovarian vein. We describe an unusual case of idiopathic OVT, probably the first reported case of idiopathic left OVT

**Methods used** Retrospective case report

**Summary of results** We report the case of a 47 year old G7P7 Caucasian female with no past medical history who presented to a local hospital for acute onset of back pain radiating to her ribs and colicky left lower quadrant pain for 1 day. She denied any associated symptoms. CT scan of

the abdomen and pelvis with IV contrast revealed left gonadal vein thrombosis. She was then transferred to our facility for further management and treatment. On admission, patient was afebrile and hemodynamically stable. Pelvic ultrasound showed normal endometrium, no mass or cyst in the uterus or ovary with left ovary measuring 2.4cmx1.5cm with normal blood flow. Work up for inherited and acquired thrombophilia was obtained and later proved unremarkable. Therefore, the diagnosis of OVT was made and anticoagulation treatment was initiated with low molecular weight heparin (Levonox 1mg/kg q12h). Patient's symptoms completely resolved in the next 24 hours and she was discharged home on direct oral anticoagulant (Rivaroxaban) for 3 months. At her two month follow-up appointment, CT of abdomen and pelvis with IV contrast showed complete resolution of the left ovarian vein thrombosis

**Conclusions** OVT is an uncommon yet potentially life threatening thrombotic condition with a 25% risk of developing into PE and 4% mortality rate. Based on our research, 70-90% OVT cases occur on the right ovarian vein, whereas 11-14% are bilateral. OVT affects mostly postpartum women but might also be associated with pelvic inflammatory disease, malignancies, and pelvic surgical procedures. This is probably the first case reported for idiopathic left OVT in a healthy woman. Standard guidelines for managing OVT are lacking. Historically, heparin followed by bridging to warfarin until a therapeutic INR is achieved was the main stay of treatment. Recently, direct oral anticoagulants offers a potentially useful alternative even the efficacy of these drugs has not been studied yet.

## Infectious diseases II

### Concurrent session

10:15 AM

Friday, January 24, 2020

325

#### MEASLES VACCINE RESPONSE VARIES IN 12-MONTH-OLD KENYAN CHILDREN WHICH MAY INCREASE MEASLES TRANSMISSION

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10.1136/jim-2019-WMRC.325

**Purpose of study** Measles is a preventable infectious disease, but still presents a large burden of disease throughout the world. In 2017, measles caused roughly 110,000 deaths worldwide. The measles vaccine has greatly reduced measles-related morbidity and mortality. Despite this, Africa still suffers from this disease. Reduced measles vaccine efficacy has been reported in Sub-Saharan Africa. The aim of this study was to determine the response to measles vaccine following routine 9-month vaccination in infants living in a malaria endemic region of sub-Saharan Africa.

**Methods used** Plasma samples were collected from children from Kisumu, Kenya, at 12 months of age, three months after routine vaccination for measles. These plasma samples were tested by indirect ELISA to measure anti-measles antibodies.

Each sample was analyzed in triplicate. Samples that had one well with an optical density >0.5 different from the other two wells were trialed again to account for pipetting error. If after reanalysis the wells of the sample no longer had a well with a difference >0.5, the sample was included in analysis with its original wells excluding the well that differed >0.5. However, if the sample again had a well that differed in optical density from the other two wells by >0.5, the sample was considered an outlier and excluded from analysis. Eleven samples were excluded, leaving 143 samples included in the final analysis.

**Summary of results** The mean optical density was 1.83 (SD  $\pm$  0.72; 95% CI 1.71-1.94), with a minimum optical density of 0.42 and maximum optical density of 3.92. Twenty-two participants had an OD of 1.0 or less, raising concern of not being immunoprotective against measles.

**Conclusions** These twenty-two participants represent 15% of the total participant sample. For the measles vaccine to be protective, roughly 95% of the community must be vaccinated to prevent transmission. This then represents a possibility for transmission of measles to occur in these communities, particularly in young children who are more at risk of infection. The variability in levels of anti-measles antibodies following routine measles vaccination in this sample are not entirely understood and will be the subject of ongoing analysis.

### 326 INCORPORATING ZINC OXIDE NANOPARTICLES IN CONTACT LENS MATERIAL TO IMPROVE BIOCOMPATIBILITY

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10.1136/jim-2019-WMRC.326

**Purpose of study** Zinc oxide nanoparticles (ZON) have been found to filter UV radiation, prevent bacterial growth and encourage wound healing. Our purpose is to harness these useful properties by incorporating ZON into gels which are otherwise chemically identical to modern contact lenses. We will then test our enhanced contact lenses to see how their hydrophilicity, UV filtration and antimicrobial properties have changed. If successful, the implications may someday afford contact lens wearers a safer and more comfortable contact lens experience.

**Methods used** Gels chemically identical to modern contact lenses were produced with varying ratios of hydroxyethyl methacrylate (HEMA) and methacrylic acid (MAA), cross-linked with ethylene glycol dimethylacrylate (EGDMA), and heat polymerized in presence of 4,4'-Azobiz(4-cyanovaleric acid).

The wettability of these gels was measured by photographing a fully submerged, .2 cc, sessile air bubble as it contacted the gel surface in both deionized water and saline solutions. The angle between air bubble and gel quantified how varying ratios of HEMA:MAA impacted the hydrophilicity of the gels.

**Summary of results** To date, we have successfully produced polymerized material that resembles modern contact lenses in strength, flexibility, hydrophilicity and transparency. By experimenting with different ratios of HEMA:MAA and

polymerization methods, we have established that a 70:30 HEMA:MAA ratio coupled with thermoinitiator consistently produces the strongest, clearest and most flexible lenses.

**Conclusions** Now that we have successfully established a method for polymerizing gels. We will be able to move to the next steps which include:

- Incorporating ZON into gels with the established 70:30 HEMA:MAA ratio.
- Comparing how ZON impacts lens wettability using the sessile drop technique.
- Growing bacteria on lenses to test antimicrobial properties of nanoparticles in lens polymer.

### 327 ASSESSMENT OF MUTANT STAPHYLOCOCCUS AUREUS AND MRSA STRAINS FOR DRUG LEAD OPTIMIZATION

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10.1136/jim-2019-WMRC.327

**Purpose of study** Antibiotic resistance is an issue for the treatment of bacterial infections. *S. aureus*, especially methicillin resistant *S. aureus* (MRSA), has developed resistance to many current treatments. The increase in resistance demands a response to develop alternative therapies. The methionine t-RNA synthetase (MetRS) enzyme of bacteria is a novel drug target for many gram-positive species, including *S. aureus*. A series of small molecule inhibitors is being developed that bind this target. To understand and mitigate the risk of resistance developing to this new target, experiments were performed to characterize mutations that confer resistance.

**Methods used** Using tryptic soy agar plates containing four times the MIC of three different MetRS inhibitors, resistant *S. aureus* mutants were generated. Eight to 12 resistant colonies were selected and DNA sequenced to locate mutations in the MetRS gene. Mutations in the enzyme were modelled using I-TASSER and SWISS Model for visualization of the mechanism of resistance, and MICs of resistant strains were measured following CLSI guidelines.

**Summary of results** Mutant *S. aureus* colonies contained mutations I57N, V108M, H101P, and V105F in the MetRS gene. The magnitude of shifts in the MIC of inhibitors was dependent on the mutation present, with I57N causing the highest increase in MIC of the newly sequenced mutations. Molecular models of previously identified MRSA mutants elucidated potential mechanisms of resistance. Mutations affected one of two binding regions in the MetRS enzyme, the methionine binding pocket or auxiliary pocket (AP). Changes in the AP pocket caused greater shifts in MIC, but occurred less often. Assessment of the inhibitors MIC revealed that molecules with no halogen substituents in the AP binding region, or flexible regions, maintained better activity on mutant MRSA strains.

**Conclusions** To optimize MetRS inhibitors for *S. aureus* and other gram-positive bacteria, mechanisms of resistance and cross resistance were investigated. Through experiments on resistant strains, new MetRS inhibitors have been generated limiting the effects of resistance mutations. This work adds to our progress of developing a novel antibiotic class that is not susceptible to inducing antibiotic resistance.

### 328 PALMITIC ACID POTENTIATES MYCOBACTERIAL GROWTH IN MACROPHAGES

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10.1136/jim-2019-WMRC.328

**Purpose of study** Mechanisms that mediate natural resistance to *Mycobacterium tuberculosis* (Mtb) infection in highly exposed individuals are unknown. Using transcriptomic profiling of primary monocytes, we identified palmitic acid (PA)-induced genes that were enriched in donors with latent Mtb infection (LTBI) when compared to donors who resist infection despite high exposure. PA has known pleiotropic effects on macrophage responses including the activation of the NLRP3 inflammasome to increase IL-1 $\beta$  secretion. We hypothesized PA treatment of infected macrophages would impact the early mycobacterial response.

**Methods used** Intracellular BCG-cherry and Mtb-*mlux* replication within WT U937 macrophages was measured by fluorimetry and luminometry, respectively. Mtb-*mlux* growth was also measured in U937 cells with inactivating mutations in inflammasome genes (NLRP3 and NLRC4). IL-1 $\beta$  secretion from WT U937 cells was measured by ELISA.

**Summary of results** PA potentiated BCG and Mtb growth in WT U937 cells in a dose-dependent pattern. In contrast, oleic acid (OA) treatment did not modulate mycobacterial growth. Furthermore, Mtb whole cell lysate (TBWCL)-induced IL-1 $\beta$  secretion was increased in PA-conditioned WT U937 cells. However, Mtb growth potentiation by PA was similar in WT, NLRP3-deficient and NLRC4-deficient U937 cells.

**Conclusions** PA induced mycobacterial growth and IL-1 $\beta$  secretion in Mtb/BCG-infected and TBWCL-stimulated macrophages, respectively. Although the induction of IL-1 $\beta$  is consistent with known effects of PA on the inflammasome, alternative host pathways are presumed to be responsible for the PA-induced potentiation of mycobacterial growth since the NLRP3- and NLRC4-deficient cells had a similar phenotype as WT. Targeting these PA-dependent pathways with host-directed therapies could provide adjunctive treatments for tuberculosis.

### 329 VARICELLA ZOSTER VIRUS OPEN READING FRAME 9 DOMINATES SKIN TISSUE-RESIDENT MEMORY CD8 T CELL RESPONSE AFTER ZOSTER

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10.1136/jim-2019-WMRC.329

**Purpose of study** Varicella Zoster Virus (VZV) causes chickenpox during primary infection and establishes latency in dorsal root ganglia. Herpes zoster (HZ) occurs when VZV reactivates to cause a painful dermatomal rash. T cells specific for VZV are generated during VZV infection and are thought to be important for limiting HZ. Recently, a subset of T cells, tissue resident memory ( $T_{RM}$ ), have been described that do not recirculate after assuming residence in barrier tissues and are hypothesized to provide early surveillance against (re) infection. Placement of  $T_{RM}$  is an aspirational goal for

vaccines but little is known about their basic biology. In this study we measured if  $T_{RM}$  persist in skin up to 1-year post-HZ and investigated which specific VZV proteins are most commonly recognized.

**Methods used** Subjects with HZ were recruited and skin biopsies taken 45 (n=18), 90 (n=12), and 360 days (n=5) after rash onset from healed HZ and control skin. Skin T cells were non-specifically expanded for functional assays. A panel of subject-specific artificial antigen presenting cells (aAPC) was created by transfecting Cos-7 cells with HLA cDNA corresponding to each subject's HLA type, and co-transfected with each VZV open reading frame (ORF). After skin  $T_{RM}$  were added, CD8 T cell activation was measured by IFN-g ELISA. Synthetic peptides internal to VZV confirmed reactivity to VZV ORFs.

**Summary of results** We readily detected skin VZV-specific CD8  $T_{RM}$  skin up to 1 year after zoster. The most commonly recognized VZV protein was ORF9, with reactivity detected in 75%, 42%, and 20% of samples on days 45, 90, and 360 respectively. Overall, skin  $T_{RM}$  decreased over the first year, paralleling a decline in blood.

**Conclusions** VZV-specific skin CD8  $T_{RM}$  are detectable up to 1 year after HZ. For unknown reasons, the abundant tegument ORF9 protein is commonly targeted by  $T_{RM}$ . Ongoing studies will determine if the same CD8 T cell clonotypes persist in skin over time and measure how T cell clonotypes are compartmentalized in skin versus blood. Ultimately, we hope that combined single cell mRNA and T cell receptor sequencing of skin-derived T cells will permit determination of the transcriptional signature of pathogen-specific skin  $T_{RM}$ .

### 330 CHARACTERIZING CLINICAL MANIFESTATIONS OF CONGENITAL ZIKA SYNDROME IN NON-MICROCEPHALIC INFANTS

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10.1136/jim-2019-WMRC.330

**Purpose of study** The full spectrum of abnormalities due to antenatal exposure to Zika Virus (ZIKV) have not been delineated. We analyzed the various clinical manifestations in children with Congenital Zika Syndrome (CZS) from Rio de Janeiro, Brazil.

**Methods used** Newborns of women with nonspecific viral symptoms during pregnancy or referral to Instituto Fernandes Figueira (IFF) for suspected ZIKV were included. Vertical exposure to ZIKV was determined by PCR or IgM serology. For neurodevelopmental evaluation, Bayley-III Scales of Infant and Toddler Development was used.

**Summary of results** The study enrolled 296 newborns born during the ZIKV outbreak in Brazil. In utero exposure to ZIKV was confirmed in 219 cases.

Among the non-microcephalic infants (N=161), 76.8% had failure to thrive (FTT) and 68.1% had a neurologic abnormality. Among non-microcephalic infants with Bayley III exam scores (N=112), head circumference was a significant indicator of abnormal cognitive (p=0.004) and developmentally delayed language score (p=0.011).

**Abstract 330 Table 1** Outcomes according to microcephaly presence in ZIKV-Exposed infants

Variable	Microcephalic Infants (N = 53)	Normocephalic Infants (N = 161) <i>no. of infants/total no. (%)</i>	All Infants (N = 219)
Average Weight Z-score at Birth	-1.3	0.14	-0.21
Average Head Circumference Z-score at Birth	-3.56	0.84	-0.25
Average Height Z-score at Birth	-1.09	0.08	-0.22
Failure to thrive	46/47 (97.9)	109/142 (76.8)	156/190 (82.1)
Cardiologic Abnormality	19/46 (41.3)	20/100 (20.0)	39/146 (26.7)
Auditory Abnormality	13/50 (26.0)	14/141 (9.9)	27/192 (14.0)
Ophthalmologic Abnormality	42/53 (79.3)	28/158 (17.7)	71/213 (33.3)
Excess Skin on Neck	16/22 (72.7)	35/93 (36.6)	52/116 (44.8)
Beak Deformity of Occipital Bone	14/22 (63.6)	15/93 (16.1)	29/116 (25.0)
Neuromotor Abnormality	46/46 (100.0)	89/139 (64.0)	136/186 (73.1)
Hyperreflexia	37/46 (80.4)	36/136 (26.5)	74/183 (40.4)
Hyperexcitability	32/46 (69.6)	21/137 (15.3)	54/184 (29.4)
Hypotonia	16/46 (34.8)	21/137 (15.3)	37/184 (20.1)
Hypertonia	10/46 (87.0)	35/137 (25.6)	75/184 (40.8)
Fovea Sign of the Flexor Regions	10/20 (50.0)	39/93 (41.9)	49/114 (43.0)
Arthrogryposis	5/23 (21.7)	2/93 (2.2)	7/117 (6.0)
Abnormal Neurodevelopment	42/46 (91.3)	28/115 (24.4)	78/183 (42.6)
Abnormal feeding	16/47 (34.0)	15/143 (10.5)	31/191 (16.2)
Nystagmus	5/26 (19.2)	3/51 (5.9)	8/78 (10.3)
Seizures	21/46 (46.7)	5/137 (3.7)	26/184 (14.1)
Abnormal Neuroimaging	51/53 (96.2)	44/149 (29.5)	95/203 (46.8)
Abnormal Transfontanelar Ultrasound	44/46 (95.7)	30/141 (21.3)	74/188 (39.4)
Abnormal CT Brain	50/50 (100.0)	23/50 (46.0)	73/100 (73.0)
Abnormal MRI Brain	23/23 (100.0)	16/43 (37.2)	39/66 (59.1)
Anemia	8/29 (27.6)	5/45 (11.1)	14/76 (18.4)
Neutropenia	5/29 (17.2)	7/45 (15.6)	12/76 (15.8)
Neutrophilia	16/30 (53.3)	14/45 (31.1)	32/77 (41.6)
Thrombocytosis	13/29 (44.8)	16/45 (35.6)	29/76 (38.2)
Thrombocytopenia	3/29 (10.3)	5/45 (11.1)	9/76 (11.8)

**Conclusions** ZIKV exposed infants without microcephaly suffer from congenital symptoms similar to those with microcephaly. Infant head circumference z-score at birth of non-microcephalic infants is significantly associated with neurocognitive development. Recognition of the various CZS phenotypes and spectrum of severity can help ensure early intervention.

### 331 EARLY PREDICTORS OF NEURODEVELOPMENT IN INFANTS ANTENATALLY EXPOSED TO ZIKA

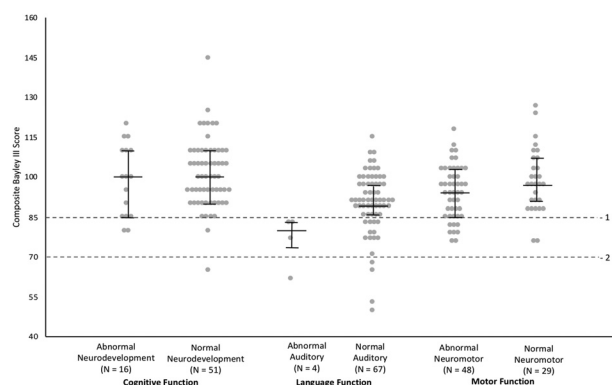
<sup>1</sup>SF Tiene\*, <sup>1</sup>JS Cranston, <sup>1</sup>K Nielsen-Saines, <sup>2,3</sup>M Moreira, <sup>2,3</sup>Z Vasconcelos, <sup>2,3</sup>A Da Costa. <sup>1</sup>David Geffen School of Medicine, Los Angeles, CA; <sup>2</sup>Fundação Oswaldo Cruz, Rio de Janeiro, Brazil; <sup>3</sup>Instituto Fernandes Figueira, Rio de Janeiro, Brazil

10.1136/jim-2019-WMRC.331

**Purpose of study** Identify early predictors of poor neurocognitive outcomes in non-microcephalic infants antenatally exposed to ZIKV, and evaluate their prognostic validity.

**Methods used** This study enrolled pregnant women with fever and rash during the ZIKV epidemic in Rio de Janeiro, Brazil from September 2015 through June 2016. Infants were also enrolled due to an abnormal prenatal ultrasound, confirmed antenatal ZIKV exposure, or clinical suspicion of CZS. We compared clinical findings identified prior to 3 months of age to neurocognitive outcomes, as measured by the Bayley III assessment after 6 months of age.

**Summary of results** Antenatal exposure to ZIKV was confirmed in 219 cases by positive maternal or infant PCR or IgM serology. 161 of these infants were non-microcephalic, 53 were microcephalic. Of the non-microcephalic infants, 112 received Bayley III exams after 6 months of age. Neuromotor



**Abstract 331 Figure 2** Individual scores on Bayley III assessment according to significantly correlated early clinical findings. Abnormal neurodevelopment, auditory function, and neuromotor function prior to 3 months of age were found to be correlated with poor Bayley III outcomes (see table 1). -1 and -2 standard deviation are depicted by the red and gray dotted lines, respectively. The solid lines display values and the interquartile range

abnormalities are correlated with abnormal motor scores ( $p=0.038$ ,  $PPV=27.1\%$ ), and lower composite cognitive scores ( $p=0.048$ ). Neurodevelopmental abnormalities are correlated with abnormal cognitive scores ( $p=0.044$ ,  $PPV=31.3\%$ ). Auditory Abnormalities are correlated with abnormal language scores ( $p=0.004$ ,  $PPV=100\%$ ) and lower composite language scores ( $p=0.009$ ).

**Conclusions** This study found that early neuromotor, neurodevelopmental, and auditory abnormalities are correlated to poor neurocognitive outcomes; however, the prognostic validity of these findings is poor and all infants that are antenatally exposed to ZIKV are at increased risk of developmental delay and should be monitored closely.

### 332 THE USE OF CEFTAROLINE IN THE TREATMENT OF PEDIATRIC INFECTIONS WITH A FOCUS ON METHICILLIN RESISTANT STAPHYLOCOCCUS AREUS (MRSA): A LITERATURE REVIEW

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10.1136/jim-2019-WMRC.332

**Purpose of study** Ceftaroline, a novel cephalosporin was recently approved for treatment of community acquired bacterial pneumonia (CABP) and soft tissue infections (STI). However, literature on the effectiveness of ceftaroline in treatment of serious infections due to MRSA is limited. The purpose of this study is to investigate the clinical effectiveness of ceftaroline in pediatric patients with serious infections, with a focus on MRSA infection.

**Methods used** An extensive literature search was conducted on PubMed and Google Scholar using keywords 'ceftaroline,' 'community-acquired pneumonia,' 'skin infection' and 'MRSA.' Only studies or case reports of patients <18 years of age, diagnosed with serious infections which included evaluation of patients with MRSA infection were included.

**Summary of results** Of the 19 studies, 4 met our inclusion criteria (table 1 below). Ceftaroline was as effective as other

**Abstract 332 Table 1** Use of ceftaroline in pediatric infections with focus on treatment of MRSA

First Author, Year Published	Type of Study	# of patients in experimental group (ceftaroline), age range	# of patients in control group (other antibiotic), age range	Diagnosis	# of patients with MRSA	Variable measured (treatment outcome)	% with successful treatment in experimental group (ceftaroline)	% with successful treatment in control group (other antibiotic)	Side effects
Blumer, JL 2016	Prospective Randomized Control	30 (2mo-17yrs)	10, ceftriaxone plus vancomycin (2mo-17yrs)	CABP	1	Clinical response (improvement)	52%	67%	Anemia, Pruritus, Vomiting
Korcowski, B 2016	Prospective Randomized Control	107 (2mo-17yrs)	52, vancomycin or cefazolin (2mo-17yrs)	Bacterial skin infection	18	Clinical outcome (cure)	89%	96%	Diarrhea, Rash, Vomiting, Pruritus
Hall, AM 2018	Case Report	1 (12 y/o female)	N/A	Fasciitis and Bacteremia	1	Blood culture and clinical outcome (cure)	100% (1 case)	N/A	Not Reported
Williams, AW 2015	Case Report	2 (8 y/o males)	N/A	1. CA-MRSA bacteremia, thigh abscess, osteomyelitis 2. CA-MRSA sepsis, right arm abscess, osteomyelitis	2	Blood culture and clinical outcome (cure)	100% (2 cases)	N/A	Not Reported

antibiotics for treatment of CABP and STI. It was not possible to make a firm conclusion regarding its effectiveness for MRSA infections because of the low number of MRSA cases. However, addition of ceftaroline to daptomycin was successful in treatment of a pediatric patient with fasciitis and persistent bacteremia who had failed vancomycin and/or daptomycin therapy. In addition, two patients with severe MRSA infections were successfully treated with ceftaroline after failure with prior antibiotic therapy. The incidence of side effects due to ceftaroline was low and included rash, coombs seroconversion and gastrointestinal discomfort.

**Conclusions** Our review suggests that ceftaroline is effective and well tolerated in pediatric patients and may be considered as an adjunctive therapy in patients with MRSA infection. Larger controlled trials are needed to study the effectiveness of ceftaroline in MRSA infections.

### 333 CINEMATIC PORTRAYAL OF INFECTIOUS DISEASES

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10.1136/jim-2019-WMRC.333

**Purpose of study** Uptake of harmful activities (e.g. use of cigarettes and alcohol by children) is associated with viewing movies with these themes. To our knowledge, no studies have characterized the cinematic portrayal of infectious diseases. We hypothesized that over the last 4 decades, these films would feature an increasingly negative portrayal of the scientific/medical community.

**Methods used** 1567 films were identified using 149 infection-related search terms on the Independent Movie Database

(IMDB), a validated tool for cinematic research. Synopses were reviewed on IMDB, Wikipedia, or American Film Institute (AFI) websites. Movies without synopses, without infectious diseases as a major theme, or without a domestic theatrical release were excluded. Year of release, box office data, media references, Academy Awards, genre, pathogen, themes, and portrayal of the scientific/medical community were assessed.

**Summary of results** 440 films (21.8% foreign-productions) released domestically from 1910 to 2018 were eligible. Drama (43.5%) and horror (37.4%) were the most common genres. Major themes included apocalyptic (27.3%), pandemics (20.1%), government conspiracies (19.8%), and bioterrorism (14.0%). The most common pathogens were viruses (55.4% of films), with human immunodeficiency virus most frequent (61 films) and fungi the least (7 films). Fictional viruses were increasingly depicted in modern movies in a linear regression model ( $p=0.0078$ ), while bacteria (real/fictional) were more commonly featured in older movies ( $p=0.0012/p=0.0001$ ). Films averaged 31.9 media references (median 4, range 0-655). Box office mean was \$27,400,000 (median \$2,856,712; range \$0-\$409,000,000). There were no significant relationships between media references and box office totals with 'negative' or 'positive' themes. 13 films won academy awards. Of films portraying the scientific/medical community, 69.0% depicted negative/mixed portrayals (e.g. unethical medical research, 15.5%). Negative themes were not more common over time when analyzed by decade in a logistic regression model ( $p=0.074$ ).

**Conclusions** The scientific/medical community has been negatively portrayed in films depicting infectious diseases. Research on the ability of cinema to create mistrust towards the medical/scientific community is warranted.



## Morphogenesis and malformations

## Concurrent session

10:15 AM

Friday, January 24, 2020

**334 VARIANTS IN QRIC1- A NEW NEURODEVELOPMENTAL SYNDROME WITH VARIABLE HYPERMOBILITY, LEG PAIN, CONGENITAL HEART DISEASE AND MILD DYSMORPHIC FEATURES- REPORT OF A NEW PATIENT**

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10.1136/jim-2019-WMRC.334

**Case Report** Loss of function variants in QRIC1 have recently been reported in 5 patients (Ververi et al 2018 and Lui et al 2019). QRIC1 encodes the glutamine-rich protein 1, likely to be involved in apoptosis and inflammation. These 5 patients had mild developmental issues, 2 had leg pain with elevated CK's, 2 had short stature with a mild chondrodysplasia and 1 had congenital heart disease. A relatively consistent craniofacial appearance was reported with thin upper lip and prominent nasal tip.

Our patient presented at 15 months with a large secundum ASD, mild developmental delays, gastroesophageal reflux and subtle dysmorphic features. A oligoarray was normal She returned at age 11 with a history of hypermobility, migraine and a diagnosis of a childhood amplified pain syndrome. She had obstructive sleep apnea, suboptimal school performance and normal growth parameters. Dysmorphic features included a long face, high palate, prominent nasal tip, a mildly thin upper lip and mild micrognathia. Her Beighton score was 8/9. Her CK was normal. Her mother had a diagnosis of fibromyalgia.

Trio exome sequencing revealed a de novo heterozygous splice site variant in intron 8 of QRIC1 (NM\_017730.3 c.1896-2A>G;IVS8-2A>G) predicting loss of function. Her symptoms and dysmorphic findings correspond well to those described in the 3 original patients (limited description in other two). We are aware of 3 other unpublished children, at least one of whom has hyperflexibility and headache. Two of the published patients have leg pain. QRIC1's role in inflammation may explain at least part of the reported clinical symptomatology. This new syndrome may be underascertained due to the relative non-specificity of the clinical findings and the prominent symptom of hypermobility in at least some, leading to a suspicion of benign hypermobility Ehlers Danlos syndrome and a decision not to perform genetic testing.

**335 PDGFRB-RELATED OVERGROWTH SYNDROME WITH ANEURYSM: A SECOND EXAMPLE**

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10.1136/jim-2019-WMRC.335

**Purpose of study** Activating germline variants in *PDGFRB* have been associated with Kosaki overgrowth syndrome, infantile myofibromatosis, and premature aging (Penttinen syndrome).

Whether these conditions are distinct or overlapping entities is not clear. We report a patient with *PDGFRB*-related condition identified by next-generation sequencing (NGS)-based somatic genetic testing.

**Methods used** A 26-year-old female with extensive unrevealing investigations for congenital differences in skin, soft tissues, and blood vessels presented with progressive left eye blindness. On exam, she looked older for age, with sparse hair and coarse facial features. The left leg and right arm were larger and longer than their counterparts. Nodular lesions of the tongue and widespread asymmetric vascular cutaneous patches were noted. MRA showed a fusiform aneurysm of the internal carotid artery compressing the left optic nerve. A mosaic somatic overgrowth syndrome was suspected and NGS-based somatic tumor testing of 479 genes was performed on biopsied lesions. Previous case reports were reviewed.

**Summary of results** The missense variant in *PDGFRB* p.Y562C was detected in all somatic samples with variant frequencies (9%, 14%, 17%) but absent in blood. This variant was reported in only one case with the same phenotype. Interrogation of an inhouse database of 2,399 specimens revealed four other tumors with somatic variants in *PDGFRB*, including in myofibromas. We found that features of the mosaic condition can overlap with germline *PDGFRB* variants, sharing multiple features of Kosaki syndrome and Penttinen syndrome; also, aneurysms have been reported in a child with infantile myofibromatosis.

**Conclusions** Primarily used to identify cancer treatment, NGS-based somatic tumor testing may implicate this novel overgrowth condition by detecting low-level somatic mosaicism that would have been missed by traditional methods. The *PDGFRB*-related conditions represent a spectrum of manifestations. *PDGFRB* variants are also the first known genetic cause of these fusiform aneurysms, suggesting roles of aneurysm surveillance and therapies targeted to the pathway such as kinase inhibitors.

**336 IDENTIFICATION OF NOVEL CANDIDATE RISK GENES FOR MYELOMENINGOCELE WITHIN THE GLUCOSE HOMEOSTASIS AND FOLATE AND ONE CARBON METABOLISM NETWORKS**

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10.1136/jim-2019-WMRC.336

**Purpose of study** Neural tube defects (NTDs) occur secondary to incomplete closure of the neural tube. Studies have shown an etiology with both genetic and environmental factors, but the underpinning of NTDs are yet to be elucidated. Two associated metabolic pathways are folate one carbon metabolism (FOCM) and glucose homeostasis/oxidative stress (GHOS). The purpose of this study is to apply WES data from a cohort of patients born with myelomeningocele (MM) to the hypothesis that analysis of damaging mutational burden will give insight into genes related to increased NTD risk.

**Methods used** Case data was generated with ~500 exomes of MM patients, split evenly between the ethnic groups with the highest birth prevalence in the United States: Mexican Americans and Caucasian Americans. Control data was obtained through the public Genome Aggregation Database (gnomAD).

Using an in-house bioinformatic pipeline, variants were filtered for quality and functional annotation. Variants included had an allele frequency <1% and are predicted to be damaging (stop gain, stop loss, canonical splice site, or combined annotation dependent depletion (CADD) phred score 20). Gene lists related to FOCM and GHOS were generated using gene ontology.

**Summary of results** We identified ~4000 qualifying variants in 1056/1469 genes, with 63 genes meeting nominal significance ( $p < 0.05$ ) for mutational burden (44 in the FOCM network, 22 related to GHOS, and 3 overlap). No genes reached mutation burden significance after applying Bonferroni correction. Overall, 64% of our population had at least one variant in a nominally significant gene and 28% had more than one.

**Conclusions** We present the largest WES cohort of NTD patients to date and propose using a large public database as a control. Interestingly, there was no overlap of implicated genes between ethnicities in either pathway. Only 6 genes have previously been implicated in neural tube defects, but 17 of them are expressed during human neural tube closure. Thus, we present 58 new genes as consideration for potential NTD risk.

### 337 WNT16 REGULATES VERTEBRAL SIZE AND PATTERNING DURING ZEBRAFISH DEVELOPMENT

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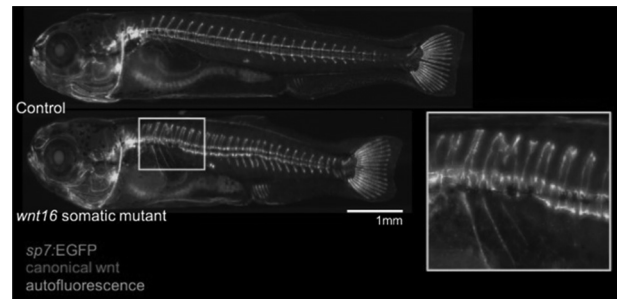
10.1136/jim-2019-WMRC.337

**Purpose of study** WNT16 has a critical role in chronic diseases of the spine, as evidenced by its link to genetic osteoporosis susceptibility. However, the function of WNT16 in axial skeletal development remains elusive. To better understand the spinal roles of *wnt16*, we tested the hypothesis that Wnt16 mediates vertebral size and patterning during skeletal development.

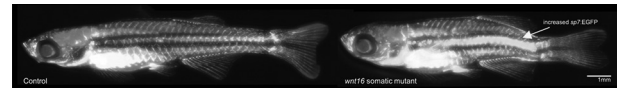
**Methods used** All studies were approved by the University of Washington IACUC. CRISPR-based gene editing was performed by co-injecting zebrafish embryos with two guide RNA/Cas9 complexes (IDT) targeting *wnt16*. Somatic mutants were generated in a double transgenic background containing fluorescent reporters for osteoblast progenitors (*sp7:EGFP*) and canonical Wnt/ $\beta$ -catenin signaling. Imaging was performed at 12 or 26 days post fertilization (dpf) for somatic mutants. Germline mutants were stained with 0.2% calcein to visualize mineralization and imaged at 15 dpf.

**Summary of results** We performed in vivo imaging of osteoblast progenitors in tandem with Wnt/ $\beta$ -catenin signaling at stages of skeletal development (figure 1). Somatic mutants with mosaic loss of *wnt16* exhibited reduced vertebral size at 12dpf as well as sporadic vertebral fusions (figure 1,  $p < 0.05$ ). At 26dpf, we observed increased *sp7*-derived fluorescence in the caudal spine (figure 2,  $p < 0.05$ ). Germline *wnt16* mutants exhibited severe reductions in vertebral size (figure 3,  $p < 0.05$ ).

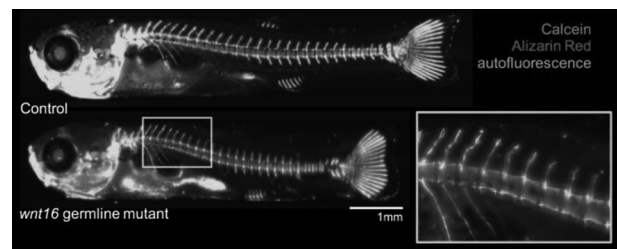
**Conclusions** These data indicate Wnt16 regulates vertebral size and patterning in zebrafish. Because *wnt16* mutants exhibited decreased body size, it is possible that smaller centra in mutants may be secondary to body elongation defects. Somatic mutants also exhibited altered segmentation, while germline mutants did not, suggesting that



Abstract 337 Figure 1 12dpf somatic mutants



Abstract 337 Figure 2 26dpf somatic mutants



Abstract 337 Figure 3 15dpf somatic mutants

although *wnt16* is not required for spine segmentation, its mosaic expression influences the patterning process. In all, the role of *wnt16* in vertebral development has future implications on the study and treatment of low bone mineral density diseases.

### 338 CHEDDA SYNDROME: A CASE REPORT AND REVIEW

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10.1136/jim-2019-WMRC.338

**Case report** We report a patient with CHEDDA syndrome, a newly-described neurodevelopmental and multiple congenital anomaly disorder caused by a *de novo* missense variant in *ATN1* at 12p13.31: c.3160C>T (p.His1054Tyr). CHEDDA syndrome is an acronym for congenital hypotonia, epilepsy, developmental delay and digital anomalies.

A term male with BW 3515g was born after a pregnancy complicated by nausea, hyperemesis and premature rupture of membranes at 7 mo. He was admitted at 10 days for lethargy and inadequate intake. He had nevus flammeus, thin lips, long philtrum, pointy chin, fetal pads, mild finger contractures of both hands, overlapping toes and facial telangiectasias. He had mixed hyper/hypotonia, choreoathetoid movements and opisthotonic posturing with crossed ankles. Echocardiogram was normal. Brain MRI/MRS showed a thin corpus callosum. At 10 mos, he had a submucous cleft palate, bilateral strabismus, GERD and sleep apnea.

At age 3, he had febrile seizures. An EEG showed diffuse background slowing but no epileptiform focus. He ate only

pureed foods. He had no speech, crawled, and pulled to a stand. He did not walk but manipulated a wheelchair expertly. He is being evaluated for autism. A trio WES (Ambry, 10/17) was negative. A diagnostic research trio whole genome test (UCLA, Dr. Stanley Nelson, PI, 7/19) identified the *ATN1* variant.

In March 2019, Palmer *et al.* defined CHEDDA syndrome in 8 patients, 2 mo-9 yrs, with recognizable facies and variable congenital anomalies. The 7 surviving patients had hypotonia, limited speech and were nonambulatory. Five had seizures. One had choreoathetoid movements.

CHEDDA syndrome is caused by heterozygous *de novo* missense variants in exon 7 in the histidine-rich HX repeat motif (1050-1065) of *ATN1*. Other genes with this motif (*RERE*, *AUTS2*) also have neurocognitive phenotypes. *ATN1* encodes atrophin-1, a nuclear transcriptional regulator important in embryogenesis of the CNS and heart. A triplet repeat expansion in exon 5 in *ATN1* causes dentatorubral-pallidoluy-sian atrophy, a progressive neurodegenerative condition not associated with congenital anomalies.

CHEDDA syndrome, a distinct and recognizable pattern of anomalies, defines a second phenotype associated with a different functional domain in *ATN1*, a gene known to cause a progressive neurodegenerative disorder.

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#### MONOZYGOTIC TWINS DISCORDANT FOR CRANIAL DYSINNERVATION DISORDER: EVIDENCE OF VASCULAR DISRUPTION

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10.1136/jim-2019-WMRC.339

**Purpose of study** Congenital cranial dysinnervation disorders (CCDDs) are a collection of rare, non-progressive neurogenic syndromes caused by developmental abnormalities of cranial nerves (CNs) resulting in primary or secondary dysinnervation. Included in this collection is Moebius syndrome, a disorder presenting with non-progressive 6th (abducens) and 7th (facial) CN palsies resulting in facial weakness and inability to abduct the eyes; other CNs may also be involved. Affected individuals often present as infants due to parental concern for lack of facial expression, excessive drooling, and strabismus. The etiology of Moebius syndrome is unclear, as most cases are sporadic. Some hypothesize it is due to an ischemic vascular event during embryonic development; however, autosomal dominant inheritance has been described in a few families, suggesting a genetic contribution.

**Methods used** Chart review, physical examination, and literature review.

**Summary of results** Here we describe a pair of ex-37 week monozygotic diamniotic twin girls; one with normal growth and development, and one presenting at the age of 19 months with micrognathia, reduced facial expression, and poor feeding. MRI performed on the affected twin revealed severely hypoplastic or absent 4th (trochlear) CN bilaterally, left 6th CN smaller than right, and bilateral hypoplastic 7th and 9th (glossopharyngeal) CNs. Exam was notable for mild facial palsy with decreased expression of the lower face and drooling; no obvious limitation of extraocular eye movement was noted. History, physical exam,

and imaging are consistent with a diagnosis of a CCDD, suggestive of Moebius syndrome.

**Conclusions** The contribution of genetic risk factors underlying the etiology of CCDDs such as Moebius syndrome (e.g. heritability) likely varies among affected individuals due to the degree of impact and penetrance of the specific genetic variant(s). This presentation of monozygous twins discordant for a CCDD provides evidence in favor of a vascular disruption hypothesis and against that of a genetic etiology, as genetic variation between monozygous twins is assumed to be low.

## Neonatology general IV

### Concurrent session

10:15 AM

Friday, January 24, 2020

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#### GROWTH TRENDS OF OVER 2500 PREMATURE INFANTS FROM BIRTH TO EIGHT YEARS

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10.1136/jim-2019-WMRC.340

**Purpose of study** Although numerous studies characterize the growth of preterm infants postnatally from birth to term, there is less information regarding expected growth for premature infants beyond this period. Prior studies with smaller cohorts of premature infants suggest differences in this population's growth compared to the World Health Organization (WHO) and Center for Disease Control (CDC) growth charts. However, to the best of our knowledge, there are no studies assessing the growth of preterm infants with this large of a cohort. We aimed to compare postnatal growth trajectories for premature infants from birth to eight-years-old to the CDC and WHO growth charts.

**Methods used** This retrospective cohort study includes 2778 premature infants, born at 32 weeks (w) or less, who received care within Rady Children's Hospital Network over a ten-year period. Data consisted of weight (Wt), height (Ht), head circumference, weight-for-length and BMI at each Rady outpatient encounter. Age-adjusted z-scores were calculated using the CDC growth standards for Wt and Ht. The effects of sex, GA, BW, correcting for gestational age (CGA), ethnicity and race on growth patterns are being assessed.

**Summary of results** Preliminary results show statistically significant differences in the growth trends of preterm infants subdivided by BW or GA. Using a t-test, infants born <27 w are significantly more likely to weigh less and be shorter ( $p < 0.001$ ) than those born >27 w after CGA. Infants with BW <750 g are significantly more likely to weigh less and be shorter ( $p < 0.001$ ) than those with BW  $\geq 750$  g after CGA. Interestingly, infants born 27-32 w and <750 g (older and smaller) are significantly more likely to weigh less and be shorter than those born <27w and  $\geq 750$  g ( $p < 0.05$ ).

**Conclusions** As more extremely premature and very low BW infants are surviving, there is a need for further assessment of this subpopulation's expected postnatal growth. Interestingly,

the extremely premature and/or low BW infants appear to not demonstrate catch-up growth on the WHO and CDC growth charts even by eight years of age. Therefore, there is a need for the development of new growth charts for these populations.

### 341 OPTIMAL GROWTH IN PRETERM INFANTS

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10.1136/jim-2019-WMRC.341

**Purpose of study** There is a knowledge gap regarding sociodemographic and hospital-level factors that lead to optimal growth in preterm, very low birth weight (VLBW) infants. Suboptimal early growth of an infant can impact long-term growth and early onset of adult metabolic and cardiovascular diseases. The objective of this study was to determine hospital-level and patient-level factors that contribute to suboptimal postnatal growth among preterm and VLBW infants in California.

**Methods used** This is a population-based study including 21,332 infants with a birth weight <1500g or gestational age of 23-32 weeks registered in the California Perinatal Quality Care Collaborative in 2008-2016. Z-scores of birth weight and discharge weight were calculated by 2013 Fenton-growth-chart-calculator. Infants below the 10th percentile of Z-score difference of birth weight and discharge weight ( $\Delta$ WeightZ) were flagged and analyzed for trends. A multivariate generalized linear model with the birth hospital as a random effect was used to analyze risk factors for <10th percentile  $\Delta$ WeightZ.

**Summary of results** In this cohort, the average z-score at birth weight was -0.059 (SD: 0.845), average z-score at discharge weight was -1.04 (SD: 0.92), and average  $\Delta$ WeightZ was -0.98 (SD: 0.75). The incidence of <10th percentile  $\Delta$ WeightZ was highest in Hispanic infants (72%). In the multivariate analysis, we identified several significant risk factors and protective factors for <10th percentile  $\Delta$ WeightZ. Hispanic infants were more likely to be <10th percentile of  $\Delta$ WeightZ (OR: 1.32; 95% [CI]: 1.1, 1.6). Infants born in regional hospitals were less likely to be <10th percentile of  $\Delta$ WeightZ (OR: 0.62; 95% [CI]: 0.41, 0.94). Infants born at an older gestational age were less likely to be <10th percentile  $\Delta$ WeightZ (OR for a 1-week increase: 0.64; 95% [CI]: 0.62, 0.67). Infants with a higher Apgar Score at 5-minutes were less likely to be <10th percentile  $\Delta$ WeightZ (OR for a 1-unit increase: 0.94; 95% [CI]: 0.92, 0.97).

**Conclusions** A risk factor for <10th percentile  $\Delta$ WeightZ is Hispanic ethnicity. Protective factors for <10th percentile

$\Delta$ WeightZ include birth at a regional hospital, birth at later gestational age, higher Apgar score at 5-minutes. Overall, attention to growth among different hospital characteristics and nutrition methods can facilitate targeted interventions in preterm and VLBW infants.

### 342 THE EFFECT OF AN IV COMPOSITE LIPID ON POLYUNSATURATED FATTY ACIDS IN NEONATES

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10.1136/jim-2019-WMRC.342

**Purpose of study** Preterm infants and infants with gastrointestinal disorders use IV lipids as a source of fatty acids. Pure soybean oil (SO) emulsions are associated with low arachidonic (ARA) and docosahexaenoic acid (DHA). This study's purpose was to compare fatty acid profiles in neonates who received SO or a composite (CO) emulsion containing fish oil.

**Methods used** This was a prospective study that included neonates <14 days of age with a birth weight <2 kg or gastrointestinal disorder and parenteral nutrition (PN) >14 days. Gas chromatography/mass spectrometry was used to measure fatty acid% in red blood cell (RBC) membranes. Linear mixed effects models and t-tests were used to compare fatty acids.

**Summary of results** In CO (n=27) and SO (n=69), the mean ( $\pm$ SD) gestational age was 31 $\pm$ 6 and 31 $\pm$ 5 weeks, respectively (p=0.7). PN duration was similar in SO and CO (31 $\pm$ 27 vs.27 $\pm$ 26 days, p=0.5). There was no significant difference in lipid dose between groups (p=0.2). At specific time points, DHA and eicosapentaenoic acid (EPA) were greater in CO vs. SO, while linoleic acid was lower in CO vs. SO. When CO was compared to SO, ARA was greater at week 4 only (Table). DHA decreased over time (-0.3%/week and -0.2%/week in SO and CO, respectively, p<0.01 for both) with no difference in the rate of change between groups (p=0.1). While EPA significantly increased over time in SO and CO (0.04%/week and 0.2%/week, respectively, p<0.01 for both), there was a difference between groups (p<0.01). ARA decreased over time in both groups (-1.1%/week and -1.0%/week in SO and CO, respectively, p<0.001 for both) with no difference in the rate of change between groups (p=0.7).

**Conclusions** When compared to SO, CO was associated with a greater DHA and EPA RBC%. While changes in ARA over time were similar for the two groups, CO had an increased ARA% at week 4. It remains to be seen if CO improves neonatal outcomes.

Abstract 342 Table 1 Mean $\pm$ SD Fatty Acid%

	Baseline		Week 2		Week 3		Week 4	
	SO	CO	SO	CO	SO	CO	SO	CO
DHA	4.3 $\pm$ 1.3	5.2 $\pm$ 1.0	3.3 $\pm$ 1.1	4.8 $\pm$ 1.1*	3.1 $\pm$ 1.1	4.2 $\pm$ 0.8*	2.7 $\pm$ 0.9	4.3 $\pm$ 1.1*
EPA	0.3 $\pm$ 0.1	0.7 $\pm$ 0.5	0.4 $\pm$ 0.2	1.5 $\pm$ 0.5*	0.4 $\pm$ 0.1	1.7 $\pm$ 1.0*	0.5 $\pm$ 0.1	1.7 $\pm$ 0.7*
ARA	20.8 $\pm$ 1.6	21.8 $\pm$ 3.1	17.2 $\pm$ 2.0	17.7 $\pm$ 1.9	16.3 $\pm$ 1.6	16.3 $\pm$ 1.6	15.2 $\pm$ 1.5	16.6 $\pm$ 2.4*
Linoleic Acid	6.1 $\pm$ 1.7	6.5 $\pm$ 2.6	13.9 $\pm$ 3.5	10.0 $\pm$ 3.0*	14.5 $\pm$ 3.2	10.9 $\pm$ 2.6*	16.2 $\pm$ 3.2	12.0 $\pm$ 5.6*

\*p

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### BIOCHEMICAL DIFFERENCES IN PRETERM INFANTS LESS THAN 1250 GRAMS AT BIRTH FED HUMAN MILK WITH HUMAN MILK BASED FORTIFIER VERSUS BOVINE BASED FORTIFIED HUMAN MILK

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10.1136/jim-2019-WMRC.343

**Purpose of study** Comparison of laboratory values in preterm infants less than 1250 grams at birth fed with human milk with human milk-based fortifier (EHM) or bovine milk-based fortifier (HMF).

**Methods used** Retrospective data collection in preterm infants less than 1250g at birth admitted to NICU from January 2016 to May 2019 who were fed with EHM (26 cal/oz, protein: 0.025g/ml, potassium: 1.12mg/ml) or human milk fortified with HMF (24 cal/oz, protein: 0.025g/ml, potassium: 1.14mg/ml). Demographics and laboratory values were collected after full enteral feeding was tolerated for 3 consecutive days and off parenteral nutrition. Data was compared using chi square test or Wilcoxon rank sum test as appropriate.

**Summary of results** There were 53 preterm infants included in the study. Preterm infants fed EHM were of lower gestational age, however time to full enteral feeding was not significantly different between the type of fortification of human milk. (Table 1) Serum albumin and blood urea nitrogen (BUN) were significantly higher in preterm infants fed EHM. (Table 2).

**Abstract 343 Table 1** Demographics of the study population

	Human milk with human milk-based fortifier (N=25)	Human milk with bovine milk-based fortifier (N=28)	p value
Gestational age (weeks)*	26 (25, 27.7)	27.6 (26.9, 28.9)	0.02
Birth weight (grams)*	900 (755, 1005)	967.5 (737.5, 1125)	0.50
Length at birth (cm)*	33.5 (32, 36.5)	35.12 (32.7, 37)	0.60
Female n (%)	14 (56)	16 (57.14)	0.93
Cesarean section n (%)	15 (60)	21 (75)	0.24
First enteral feeding (days)*	7 (4, 16)	6 (3.5, 10)	0.37
Full enteral feed (days)*	36 (21, 44)	30 (21, 44.5)	0.84

\*Median (25,75 percentile)

**Abstract 343 Table 2** Laboratory values based on type of fortification

Laboratory values	Human milk with human milk-based fortifier (N=25)	Human milk with bovine milk-based fortifier (N=28)	p value
Sodium (meq/L)*	136 (135, 139)	136.5 (135, 138)	0.79
Potassium (meq/L)*	4.6 (3.8, 4.8)	4.9 (4.8, 5.3)	0.007
BUN (mg/dL)*	11 (8, 13)	6 (5, 11)	0.004
Direct Bilirubin (mg/dL)*	0.6 (0.4, 1.9)	0.7 (0.6, 1.3)	0.57
Alkaline Phosphatase (IU/L)*	417 (340, 454)	377 (298.5, 585)	0.94
Albumin (g/dL)*	2.9 (2.7, 3.6)	2.7 (2.5, 2.9)	0.03

\*Median (25,75 percentile)

**Conclusions** Preterm infants fed EHM resulted in improved nutritional indices after achieving full enteral feeding. This could potentially improve growth outcomes of ELBW infants at discharge.

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### INTRAUTERINE GROWTH RESTRICTION AND LIVER DYSFUNCTION IN SMALL FOR GESTATIONAL AGE INFANTS

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10.1136/jim-2019-WMRC.344

**Purpose of study** Evaluate the association between intrauterine growth restriction (IUGR) in small for gestational age (SGA) newborns and liver dysfunction in the first 48 hours of life.

**Methods used** Retrospective study of SGA newborns admitted to LAC+USC Medical Center Neonatal Intensive Care Unit between January 2010 and October 2018. Data were collected from our electronic medical records. Blood laboratory tests were obtained within the first 24 to 48 hours of life including: Aspartate aminotransferase (AST), alanine transaminase (ALT,) protein, albumin, glucose, and bilirubin.

**Summary of results** From 207 SGA infants (birthweight <10th percentile), 39 patients were excluded from the study because of congenital infection, hypoxic-ischemic encephalopathy, <24 weeks of gestation, or major congenital anomalies. A total of 168 patients were evaluated (female 51%, Hispanic 53%, <37 weeks 71%, birthweight 1367±694 g, gestational age 32.1±4.9 weeks, Mean +/-SD). Sixty three percent of patients had increased AST values (>40 U/L), 57% had albumin level <3.5 g/dl, 25% had hypoglycemia (<45 mg/dL), and 31% of patients developed cholestasis (direct bilirubin >1mg/dL)

**Abstract 344 Table 1** Laboratory results

Laboratory results (N=168)	Median	IQR
AST (U/L)	58.5	42-77
ALT (U/L)	9.5	7.0-14.0
Albumin (mg/dL)	3.3	2.8- 3.7
Glucose (mg/dL)	69	48-90
Direct bilirubin (mg/dL)	2.1	0.5-3.9

**Conclusions** Our preliminary findings indicate that 63% of SGA infants show signs of liver dysfunction within the first 24-48 hours of life and 31% developed cholestasis. We speculate that this could be related to undernutrition in the intrauterine environment.

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### TREATMENT WITH LANSOPRAZOLE IMPROVES PREGNANCY OUTCOME IN MICE

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10.1136/jim-2019-WMRC.345

**Purpose of study** Using a computational drug repositioning approach that leverages data to uncover novel therapeutic uses for drugs already developed and evaluated for safety, we identified 83 that may be effective for preventing spontaneous preterm birth (sPTB). Of these, lansoprazole, a proton pump inhibitor (PPI) currently used for treating gastric ulcers, was identified with a strong profile. Thus, we evaluated the effect of lansoprazole on pregnancy outcome using a mouse inflammation model of fetal wastage.

**Methods used** Pregnant FVB mice were treated on E6.5–E8.5 with saline (IP), progesterone (P4, 80 mg/kg IM), mineral oil (P4 vehicle, IM), lansoprazole (PPI, 24 mg/kg IP), or 5% DMSO (PPI vehicle, IP). P4 served as a positive control as it is currently indicated for preventing sPTB. At E7.5, 2h after treatment, mice were given lipopolysaccharide (LPS, 100 µg/kg

IP) to induce inflammation. Control mice received no LPS (Saline only). Mice were then sacrificed at E12.5 and the number of viable fetuses and resorbed concepti (identified by their hemorrhagic/necrotic appearances and absence of fetuses) was recorded for each pregnancy.

**Summary of results** In LPS Only-treated pregnant mice, fetal survival significantly decreased 61% compared with that for pregnant controls (Saline Only), as expected. Treatment with P4 (Oil+LPS) or PPI (DMSO+LPS) vehicle had no effect on fetal survival compared with LPS-Only-treated dams. Most importantly, treatment with P4 or PPI significantly increased fetal survival after LPS treatment (P4+LPS, 1.7-fold; and PPI +LPS, 2.7-fold) compared with LPS-Only-treated dams and were similar to that of controls.

**Abstract 345 Table 1** Number of viable fetuses (mean±SD, n=number of pregnancies)

Group	Saline Only	LPS Only	Oil+LPS	P4+LPS	DMSO+LPS	PPI+LPS
Viable Fetuses	8.4±1.0*	3.6±4.0	1.3±2.4	6.4±3.1*	0.0±0.0	9.6±1.1*
	(7)	(10)	(6)	(5)	(5)	(5)

\*p

**Conclusions** We conclude that the administration of lansoprazole may have protective effects in an LPS-induced inflammation mouse model of fetal wastage. These promising results demonstrate the potential effectiveness of using computational drug repurposing approaches for identifying compounds, such as PPIs, that might be effective in preventing sPTB.

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#### OUTCOMES OF LIGATION VERSUS CATHETER OCCLUSION IN VERY LOW BIRTHWEIGHT INFANTS

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10.1136/jim-2019-WMRC.346

**Purpose of study** Patent ductus arteriosus (PDA) remains a serious and controversial problem in preterm infants. We have previously reported that surgical ligation for closure of moderate-to-large PDA in very low birthweight infants is associated with increased prevalence of bronchopulmonary dysplasia (BPD). Another known complication of ligation is postoperative hemodynamic instability or post-ligation syndrome (PLS). Recently, an alternative method of PDA closure via trans-catheter occlusion has been introduced. We describe our outcomes from this method.

**Methods used** We prospectively collected data of infants admitted to our NICU who were treated by ligation or occlusion after failing pharmacologic closure. Infants were <29 weeks gestational age, admitted prior to 30 days of age, and survived >7 days. We determined the prevalence of BPD, PLS, necrotizing enterocolitis (NEC), retinopathy of prematurity (ROP), intraventricular hemorrhage (IVH), and periventricular leukomalacia (PVL). We compared gestational age (GA), age at treatment, age at discharge, size of PDA and left atrial to aortic diameter (La:Ao) ratio at treatment between groups. Chi-square and t-Tests were used.

**Summary of results** Our cohort contained 34 infants (21 – ligation; 13 – occlusion). The occlusion group had a lower

**Abstract 346 Table 1**

Groups	GA (w)	Age at Treatment (d)	Age at Discharge (d)	PDA Diameter (mm)	La:Ao Ratio
Ligation	24.9 ± 1.5	21 ± 7	138 ± 79	2.8 ± 0.3	1.5 ± 0.4
Occlusion	25.3 ± 1.1	38 ± 17	118 ± 59	2.6 ± 0.8	1.5 ± 0.2
p	0.39	0.07	0.49	0.39	0.95

**Abstract 346 Table 2**

Groups	n	BPD	PLS	NEC	ROP	IVH	PVL
Ligation	21	18	9	7	17	10	2
Occlusion	13	13	0	7	8	5	0
p		1.00	0.01	0.30	0.21	0.73	0.51

prevalence of PLS and a trend for older age at treatment than the ligation group. There were no differences in GA, age at discharge, size of PDA, and La:Ao ratio between the two groups. There were no differences in rates or severity of BPD, NEC, ROP, IVH, or PVL between groups.

**Conclusions** These findings suggest trans-catheter occlusion may provide a lower risk of hemodynamic instability compared to surgical ligation. The rates of other outcomes may be related to gestational age rather than method of closure.

## Nephrology and hypertension

### Concurrent session

10:15 AM

Friday, January 24, 2020

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#### ASSESSING SAFETY AND EFFICACY OF C1 ESTERASE INHIBITOR FOR PREVENTION OF DELAYED GRAFT FUNCTION IN DECEASED DONOR KIDNEY TRANSPLANT RECIPIENTS

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10.1136/jim-2019-WMRC.347

**Purpose of study** Delayed graft function (DGF) is related to ischemia-reperfusion injury (IRI) and may be complement-dependent. Complement activation through the mannose binding lectin pathway is a suspected mediator of IRI/DGF. C1 esterase inhibitor (C1INH) specifically inhibits the MBL pathway, thus may have utility in preventing IRI/DGF. We previously reported a randomized placebo-controlled trial that treatment with C1INH was associated with a shorter duration of delayed graft function, less dialysis and higher estimated glomerular filtration rate (eGFR) at one year. Here, we report longer-term outcomes from this trial.

**Methods used** This is a post-hoc analysis of a phase I/II randomized-controlled trial enrolling seventy recipients of deceased donor kidney transplants at risk for delayed graft

function (NCT02134314). Subjects were randomized to receive C1INH 50 U/kg (n=35) or placebo (n=35) intraoperatively and at 24 hours. The cumulative incidence functions method was used to compare graft failure and death over 3.5 years. eGFR slopes were compared using a linear mixed effects model.

**Summary of results** Seven graft failures developed in the placebo group compared to one among C1INH-treated recipients; the cumulative incidence of graft failure was lower over 3.5 years among C1INH-treated recipients compared to placebo ( $p=0.03$ ). Although no difference in eGFR slopes was observed between groups ( $p$  for group-time interaction=0.12), eGFR declined in placebo-treated recipients ( $-4$  ml/min/ $1.73$  m<sup>2</sup>/year; 95% CI:  $-8$  to  $-0.1$ ) but was stable in C1 esterase inhibitor-treated patients (eGFR slope:  $0.5$  ml/min/ $1.73$  m<sup>2</sup>/year; 95% CI:  $-4$  to  $5$ ). At 3.5 years, eGFR was  $56$  ml/min/ $1.73$  m<sup>2</sup> (95% CI:  $42$ - $70$ ) in the C1 esterase inhibitor group vs.  $35$  ml/min/ $1.73$  m<sup>2</sup> (95% CI:  $21$ - $48$ ) in the placebo group, with an estimated mean eGFR difference of  $21$  ml/min/ $1.73$  m<sup>2</sup> (95% CI:  $2$  to  $41$  ml/min/ $1.73$  m<sup>2</sup>).

**Conclusions** Treatment of patients at risk for IRI/DGF with C1INH at transplant was associated with improved eGFR and lower incidence of graft failure at 3.5 years. Thus, C1INH treatment at time of kidney transplant has the potential to improve the utility and function of marginal kidneys that are currently discarded.

### 348 ADVANCED CHRONIC KIDNEY DISEASE IS ASSOCIATED WITH HIGHER AND NOT LOWER INSULIN USE

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10.1136/jim-2019-WMRC.348

**Purpose of study** As kidneys metabolize insulin, it is commonly held that insulin use is lower with more advanced CKD. On the other hand, more advanced CKD might result in progressive loss of beta cell function, increase in peripheral insulin resistance and contraindications to other antidiabetic medications, all of which might increase the need for insulin. Better understanding the relationship of CKD and insulin use will help to improve treatment in patients with type 2 diabetes and CKD.

**Methods used** We performed an observational study of 944,891 veterans with an ICD-9 code of type 2 diabetes mellitus and a serum creatinine lab drawn between 1/1/2008 and 12/31/2010. The incidence of baseline and subsequent insulin use was determined by the first time that the patient had a prescription for insulin after the index date in the VA database and was identified by pharmacy data and tracked until 12/31/2013.

**Summary of results** There were 212,040 (22%) on insulin at baseline. Baseline characteristics by insulin use are summarized in table 1. In a multivariable logistic regression model (adjusted for demographics, comorbidities, blood pressures, BMI, HbA1C and other anti-diabetic medications), compared to eGFR $\geq 90$ , the odds ratios for baseline insulin use in those with eGFR of 30 to  $<45$  and  $<30$  were 1.86 (95% CI 1.82 to 1.90) and 2.62 (2.19 to 2.34), respectively. Results were

Abstract 348 Table 1

	Insulin (N=212,040)	No Insulin (N=732,851)	P-Value
Age (Years)	65 ± 11	67 ± 11	<0.001
Male (%)	97	97	<0.001
Black (%)	21	17	<0.001
Diabetes Duration (Years)	5.6 ± 3.2	3.9 ± 3.0	<0.001
HbA1C (%)	8.4 ± 2.0	7.0 ± 1.4	<0.001
BMI (kg/m <sup>2</sup> )	32.7 ± 6.9	31.4 ± 6.2	<0.001
Sulfonylurea (%)	36	42	<0.001
Metformin (%)	44	50	<0.001
TZD (%)	7	5	<0.001
Other Meds (%)	2.0	1.3	<0.001

similar for incident insulin use in a Cox model adjusted for above.

**Conclusions** Insulin use increased in patients with more advanced CKD. Given the results in this study, the safety of insulin use in more advanced CKD needs to be evaluated in randomized controlled trials.

### 349 DIETARY SODIUM RESTRICTION LOWERS A URINARY BIOMARKER OF KIDNEY TUBULAR DAMAGE IN ADULTS WITH MODERATELY ELEVATED SYSTOLIC BLOOD PRESSURE FREE FROM CHRONIC KIDNEY DISEASE

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10.1136/jim-2019-WMRC.349

**Purpose of study** Increased aortic stiffness may contribute to kidney damage by transferring excessive flow pulsatility to susceptible renal microvasculature, leading to constriction or vessel loss. We previously demonstrated in that 5-weeks of dietary sodium restriction (DSR) reduces large-elastic artery stiffness as well as blood pressure in healthy middle-aged/older adults with moderately elevated systolic blood pressure and free from chronic kidney disease (CKD) as compared to normal sodium intake. Given these changes, we hypothesized that DSR would also reduce urinary concentrations of renal tubular injury biomarkers in this cohort, which are associated with more rapid loss of kidney function and predict incident CKD in the general population.

**Methods used** This was a post-hoc analysis using stored 24-hr urine samples collected in 13 participants as part of a randomized, double-blind, cross-over clinical trial of DSR. We measured urine concentrations of the kidney tubular injury biomarkers kidney injury molecule-1 (KIM-1) and neutrophil gelatinase-associated lipocalin (NGAL) during the final week (week 5) of both low sodium (LS; target of 50 mmol/d) and normal sodium (NS; target of 150 mmol/d) intake.

**Summary of results** Participants were  $61 \pm 2$  (mean  $\pm$  s.e.m.) years (8M/5F) with a baseline blood pressure of  $139 \pm 2/82 \pm 2$  mmHg and a baseline estimated glomerular filtration rate of  $79 \pm 3$  ml/min/ $1.73$  m<sup>2</sup>. Twenty-four hour urinary sodium

excretion was reduced from  $149 \pm 7$  to  $66 \pm 8$  mmol/d during week 5 of each condition. Despite having preserved kidney function, participants had a 31% reduction in urinary NGAL concentrations with just 5 weeks of DSR (LS:  $2.8 \pm 0.6$ ; vs. NS:  $4.2 \pm 0.8$  ng/ $\mu$ L,  $p < 0.05$ ). Results were similar when normalized to urinary creatinine, which did not change between conditions. KIM-1 concentrations, however, were below the detectable limit in all but one sample.

**Conclusions** DSR reduces evidence of kidney tubular damage in adults with moderately elevated SBP who are free from prevalent kidney disease. Reducing dietary sodium intake should be evaluated as a strategy to prevent incident CKD as well as slow progression of prevalent CKD.

### 350 COMPENSATORY RENAL GROWTH PREDICTS OUTCOME IN CHILDREN WITH A SOLITARY FUNCTIONING KIDNEY

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10.1136/jim-2019-WMRC.350

**Purpose of study** Congenital anomalies of the kidney are frequent causes of childhood chronic kidney disease (CKD), however not all experience a decline in their glomerular filtration rate (GFR). The challenge is to identify those at risk of developing CKD. We hypothesized that in children with a solitary functioning kidney (SFK), kidney size at diagnosis and the extent of compensatory renal growth predict long term outcome, and could be incorporated into a risk stratified model of care.

**Methods used** Using a retrospective cohort design, we included cases with SFK due to unilateral renal agenesis (RA) or multicystic dysplastic kidneys (MCDK) between the years 2000-2017. We extracted clinical data from medical charts, standardized kidney lengths (kidney length/body height) from ultrasounds at first postnatal evaluation in the first year of life, and used the last documented estimated GFR as the primary outcome, with  $< 90$  ml/min/1.73 m<sup>2</sup> as our definition of CKD. Between group differences were analyzed by t-test, and receiver operating curve (ROC) analysis was used to predict CKD.

**Summary of results** We identified a total of 229 SFK cases (71 RA, 158 MCDK) with median age of 0.3 (IQR 0.6) years at initial evaluation and median follow up of 4.3 (IQR 4.8) years. At last follow up mean eGFR was  $88.9 \pm 28.4$  ml/min/1.73 m<sup>2</sup>, with a total of 53 cases (23%) with CKD. In those initially evaluated in the first year ( $n=31$ ), mean follow-up was  $4.3 \pm 3.8$  years, mean standardized kidney length was  $0.102 \pm 0.001$ , and 10 cases (32%) developed CKD. When stratified by outcome, those who developed CKD had significantly smaller standardized kidney lengths compared to those who did not develop CKD ( $0.093 \pm 0.005$  vs  $0.106 \pm 0.003$ ,  $p=0.02$ ). By ROC analysis, a standardized kidney length below 0.101 optimally predicted CKD (AUC 0.722, 95% CI 0.514-.931).

**Conclusions** In this study of children born with a SFK, a low standardized kidney length at initial assessment, reflecting impaired compensatory renal growth, was associated with the development of CKD. These results will help us stratify long term risk of CKD, will be used in the development of a clinical pathway, and will allow the delivery of more focused and efficient long-term clinical care.

### 351 EFFECT OF SHAM SURGERY AND UNILATERAL NEPHRECTOMY ON AUTOPHAGIC FLUX IN KIDNEY AND HEART

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10.1136/jim-2019-WMRC.351

**Purpose of study** Compensatory renal hypertrophy resulting from loss of nephron mass promotes nephron damage and CKD. Unilateral nephrectomy (UNX) is a model of compensatory renal hypertrophy in the remaining kidney. The purpose of the study was to determine the effect of UNX on mTORC1/2 signaling, lysosomal biogenesis and autophagic flux in the kidney.

**Methods used** A model was developed to study autophagic flux in vivo in the kidney and heart by treating mice with vehicle or bafilomycin A1 (BAF) and measuring LC3-II and p62 by immunoblot analysis. An increase in LC3-II (marker of autophagosomes) after BAF or a decrease in p62 (degraded by autophagy) was used as a marker of autophagy.

**Summary of results** On immunoblot analysis, sham surgery (SS) and UNX resulted in increased pS6 (mTORC1) and pAkt (mTORC2) in the remaining kidney. mTOR is known to regulate transcription factor EB (TFEB) and lysosomal biogenesis. LAMP2 protein expression and *Lamp2*, *TFEB*, and *Atp6v0d2* transcripts were decreased in SS and UNX indicating decreased lysosomal biogenesis vs. normal. As mTOR and lysosomal function are crucial to autophagy, autophagic flux was measured. There was a significant increase in LC3-II in normal kidneys and heart 2 hours after BAF treatment. After both UNX and SS, the increase in LC3-II after BAF was absent indicating suppressed autophagic flux vs. controls. On both IF and EM, the increase in autophagosomes was absent after both SS and UNX vs. normal. Rapamycin inhibited the increase in mTORC1/2 but did not restore autophagic flux nor correct the lysosomal abnormalities. Autophagic flux in heart was suppressed after UNX, but not sham surgery. To determine whether other surgical procedures affect autophagic flux, a 24 hr bilateral renal ischemia/reperfusion(I/R) model was performed in mice. LC3-II did not increase with BafA1 in kidney after I/R vs. normal mice and SS. Unexpectedly, LC3-II did not increase in heart with BAF after both SS or I/R.

**Conclusions** Increased mTORC1 and 2 signaling, lysosomal abnormalities and suppressed autophagic flux were found in the kidney after both SS and UNX. Both SS and I/R suppressed autophagic flux in the heart. Suppressed autophagic flux caused by sham surgery may have important implications for interpreting results of autophagy studies using animal models requiring surgery.

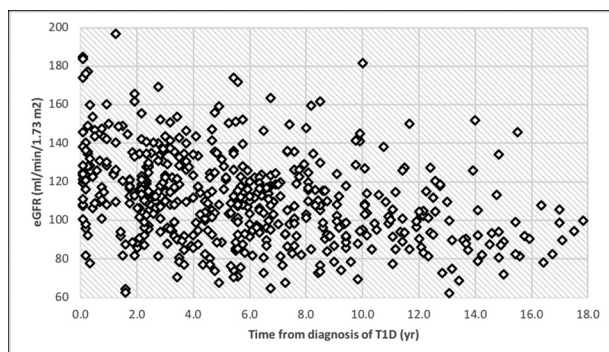
### 352 CHRONIC KIDNEY DISEASE (CKD) PREVALENCE AND GLOMERULAR FILTRATION RATE (GFR) TRENDS IN CHILDREN WITH TYPE 1 DIABETES (T1D)

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10.1136/jim-2019-WMRC.352

**Purpose of study** Identification of CKD in pediatric T1D patients is important given their increased risk of end stage renal disease (ESRD) in adulthood. However, literature analyzing the burden of CKD and GFR trajectory in pediatric





Abstract 352 Figure 1

T1D is lacking. Our objectives were to identify the prevalence of CKD in pediatric T1D and GFR changes over time from T1D onset.

**Methods used** This ambispective cohort study was conducted at BCCCH from Nov 2016-Sept 2019. Patients  $\leq 18$  years with T1D were included ( $n=520$ ). Most recent outpatient serum creatinine values and heights were used for calculation of GFR (modified Schwartz,  $\text{mL/min}/1.73\text{m}^2$ ) from health records. CKD was defined as  $\text{GFR} < 60$  and at risk of CKD was defined as  $\text{GFR}$  of 60-90 or hyperfiltration as  $\geq 140$ . The relationship of GFR and time from diagnosis was assessed with median test and linear regression.

**Summary of results** Of 520 patients, 279 (54%) were male, with median age at diagnosis of 6.6 (3.6-10.2) years. CKD was not identified in any patients. 156 (30%) were at risk of CKD. Figure reveals a linear relationship between GFR and time from diagnosis ( $r=-0.34$ ,  $p<0.0001$ ). With increasing time from T1D diagnosis (0-3, 3-10, and  $>10$  years), there was a steady decline in GFR from a median GFR of 124 ( $n=87$ ) to 110 ( $n=341$ ) to 97 ( $n=92$ ) respectively (all  $p<0.0001$ ). Linear regression modelling revealed that for every 1 year from diagnosis, GFR decreased by 1.9 ( $p<0.0001$ ).

**Conclusions** 30% of pediatric T1D patients were at risk for CKD with mildly reduced GFR or hyperfiltration. The GFR decline throughout childhood is concerning given the increased risk for ESRD in adulthood. Further studies are needed to identify the prevalence of other modifiable risk factors in T1D and quantify further GFR changes in the young adult population to determine if these trends persist and if early renal protective strategies are warranted.

### 353 ACUTE INTERSTITIAL NEPHRITIS A RARE AND UNUSUAL SIDE EFFECT OF OMALIZUMAB

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10.1136/jim-2019-WMRC.353

**Purpose of study** Drug-induced acute interstitial nephritis (DI-AIN) accounts for 70-75% of acute kidney injury cases. Although any drug can cause AIN, there have been few reports of AIN caused by immune-modulator drug therapy. Here, we share the first reported case of AIN following administration of omalizumab for the treatment of moderate to severe persistent asthma.

**Methods used** Retrospective case report

**Summary of results** A 71-year-old female with moderate to severe asthma, uncontrolled type II diabetes, hypertension, heart failure with preserved ejection fraction, and chronic kidney disease stage four presented to the emergency department (ED) for progressively worsening shortness of breath and productive cough. She was in her normal state of health until three weeks prior to presentation when she received her first omalizumab injection for refractory asthma. After the injection, she developed mild generalized weakness and fatigue that worsened after her second injection two weeks later. In the ED, she was treated for fluid overload secondary to CHF exacerbation and renal failure, and acute asthma exacerbation. Subsequently, she underwent emergent dialysis as she had elevated levels of potassium of 8.1 mEq/L, BUN of 139 mg/dl, and creatinine of 8.08 mg/dl, suggestive of worsening kidney function as her baseline creatinine was 1-2 mg/dl prior to this admission. After two dialysis sessions, her symptoms significantly improved. She was then started on high-dose methylprednisolone for possible AIN secondary to omalizumab versus eosinophilic granulomatosis with polyangiitis. Her antinuclear antibodies screening returned positive but negative for antineutrophil cytoplasmic antibodies (ANCA) for myeloperoxidase and proteinase 3. A renal biopsy demonstrated no evidence of lupus nephritis or ANCA-associated crescentic glomerulonephritis with focal eosinophils noted near the cortico-medullary junction, suggestive of a DI-AIN. The patient's hospital course remained uncomplicated and she was discharged with oral steroids and outpatient hemodialysis awaiting renal recovery.

**Conclusions** Our case highlights the first report of AIN as a side-effect of omalizumab and the importance of continued surveillance of rare side effects from current medications on the market.

### 354 ENCAPSULATING PERITONEAL SCLEROSIS A LATE COMPLICATION OF PERITONEAL DIALYSIS

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10.1136/jim-2019-WMRC.354

**Purpose of study** Encapsulating peritoneal sclerosis is a rare late-stage complication of long term peritoneal dialysis that can present in many ways. While prognosis is poor, treatment for this condition still requires further research.

**Methods used** Retrospective Case Study

**Summary of results** 63-year-old female with renal transplant in 1992, subsequent nephrectomy of transplanted kidney in 2018, ESRD on HD, previously on peritoneal dialysis for 12 years discontinued due to recurrent peritonitis presents to ED for abdominal pain, nausea and weight loss for 5 days. CT abdomen revealed moderate ascites, distention of stomach and duodenum, gradually decreased caliber of jejunum, consistent with partial small bowel obstruction. Thickening of peritoneal lining which correlates with peritonitis. NG tube was placed for decompression without resolution of symptoms. Since patient has history of multiple bouts of peritonitis and partial small bowel obstruction, diagnosis of encapsulating sclerosing peritonitis (EPS) was made. Traditionally, EPS has been managed conservatively, however after reviewing literature, the patient was started on Tamoxifen 10mg TID for 3 months and prednisone 40mg daily for 4 months followed by taper over 6 to 8 weeks in attempts to block calcium deposition in the peritoneum. Patient returned to hospital 2 months later

febrile with recurrent partial small bowel obstruction, worsening peritonitis. Paracentesis was performed which revealed an elevated nucleated cell count of 15,000 and multiple loculations in her abdomen. Despite initial treatment with antibiotics the patient had 1-2 febrile episodes every day during admission. Over the course of the admission, she required multiple therapeutic paracenteses. Cachexia worsened and nutritional status deteriorated with albumin 1.1. Patient was started on TPN for symptomatic relief. Given deteriorating medical status, patient and family decided patient be placed on comfort care, and passed away on day 15 of admission.

**Conclusions** Encapsulating peritoneal sclerosis is a late complication of peritoneal dialysis characterized by intraperitoneal inflammation and fibrosis resulting in encasement of bowel. Despite trial of tamoxifen and prednisone, patient continued to deteriorate. Education about this rare complication of PD is crucial and further research for treatment for EPS is needed.

## Neuroscience II

### Concurrent session

10:15 AM

Friday, January 24, 2020

#### 355 PROGNOSTIC VALUE OF THE UCSD PERFORMANCE-BASED SKILLS ASSESSMENT FOR COGNITIVE DECLINE IN PARKINSON'S DISEASE

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10.1136/jim-2019-WMRC.355

**Purpose of study** In Parkinson's disease (PD), functional impairments in cognitively demanding activities of daily living (ADLs) (e.g. paying bills, planning activities) can precede cognitive changes detectable by neuropsychological testing by up to 10 years. However, current screening protocols for cognitive decline do not objectively assess ADLs. The UCSD Performance-Based Skills Assessment (UPSA) is a 30-minute test for assessing ADLs that we recently validated in PD. We now examine the UPSA's potential to predict cognitive decline at an earlier time point than standard cognitive screening tests.

**Methods used** 47 non-demented PD participants (table 1) completed the UPSA, neuropsychological battery, motor exam, and mood and quality of life scales at baseline and one year. Z-scores from neuropsychological tests were averaged into composite cognitive scores. Cognitive classifications were assigned by expert consensus conference.

**Summary of results** 11/47 (23.4%) PD participants converted to a more impaired cognitive class during the one-year follow-up. Baseline UPSA scores were not significantly different ( $p=0.16$ ) between converters ( $x=79.4$ , SD 9.4) and non-converters ( $x=83.6$ , SD 7.8) and did not predict conversion (OR 0.95,  $p=0.24$ ). However, lower baseline UPSA score predicted more rapid decline in the composite cognitive score in converters compared to non-converters ( $F(1,9)=10.1$ ,  $p=0.01$ ).

#### Abstract 355 Table 1 Baseline characteristics of PD cohort

	Mean $\pm$ SD, Range
Age (y)	68.9 $\pm$ 7.4, 53-83
Sex (% female)	34%
Education (y)	16.9 $\pm$ 2.8, 10-21
Disease Duration (y)	6.0 $\pm$ 7.2, 0.5-42.0
LEDD (mg/day)	522.7 $\pm$ 428.1, 0-1724
Cognitive Classification (%)	PD-Normal Cognition: 72.3% PD-Mild Cognitive Impairment: 27.7%

**Conclusions** The UPSA may identify those at risk of more rapid cognitive decline in PD. Our cohort will continue to be followed over time to allow for more robust exploration of cognitive functional decline in PD.

#### 356 ANNUALIZED RATE OF CORTICAL CHANGE IN FIRST EPISODE PSYCHOSIS

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10.1136/jim-2019-WMRC.356

**Purpose of study** First episode psychosis (FEP) studies evaluate patients during a critical time in which diagnosis and treatment intervention can improve a patient's prognosis from complete recovery to development of psychosis spectrum disorders, including schizophrenia (SZ) or affective psychosis (NSZ). However, there are few identified structural and neurobiological markers that can help with early detection. The role of increased peripheral inflammatory states on neuroimaging has not been thoroughly evaluated. We examined baseline and annualized rates of change (ARCH) structural differences between healthy controls (HC) and FEP patients and its association with clinical or inflammatory markers.

**Methods used** Baseline neuroimaging (FreeSurfer v6.0) and clinical measures were obtained for FEP-SZ (n=37), FEP-NSZ (n=23) and HC (n=47). ARCH was calculated between baseline and maximum timepoints for volume, surface area and thickness. General linear models assessed group differences. Spearman correlations were performed between cortical measures to clinical and inflammatory variables at baseline and with ARCH scores. Data was controlled for age, sex and race. Volume was also controlled for total intracranial volume.

**Summary of results** Baseline left anterior cingulate cortex (ACC) volume ( $d=-0.52$ ,  $p=0.02$ ) and surface area ( $d=-0.4$ ,  $p=0.04$ ) was lower in the FEP-SZ compared to the HC group. Left ACC thickness was lower ( $d=-0.56$ ,  $p=0.03$ ) in FEP-NSZ compared to FEP-SZ. Greater baseline IL10 levels was associated with lower total ventricle volume change ( $r=-0.44$ ,  $p=0.05$ ) and greater total volume ( $r=0.48$ ,  $p=0.03$ ). Within the FEP group, ARCH for left ACC volume, gray thickness and total gray volume were associated with decreased repetitive motion soft neurological signs.

**Conclusions** ACC plays a role in cognition, emotion and has been implicated in SZ pathogenesis. Evaluation of ACC is a potential predictive marker of psychosis risk and potentially a

prognostic marker of clinical outcome. IL10 may be protective against gray matter volume loss and ventricular volume enlargement.

### 357 PHENOTYPIC HETEROGENEITY IN AMYOTROPHIC LATERAL SCLEROSIS: A POTENTIAL EXPLANATION FOR THERAPEUTIC FAILURE

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10.1136/jim-2019-WMRC.357

**Purpose of study** Current diagnostic criteria for amyotrophic lateral sclerosis (ALS) results in a heterogeneous patient population for clinical trials. Variability in patient presentation has resulted in a large spectrum of clinical signs that may represent distinct disease entities under the heading of ALS. This may explain why progress made in elucidating the etiology and pathophysiology of ALS has not been translated into effective treatments. The objective of this study is to utilize a new diagnostic scheme to stratify disease presentation.

**Methods used** Retrospective chart reviews were conducted on patients with ALS at Loma Linda University's ALS clinic between April 2013 and July 2019. Clinical presentation was categorized on four axes, depicting the extent of:

1. Upper motor neuron signs
2. Lower motor neuron signs
3. Bulbar involvement
4. Behavioral/cognitive involvement

We used heat map analysis to identify trends in phenotypic progression to determine if patient presentation was maintained and to compare clinical courses between subgroups. A Bowker's test of symmetry was conducted to ascertain if overall change in phenotype was significant over three timespans. Patients were omitted if they presented to the clinic over a timespan of less than 9 mos. and if enough data was not presented to determine the axes. The cognitive axis was not determined due to inconsistency of data.

**Summary of results** Seven distinct phenotypic subgroups were identified:

1. Upper motor neuron
2. Lower motor neuron
3. Bulbar
4. Upper and lower motor neuron
5. Lower motor neuron and bulbar
6. Upper motor neuron and bulbar
7. Generalized

Of 28 patients presenting with lower motor predominance, 21 (75%) remained lower motor predominant and 28 (100%) had lower motor neuron involvement one year after initial presentation. Patients with bulbar predominance became more generalized between 9 mos. and 12 mos. (100% vs 45.5% remaining bulbar predominant, respectively). There was no significant change in phenotype from first visit to 9mos., first visit to 12mos., or 9mos. to 12mos. using an adjusted significance level of 0.0167.

**Conclusions** Preliminary data suggests that there are phenotypic subgroups within the spectrum of ALS that remain consistent in the disease course. These data provide justification to further explore distinct pathophysiology and treatment responses in these groups.

### 358 PATIENT DEMOGRAPHICS AND DISEASES CHARACTERISTICS PREDICT LIKELIHOOD OF IMPROVEMENT ON PATIENT-REPORTED OUTCOME MEASURES IN MULTIPLE SCLEROSIS

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10.1136/jim-2019-WMRC.358

**Purpose of study** Patients with multiple sclerosis (MS) are increasingly treated with high-efficacy disease-modifying therapies (DMTs). Clinicians have observed functional improvement in a subset of these patients, but the factors influencing improvement are unknown. We examined the impact of demographics, disease characteristics, and brain volumetrics on the likelihood of clinical improvement in patients treated with high-efficacy DMTs, as assessed by patient-reported outcome (PRO) measures.

**Methods used** This retrospective chart review included adults with MS (>18 years) who had completed  $\geq 2$  PRO measures across 2 time points separated by  $\geq 10$  months and taking fingolimod, dimethyl fumarate, natalizumab, rituximab, or ocrelizumab at baseline. We examined the influence of patient demographics, disease characteristics and brain volumes on the likelihood of clinical improvement. PRO measures included 10 domains of the NeuroQOL Short Form battery. Patients were grouped as Improved vs. Failed to Improve by each NeuroQOL domain, using  $\frac{1}{2}$  standard deviation as the benchmark for clinically significant improvement. Statistical analyses utilized Spearman correlations and logistic regression.

**Summary of results** 318 patients met inclusion criteria. The sample was 75% female, average age of 47.1 years, 82% relapsing-remitting MS (RRMS), and mean time between PRO 1 and PRO 2 of 2.4 years. Factors significantly predicting the likelihood of clinical improvement and the relevant NeuroQOL domain included: non-white race and Fatigue (Odds Ratio=2.325, CI 5, 95=1.122, 4.817,  $p=0.023$ ), younger age and Depression (odds ratio=0.976, CI 5, 95=0.952, 1.000,  $p=0.049$ ), and secondary progressive type of MS and Sleep Disturbance (PPMS v. SPMS odds ratio=0.101, CI 5, 95=0.012, 0.842; RRMS v. SPMS odds ratio=0.346, CI 5, 95=0.166, 0.721,  $p=0.0069$ ).

**Conclusions** Demographics and disease characteristics appear to be stronger predictors of clinical improvement than brain volumes. Most patients improved or maintained function across domains, suggesting that high-efficacy DMTs may prevent further debilitation and enhance the likelihood of functional improvement.

### 359 EXPLORING RELATIONSHIPS BETWEEN NEURAL ACTIVATION AND THE AUTOMATICITY OF POSTURAL CONTROL

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10.1136/jim-2019-WMRC.359

**Purpose of study** Postural control studies are widely used to both assess fall risk and reduce falls. An important variable in these studies is Sample Entropy (SEn), which measures the regularity of changes of the Center of Pressure (CoP) under the feet. Increased SEn, which is commonly associated with

more automatic postural control, has been observed in the presence of cognitive distractors. However, the direct link between SEN and neural activation has not been studied. This study identified relationships between neural activation and SEN during multiple balance conditions.

**Methods used** 30 subjects stood on a balance plate and wore a prefrontal cortex-directed functional near-infrared spectrometry (fNIRS) cap while undergoing four bouts of 30-second stance during four balance tasks: (1) EOST - eyes open single task (standing still); (2) EODT - eyes open dual task (standing still while counting back by 7's); (3) ECST - eyes closed single task; and (4) ECDT - eyes closed dual task. fNIRS data were characterized with autoregressive iterative least squares beta values, then analyzed with a mixed effects model. CoP was measured using a balance plate (1000 Hz), and SEN was calculated for increment resultant CoP data.

**Summary of results** Preliminary SEN data suggest significant increases in SEN for eyes open conditions when compared to eyes-closed conditions. Significant differences in SEN were observed between EOST and ECST ( $p=0.002$ ) and between EOST and ECDT ( $p=0.011$ ). fNIRS data analysis is currently underway and will be completed before WSMRF. These fNIRS beta values will then be correlated to changes in SEN relative to the EOST condition.

**Conclusions** The differences in SEN between EOST and ECST, as well as EOST and ECDT, support our expectations that eyes-closed conditions are associated with more attentional investment in balance and a subsequent decrease in SEN. We expect that increased prefrontal cortex activation during ECST will be positively correlated with decreased SEN during ECST. This finding will support the interpretation of SEN being associated with attentional effort and the automaticity of postural control. Furthermore, increased prefrontal cortical activation during dual task conditions may be due to a mix of attentional investment and cognitive distractors.

### 360 A RARE CASE OF UNILATERAL MYELITIS IN A 69 YEAR OLD FEMALE: A CASE REPORT

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10.1136/jim-2019-WMRC.360

Transverse myelitis (TM), a rare inflammatory disease affecting the spinal cord, causes bilateral weakness, sensory deficits, bowel bladder issues and autonomic dysfunction. TM is diagnosed on the basis of radiographic and clinical findings. It is crucial to consider a wide range of etiologies including: neuro-inflammatory processes such as Neuromyelitis Optica Spectrum Disorder and MOG Antibody Associated Disease, vascular process such as spinal cord infarct, infectious process such as HIV and syphilis, connective tissue disorder such as lupus or scleroderma, nutritional deficiencies such as B12 or copper, or paraneoplastic syndrome. Below we present a unique case of idiopathic unilateral myelitis with correlating findings on imaging.

**Case presentation** A 69 years old Caucasian female who presented with acute onset of right-sided paralysis. Patient reports symptoms had insidious onset over 2-3 hours. She also complained of urinary incontinence. No sensory deficits, no bowel

incontinence, and no reported visual symptoms. Examination of her cranial nerves were unremarkable. Sensory intact bilaterally. Motor exam reveal strength intact in left upper and lower extremities and paralysis of right upper and lower extremities. T2 weighted MRI spine with an area of hyperintensity on the right side of the spinal cord spanning from levels C3-C5. MRI brain without acute intracranial events. CSF analysis with increased proteins, no oligoclonal bands present. NMO-IgG and MOG-IgG antibodies both negative. Patient also underwent extensive laboratory workup of West Nile, CSF, thyroid, vitamin B12, vitamin E, MMR, meningitis, and complement 3 and 4, all negative except for C4 which was moderately elevated. Patient was diagnosed with idiopathic transverse myelitis and started on IV Solumedrol. Patient underwent a comprehensive rehabilitation program with PT, OT and physiatry with remarkable recovery. Motor recovery was noted to be distal to proximal. Follow-up visit 3 months later patient was able to ambulate using right lower extremity posterior leaf spring AFO with cane.

### 361 ROLE OF OPIOIDS AND CANNABINOIDS IN A MURINE MODEL OF BONE FRACTURE

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10.1136/jim-2019-WMRC.361

**Purpose of study** Opioids are commonly given for pain after acute fracture. Despite analgesic efficacy, evidence for their use in long-term pain control is limited, with a high incidence of side effects including tolerance, sedation, respiratory depression and addiction. Evidence from our lab and others suggests that chronic opioid therapies may enhance bone degradation, and cause opioid-induced hypersensitivity in various models of inflammatory bone disease. It has been recognized that cannabinoid therapy, specifically non-psychotropic CB2 receptor agonists, may have a role in pain management due to their anti-inflammatory properties, as well as a role in bone remodeling. We hypothesize that chronic opioid therapy will slow time to union and slow bone remodeling in a murine model of traumatic femur fracture and inadequately relieve pain, while CB2 receptor agonists will maintain analgesic efficacy and enhance bone healing.

**Methods used** Stainless steel Krischner wire was surgically implanted into the medullary cavity of male C57BL/6J mice 7-days prior to initiating a right mid-diaphyseal femur fracture using a modified three-point bending device. Animals were examined using radiographic analysis to ensure a mid-diaphyseal and non-comminuted fracture. Animals were baselined for pain behaviors prior to and immediately following fracture and tested weekly for the duration of the study. Drug treatment with either morphine (10mg/kg/day), CB2 agonist JWH015 (3mg/kg/day) or DMSO/Tween80/saline in a 1:1:8 ratio began following fracture and continued daily for 42 days (10mL/kg injection, i.p.). Following study, animals were sacrificed for tissue analysis.

**Summary of results** Treatment with JWH015 maintained analgesic efficacy in mice as assessed by vonfrey testing at all time points as compared to morphine treatment ( $p<0.0001$ ). Fracture callus size was significantly larger at days 35 and 42 post fracture in the morphine treatment group compared to the JWH015 group ( $p<0.05$ ). mRNA analysis demonstrated

increases in osteoclast and inflammatory genes (RANKL, IL-6) in the morphine treated group; not seen in the JWH015 group.

**Conclusions** Non-psychotropic cannabinoid therapies (i.e., CB2 agonists) may be more effective analgesics for bone fracture that lack unwanted side effects and enhance bone healing.

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### LEARNING ACCELERATES MICROGLIA REPOPULATION AFTER ELIMINATION BY PLX5622 TREATMENT

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10.1136/jim-2019-WMRC.362

**Purpose of study** Microglia are the resident immune cells of the brain responsible for protecting the central nervous system (CNS) against various pathogenic factors. Besides being involved in the immune response, microglia are highly dynamic, playing an important role in synaptic plasticity through synaptic pruning via phagocytic mechanisms. Although microglial role in synaptic plasticity and cognitive function has been well characterized, the impact of learning experience on microglia regeneration after microglia injury is unclear. To understand how learning and memory affect microglia regeneration, we chemically induced microglial death in a PLX-treatment mouse model and tracked elimination and repopulation of microglia in distinct layers of the hippocampus, a brain region critical for learning and memory.

**Methods used** Survival and development of microglia depend on colony-stimulating factor 1 receptor (CSF1R). PLX5622 is a CSF1R inhibitor well-studied in microglia elimination experiments. In our experiments, two groups of mice, the naive group and learning group, were fed a PLX5622 containing diet (1200mg/kg) throughout the experiment. All mouse brains were extracted after completion of the learning experiment, sliced with vibratome, and probed with Iba1 antibody. Microglial density in different hippocampal CA1 layers was counted manually in a double-blinded fashion from fluorescence microscopic images.

**Summary of results** The majority (>90%) of microglia in the Stratum Pyramidale (SP) and Stratum Radiatum (SR) layers of hippocampus were eliminated in control mice after over three weeks of PLX5622 treatment. Mice in the learning group had significantly higher numbers of microglia both in SP and SR layers when compared to control mice.

**Conclusions** The results from our study showed the mice exposed to the learning paradigm have a higher density of microglia throughout the hippocampus CA1 subregion. This indicates that learning has a positive effect on microglia regeneration. Further mechanistic studies will help elucidate if the accelerated regeneration of microglia will have a positive effect on memory in hopes of translating this information to humans suffering from cognitive disorders.

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### DISEASE-SPECIFIC VALIDATION OF THE UTAH PHOTOPHOBIA SYMPTOM IMPACT SCALE IN MIGRAINE SUBJECTS

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10.1136/jim-2019-WMRC.363

**Purpose of study** In the United States, 1 in every 6 Americans self-report experiencing migraine headache over a 3-month period. A major diagnostic criteria for migraine headache is photophobia (an abnormal sensitivity to light). Up to 80% of migraine patients experience photophobia. Due to the high prevalence of photophobia in migraine patients, it is imperative to have an effective method of measuring the severity and impact of photophobia in order to improve patient care for patients with migraine. Our group developed a new questionnaire including questions on interictal light sensitivity and ADLs. This questionnaire shows promise; however, it is not yet validated as a *disease-specific* questionnaire for migraine headache and requires additional validation.

**Methods used** Patients were screened in Headache and Neuro-ophthalmology clinic at the University of Utah for migraine headache. All patients completed the Headache Impact Test (HIT-6) and the Migraine Disability Assessment Test (MIDAS) as well as the Utah Photophobia Symptom Impact Scale (UPSIS-12). Internal consistency, construct validity, and difference of means were assessed.

**Summary of results** 109 patients were included. (60 migraines, 49 non-migraine). Good reliability was observed in migraine patients. (Cronbach's  $\alpha=0.87$ ) UPSIS-12 scores moderately correlated with HIT-6 scores. ( $r=0.37$ ,  $p=0.004$ ) An unpaired two sample t-test was conducted to determine a difference in mean UPSIS-12 scores between migraine patients and non-migraine patients. There was a significant difference of means between migraine patients (M=33.72, 95% CI=[29.63, 37.80]) and non-migraine patients. (M=18.48, 95% CI=[14.46, 22.50]).

**Conclusions** The UPSIS-12 is a valid and reliable measure of light sensitivity in migraine headaches. Future studies are needed to identify thresholds for different sub-types of migraine (Chronic migraine, Episodic, etc.) and future disease specific validation is necessary for other headache groups (cluster headaches, Post traumatic headache).

## Surgery IV

### Concurrent session

10:15 AM

Friday, January 24, 2020

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### MISSED CHEMOPROPHYLAXIS DOES MATTER: A MULTICENTER ANALYSIS OF VENOUS THROMBOEMBOLISM CHEMOPROPHYLAXIS IN TRAUMATIC BRAIN INJURY PATIENTS

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10.1136/jim-2019-WMRC.364

**Purpose of study** Traumatic brain injury (TBI) is associated with morbidity/mortality in trauma patients. Concern for progression of intracranial hemorrhage leads to delayed/missed doses of venous thromboembolism (VTE) chemoprophylaxis

(VTE-C) and to higher risk of thrombotic complications. Consensus about utilization of VTE-C in TBI patients (TBI-P) is lacking and we hypothesize late/missed VTE-C in TBI-P results in increased VTE.

**Methods used** This was a multicenter, two-year study of adults with head abbreviated injury scale  $\geq 2$ ,  $\geq 2$  head CTs, and LOS  $\geq 72$ h. We compared early v late (48h) VTE-C initiation and proportion with missed v those without missed doses.

**Summary of results** Of 1,803, 8% developed VTE. Median age was 55, 69% were male, and 95% had blunt injury. Median time to VTE-C initiation was 63h. VTE-C was not received in 29%; late in 47%; initiated within 48h in 25%; and initiated within 24h in 3%. Of 1,288 receiving VTE-C, 1,092 missed no doses. In patients with missed doses (196), there was longer time to initiation (57 v 63h,  $p=0.02$ ) and they were more severely injured (ISS 27 v 22,  $p<0.001$ ). They had more polytrauma (22% v 9%,  $p<0.001$ ), higher rates of VTE (20% v 8%,  $p<0.001$ ), longer hospital LOS (17 v 8 days), and longer ICU LOS (12 v 4d), (both  $p<0.0001$ ). There was no significant reduction in VTE with early VTE-C for the group as a whole, however, among TBI-P who underwent delayed neurosurgical intervention, early VTE-C was protective against VTE (HR 0.81, 95% CI 0.73–0.91). After multivariable regression, missed VTE-C doses significantly predicted development of VTE (HR 1.03,  $p=0.01$ ).

**Conclusions** VTE-C is often delayed  $>48$  h or held in TBI-P, predicting higher VTE risk. Future studies are needed to examine the safety of early and perioperative VTE-C.

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#### QUANTIFICATION OF BONE VISCOELASTICITY WITH LAG SCREW IN HINDFOOT ARTHRODESIS

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10.1136/jim-2019-WMRC.365

**Purpose of study** Non-union and delayed union, common complications following hindfoot arthrodesis, may be caused by failure to obtain and maintain compression across bone-to-bone interfaces. Partially threaded cannulated ‘lag’ screws are commonly used for fixation in hindfoot arthrodesis; however, the ability of these screws to generate and maintain compression across hindfoot bones has not been quantified. The goal of this project was to quantify the stress relaxation response of hindfoot bones with initial and repeated lag screw compression.

**Methods used** Twelve pairs of 25mm-diameter bone cylinders were cut with a keyhole saw from fresh thawed cadaveric feet. After cartilage removal and subchondral flattening with an oscillating saw, a calibrated Futek LTH 300 donut load cell and two metal washers were sandwiched between cylinders. Data was filtered using a 6th order Butterworth filter with a 0.035 normalized frequency cutoff. An 8.0mm partially threaded cannulated lag screw (Smith and Nephew, Memphis, TN) was placed from the posterior calcaneus to the anterior-superior talus or posterior-inferior talus to inferior tibia to simulate arthrodesis. Compression between cylinders was recorded at 10Hz as

screws were tightened by three quarter-turns, rested for 3 minutes, retightened one quarter-turn, and rested for 30 minutes.

**Summary of results** Compression with a lag screw demonstrates increased maximum compression and slowed decay upon screw retightening. Maximum compression after three quarter-turns and retightening averaged 284 N and 351 N, respectively ( $p$ -value: 0.0136). Time to decay to 80% of maximum compression after three quarter-turns and retightening averaged 40 ( $n=9$ ; SD: 57) and 528 ( $n=9$ ; SD: 590) seconds, respectively. Compression loss 30 minutes after retightening averaged 25.5% (SD: 8.8%).

**Conclusions** The increase in maximum compression and slowed decay upon retightening with a lag screw can be applied in surgical technique before wound closure to increase the likelihood of successful arthrodesis. Lag screw compression also resulted in a significantly lower percent compression loss and loss rate compared to direct compression. Limitations of this study include its small sample size and the use of cadaveric bone. Future experiments will include a larger sample size and other types of screws.

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#### PROVIDONE-IODINE DOES NOT AFFECT ACELLULAR DERMAL MATRIX INTEGRATION IN PATIENTS UNDERGOING TWO-STAGED, PREPECTORAL, BREAST RECONSTRUCTIVE SURGERY

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10.1136/jim-2019-WMRC.366

**Purpose of study** Providone-iodine has been used as an antimicrobial agent to irrigate the breast pocket and rinse prostheses prior to placement in breast reconstruction surgery. Use of providone-iodine with breast implants was banned from 2000-2017. During this time, acellular dermal matrix (ADM) was introduced to breast surgery. In nonclinical studies, providone-iodine was shown to impair collagen synthesis and kill fibroblasts. As cellular repopulation is critical for ADM integration, concerns were raised about the impact of providone-iodine on ADM integration. However, whether or not providone-iodine impacts ADM integration is unknown.

**Methods used** This retrospective study included patients who underwent immediate, prepectoral, two-stage, breast reconstruction. Study population was divided into providone-iodine-treated patients and triple-antibiotic-treated patients. Breast pockets were rinsed with the antimicrobial agent, and prostheses and ADMs were presoaked perioperatively in the same antimicrobial agent. At implant exchange, ADM integration was clinically assessed. ADM integration was defined as  $\geq 25\%$  of matrix vascularization. ADM integration and postoperative complications were compared between the two groups.

**Summary of results** A total of 111 patients (257 reconstructions) were included in this study. 58 patients (111 reconstructions) were exposed to providone-iodine and 53 patients (97 reconstructions) to triple-antibiotic solution.

ADM integration was noted in 97% of breasts in each group. At implant exchange, integrated matrices appeared healthy, had no signs of foreign body reaction, and demonstrated punctate bleeding. Complications did not differ between groups, including rate of infection, seroma, and expander loss.

**Conclusions** Providone-iodine used for irrigation of the breast pocket and presoaking of prosthesis and ADM appears to have no adverse effects on clinical outcomes. It also did not impede matrix integration. Providone-iodine is safe for irrigation of the breast pocket and presoaking of the prosthesis and ADM in breast reconstruction.

### 367 BACK (DOOR) TO THE FUTURE: DORSAL LUMBOTOMY FOR PEDIATRIC UPPER POLE HEMI-NEPHRECTOMY

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10.1136/jim-2019-WMRC.367

**Purpose of study** The dorsal lumbotomy approach to renal surgery has become a lost art. Upper pole heminephrectomy (UHN) is performed for two main indications: ectopic ureteroceles and duplication anomalies with upper pole ectopy. Current popular techniques for conducting UHN include open flank, laparoscopic, and robotic. This study evaluates outcomes following dorsal lumbotomy (DL), an open approach used historically for pyeloplasty and pyelolithotomy, and in which no clinical trials or exclusive case-series have been conducted for UHN in children.

**Methods used** A retrospective review of 50 UHN performed in pediatric patients using the DL approach by a single surgeon at BC Children's Hospital between 2000–19. Clinical variables and indicators included age, sex, weight, skin to skin time, total operative time, duration of hospital stay, post-operative complications, analgesic requirements, and 3-month post-operative ultrasound results.

**Summary of results** Mean age at surgery was 24.5 months. Mean length of follow-up was 22.5 months. Mean (range) for time between skin incision and closure was 90 (62 – 140) minutes, and the mean (range) total operating room time was 140 (70 – 180) minutes. There were neither intraoperative complications nor transfusions. The mean (range) post-operative opioid delivered was 0.74 (0.00 – 2.00) mg/kg/day. Mean (range) post-operative ibuprofen delivered was 4.73 (0.00 – 25.00) mg/kg/day. Median length of hospital stay was 2 days. No patients received postoperative prescriptions for narcotics at discharge. Two patients experienced minor wound complications. One patient had secondary atrophy of the lower pole. Secondary lower tract surgery, unrelated to surgical approach, was performed in six patients. Fifteen patients experienced a urinary tract infection at some point after surgery.

**Conclusions** DL is a historical approach for UHN that should not be forgotten. It is safe, feasible, and produces operative outcomes and times comparable or superior to that of conventional open flank incision, laparoscopic, and robotic techniques. These findings as well as cost considerations should be considered when promoting robotic approaches to UHN.

### 368 INCIDENCE OF PNEUMOTHORAX AS A COMPLICATION OF BREAST SURGERY

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10.1136/jim-2019-WMRC.368

**Purpose of study** Pneumothorax is a complication of breast surgery which was thought to be rare until Osborn and Stevenson surveyed members of the California Society of Plastic Surgeons on the number of complications of pneumothorax in breast surgery and variables involved in their cases. The response rate of the survey was 50% and the incidence of pneumothorax seemed to be more common than generally appreciated with 1 out of 3 surgeons experiencing at least one pneumothorax in their career. To our knowledge, no study has examined the incidence of pneumothorax in breast augmentation surgery procedures since the Osborn and Stevenson survey published in *PRS. (Plast. Reconstruct Surg. 116: 1122, 2005)* To address this research gap, we are performing a systematic review of the literature to evaluate the rates of complication of pneumothorax related to breast augmentation surgery and researching all institutions that may have worthwhile statistics on the subject.

**Methods used** A thorough search of the literature was conducted using the terms 'pneumothorax' and 'breast augmentation' in the PubMed/MEDLINE databases. The search generated 23 articles. This number was brought down to 6 after initial screening by title. Inclusion criteria then removed those not written in English, those without access to the full text, those without extractable data on complications, those older than 10 years and duplicates, leaving 3 case reports to examine between 2008 and 2019.

**Summary of results** The incidence of pneumothorax in breast surgery appears, at this time, to be in the range of 0.1% to 0.55%. This is consistent with the findings from our previous survey.

**Conclusions** Pneumothorax is still a rare complication after breast augmentation. Our findings confirm the conclusions of our earlier article regarding the encouragement to include pneumothorax as a risk of breast augmentation in the informed consent.

### 369 HOW GOOD IS THE MUSTARDE OTOPLASTY?

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10.1136/jim-2019-WMRC.369

**Purpose of study** The Mustarde otoplasty is a commonly used procedure for the correction of prominent ear. Complication rates following Mustarde otoplasty, related to suture extrusion and long-term outcomes, are variable in the literature. Here, we examine the efficacy and safety of the Mustarde otoplasty.

**Methods used** Retrospective data was collected on patients under 18 years-old who underwent primary otoplasty by the senior author between May 2009 – August 2018. Patient demographics, clinical presentation, intraoperative details, complications, follow-up, and patient/family

satisfaction scores were collected and analyzed. Mustarde efficacy was measured via patient and surgeon satisfaction, whereas safety was measured by complication and reoperation rates.

**Summary of results** There were 119 Mustarde otoplasties performed on 68 patients, with a median follow-up of 72 weeks (range: 24-476 weeks). Fifty-one of the 68 patients underwent bilateral procedures. Of the 119 otoplasties, 110 (92%) were performed for prominent ear and 9 (8%) for cup/constricted ear. The median operative time was 95 minutes (31-133 minutes). A total of 24 complications were reported in 17 patients. Complications included: Suture extrusion (n=20), hematoma (n=1), suture abscess (n=1) and reoperation (n=2). The study had a revision rate of 1.7% (n=2). No additional procedures were documented at other hospitals in the province. The majority (97%) of reported ear outcomes demonstrated both patient and surgeon satisfaction.

**Conclusions** The Mustarde otoplasty demonstrated a high efficacy in the correction of prominent ear, with low reoperation rates and high patient and surgeon satisfaction. Suture extrusion, the most frequent complication, was managed successfully by suture removal one year post-operatively.

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#### A COMPLEX INTERPROFESSIONAL SIMULATION SCENARIO OF NECK MASS WITH CRITICAL AIRWAY OBSTRUCTION

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10.1136/jim-2019-WMRC.370

**Purpose of study** Emergency airway management is a low-frequency, high-acuity situation that all otolaryngology residents encounter. This requires situational awareness, sound decision-making, and strong interprofessional communication. Few curricula target these non-technical skills. Simulation can enhance technical and non-technical skills in a safe setting. We aimed to develop a complex simulation scenario that promotes non-technical skills among junior otolaryngology trainees.

**Methods used** A script of a scenario describing impending airway obstruction was developed by a multidisciplinary team from a deidentified patient case edited using iterative input to simplify and ensure generalizability. The scenario was tested on junior otolaryngology trainees using a high-fidelity mannequin in a simulated OR, appropriate instrumentation, anesthesiologist and nurse confederates, and a facilitator. In the scenario, a 52-year-old with a neck mass had worsening dyspnea that progressed to respiratory distress requiring intubation. Educational objectives included recognizing urgency, calling for help and tools, communicating interprofessionally, and intubating with a flexible bronchoscope. Surveys of trainees before and after the simulation evaluated the scenario for realism and trainee confidence in airway management. Expert faculty and senior residents evaluated the scenario's realism and relevance to the ACGME core competencies.

**Summary of results** 18 R1 to R3 level trainees participated in the scenario. Trainees showed an increase in confidence

with airway management from 2.3/5 to 3.1/5 which was not statistically significant. Participants scored the scenario realism as 4.18/5 and experts reviewing the case scored the case as 4.5/5. Seven expert evaluations showed agreement to strong agreement that the scenario enhanced medical knowledge (4.6), technical skill (4.4), communication (5.0), professionalism (4.7), and systems-based practice (4.6).

**Conclusions** This scenario was felt to be realistic by trainees and faculty, offered educational value across ACGME core competencies, and improved trainee confidence. The scenario may be a resource for programs implementing similar training.

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#### DUAL-PLANE VERSUS PREPECTORAL BREAST RECONSTRUCTION IN HIGH BMI PATIENTS

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10.1136/jim-2019-WMRC.371

**Purpose of study** Patients with high body mass index (BMI  $\geq 30$  kg/m<sup>2</sup>) who undergo breast reconstruction face unique challenges and postoperative complications associated with their BMI. The optimal reconstructive approach for these patients remains to be determined. In order to determine if there was an association between postoperative complications and the plane of reconstruction, this study compared outcomes of prepectoral and dual-plane reconstruction specifically in patients with high BMI.

**Methods used** This study included high BMI patients who underwent immediate dual-plane or prepectoral expander/implant reconstruction. Patients were stratified by reconstructive approach (dual-plane or prepectoral). Subsequently, postoperative complications were compared between the two groups. Multivariate logistic regression analysis was performed to determine whether the reconstruction plane was an independent predictor of any postoperative complication after adjusting for potential confounding differences in patient variables between the groups.

**Summary of results** 133 patients enrolled in the study. Of those, 65 (128 breasts) underwent dual-plane and 68 (129 breasts) underwent prepectoral reconstruction. Rates of seroma (13.3% vs 3.1%), surgical site infection (9.4% vs 2.3%), capsular contracture (7.0% vs 0.8%), and any complication (25.8% vs 14.7%) were significantly higher in patients who had dual-plane vs prepectoral reconstruction ( $p < 0.05$ ). Multivariate logistic regression identified the following variables as significant, independent predictors of any complication: dual-plane reconstruction, diabetes, neoadjuvant radiotherapy, and adjuvant chemotherapy ( $p < 0.05$ ). Dual plane increased the odds of any complication by 3-fold compared with the prepectoral plane.

**Conclusions** Compared with the dual-plane approach of reconstruction, this study demonstrated that the prepectoral approach was associated with a lower risk of postoperative complications following immediate expander/implant breast reconstruction and may be a better reconstructive option for high BMI patients.



### 372 BOTH THE GUIDEWIRE AND STENT SELECTED INFLUENCE THE ABILITY TO BYPASS AN IMPACTED URETERAL STONE

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10.1136/jim-2019-WMRC.372

**Purpose of study** This bench-top study compares the ability of 24 different guidewire-stent combinations to bypass an impacted ureteral stone.

**Methods used** A bench-top impacted ureteral stone model was used to compare the force required to bypass a tightly impacted 5 mm ureteral Begostone. 6 different wires and 4 different stents were placed beyond an impacted stone using a Mark-10 Force Gauge. 10 trials were run for each stent-guidewire combination unless no stent passage occurred after 5 trials (N=190). Primary outcomes included stent passage rate and insertion force (lbf). The stent passage rates were compared using a Chi-Square test. The average stent insertion force was compared using ANOVA and Tukey tests. A p-value <0.05 was considered significant.

**Summary of results** The highest stent passage rates were seen in the Inlay-ZIPwire (100%) and Lubriflex-Glidewire (100%) (table 1-E). The stent passage rates were significantly different between the different combinations (Chi-Square test; p<0.05). The stent passage rate of each individual stent regardless of the guidewire used were significantly different (Chi-Square Test; p<0.05). The Olympus Lubriflex stent had the highest stent passage rate (78.18%; N=55), followed by the Bard Inlay Stent (63.64%; N=55). Of the stents that passed, the Inlay-ZIPwire required the least insertion force (table 1).

**Conclusions** These results suggest that both the guidewire and stent employed significantly influence the force required for stent passage. Knowledge of these factors could help surgeons select the optimal stent-guidewire combinations for these surgeries.

Joint plenary session  
WAFMR, WAP, WSCI, AND WSPR  
Friday, January 24, 2020  
1:30 PM – 3:45 PM

### 373 NEURODEVELOPMENTAL OUTCOMES OF PRETERM INFANTS WHO RECEIVED A BLOOD TRANSFUSION

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10.1136/jim-2019-WMRC.373

**Purpose of study** Preterm infants frequently receive red blood cell (RBC) transfusions due to early illness or to treat symptomatic anemia. Previous studies attempting to reduce anemia or provide higher volumes of blood have not led to improved outcomes at two years of age. The purpose of this study was to investigate the relationship between RBC transfusions and neurodevelopmental outcomes among preterm infants.

**Abstract 372 Table 1** Stent passage rate and average insertion force required to bypass an impacted stone of 24 different stent-guidewire combinations in a benchtop model. Pearson Chi-Square test: p<0.05

A. Stent	B. Guidewire Manufacturer	C. Guidewire	D. Stent Passage Rate	E. Average Insertion Force
Bard Inlay	Bard Boston Scientific Cook Medical Olympus	SOLO Hydro Hybrid	5/10 (50%)	0.45738
		ZIPwire	10/10 (100%)	0.21710
		Amplatz Super Stiff	3/10 (30%)	1.02611
		HiWire	8/10 (80%)	0.46300
		UltraTrack	9/10 (90%)	0.30057
Boston Scientific Percuflex	Bard Boston Scientific Cook Medical Olympus	SOLO Hydro Hybrid	0/5 (0%)	N/A
		ZIPwire	0/5 (0%)	N/A
		Amplatz Super Stiff	8/10 (80%)	0.81092
		HiWire	6/10 (60%)	0.39652
		UltraTrack	9/10 (90%)	0.56309
Cook Medical Universa Firm	Bard Boston Scientific Cook Medical Olympus	SOLO Hydro Hybrid	6/10 (60%)	0.27558
		ZIPwire	0/5 (0%)	N/A
		Amplatz Super Stiff	0/5 (0%)	N/A
		HiWire	0/5 (0%)	N/A
		UltraTrack	0/5 (0%)	N/A
Olympus Lubriflex	Bard Boston Scientific Cook Medical Olympus	SOLO Hydro Hybrid	0/5 (0%)	N/A
		ZIPwire	9/10 (90%)	0.42348
		Amplatz Super Stiff	8/10 (80%)	0.41493
		HiWire	8/10 (80%)	0.51228
		UltraTrack	8/10 (80%)	0.35201
		UltraTrack	0/5 (0%)	N/A
		Glidewire	10/10 (100%)	0.63628

**Methods used** This study utilizes a retrospective cohort design to evaluate preterm infants born between May 2007 to July 2019. Children were assessed using the Bayley Scales of Infant and Toddler Development-Third Edition. Multivariable regression was used to evaluate the association between RBC transfusion and neurodevelopmental outcomes. Severe neurodevelopmental impairment (NDI) was defined as any Bayley composite score <70, blindness, deafness, or an abnormal neurological exam.

**Summary of results** 602 children were evaluated. Two hundred sixty-eight (45%) infants received a total of 691 RBC transfusion exposures. 52% received RBC transfusion after 72 hours of life. After adjusting for maternal age, gestational age, gender, intraventricular hemorrhage, and need for inotropes, RBC transfusion was associated with lower two-year cognitive, language, and motor composite scores (adjusted- $\beta$  [95% CI]: -2.53 [-4.75 to -0.31],  $P=0.026$ ; -2.64 [-5.25 to -0.03],  $P=0.047$ ; -3.57 [-5.90 to -1.24],  $P=0.003$ , respectively). RBC transfusion was also associated with an increase in the adjusted-odds of developing severe NDI (adjusted-OR, 1.83 [95% CI, -1.02-3.30],  $P=0.043$ ). In an adjusted analysis of preterm infants <28 weeks, RBC transfusion retained statistical significance for cognitive composite scores ( $P=0.038$ ).

**Conclusions** RBC transfusion was an independent predictor of lower cognitive, language, and motor outcomes in preterm infants at two-years after adjustment for differences in perinatal characteristics and illness at birth. Prospective studies utilizing blood-saving strategies (placental transfusion, minimal blood draws), to reduce the need for blood transfusion and improve long term outcomes, are needed to confirm this association.

### 374 A NEW HOUR-SPECIFIC SERUM BILIRUBIN NOMOGRAM CONSTRUCTED WITH DATA FROM 400,000 NEONATES

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10.1136/jim-2019-WMRC.374

**Purpose of study** Since its publication in 1999 the Bhutani bilirubin nomogram has served an essential role in assessing the risk of neonatal hyperbilirubinemia. However, because it was created from 2840 neonates, it was not large enough to conduct rigorous subgroup analyses to evaluate risk-factor associations with gestational age, gender, and race.

**Methods used** We created a new total serum bilirubin (TSB) nomogram based on 15 years of data from the Intermountain Healthcare hospitals universal bilirubin screening program (54.3% of Utah livebirths). Using these data we performed various subgroup risk-analyses.

**Summary of results** We collected the initial TSB value drawn on 421267 neonates, of which 397395 qualified for inclusion in the database from which an hour-specific bilirubin nomogram was constructed. New information included; 1) robust data in the first 12 hours after birth (which was not included in the 1999 nomogram), 2) general agreement with the 1999 nomogram for values in the first 60 hours, but higher 75th

and 95th percentile TSB values thereafter in the new nomogram, 3) no difference in TSB between male and female neonates, 4) higher TSB values, after the first 36 hours, among earlier gestation neonates (35 0/7 - 36 6/7 weeks vs.  $\geq 37$  weeks,  $p<0.0001$ ), 5) lower TSB values in neonates of Black race ( $p<0.0001$ ).

**Conclusions** We constructed a new neonatal hour-specific bilirubin nomogram using the methodology of the Bhutani nomogram but including about 140 times the number of subjects in the 1999 version. We found higher TSB values in younger gestation neonates, no difference by sex, and lower values among neonates of Black race.

### 375 TELEHEALTH DIAGNOSES OF AUTISM SPECTRUM DISORDER IN TODDLERS

<sup>1</sup>M Butsch\*, <sup>1</sup>M Aites, <sup>2</sup>T Cartisano, <sup>1</sup>D Roy, <sup>1</sup>B Jordan, <sup>1</sup>E Flake, <sup>1</sup>D Tolson. <sup>1</sup>Madigan Army Medical Center, Joint Base Lewis McChord, WA; <sup>2</sup>Bassett Army Community Hospital, Fairbanks, AK

10.1136/jim-2019-WMRC.375

**Purpose of study** Determine telehealth accuracy and efficacy in diagnosing autism spectrum disorder in children aged 21 months to 48 months

**Methods used** Children receiving care at a military hospital in Alaska received comprehensive telehealth evaluations by two Developmental Pediatricians and Fellows located at Madigan Army Medical Center in Washington. Following parent interview, two of the physicians independently observed the child while directing the parent to attempt to engage their child in the Selective Play Observation via Telehealth (SPOT). Each item presented (ball, bubbles, balloon and car) was scored as a 'pass' or 'fail' in accordance with the scoring standards of the Screening Tool for Autism in Toddlers. The Developmentalists then independently rendered a determination of the presence or absence of autism, with confidence scale (very confident, somewhat confident, and uncertain), and discussed their determination with the family. Parents completed satisfaction surveys and scheduled a confirmatory in-person evaluation with a Developmental Pediatrician. The Telehealth evaluation and confirmation evaluations were compared.

**Summary of results** Of the 15 children enrolled, 7 received Autism diagnoses after the Telehealth evaluation (inter-rater reliability 100%). In-person evaluation diagnoses matched telehealth diagnoses in 15/15 children. 14/15 of the children underwent the confirmatory evaluation with a different provider than originally participated in the telehealth evaluation. Telehealth assessment utilizing the SPOT demonstrated a sensitivity equivalent to the Screening Tool for Autism in Toddlers sensitivity (83%) but with a reduced specificity (58% versus 86%). Staff providers were more frequently 'very confident' (78%) using telehealth to evaluate a child for autism compared to Fellows (48%); and were similarly 'very confident' (100%) rendering an actual diagnosis of autism via telehealth compared to Fellows (40%).

**Conclusions** This is the first study to report utilizing video telehealth to diagnose autism using a parent led play observation. This study supports the concept of conducting autism evaluations by video telehealth.

## Behavior and development II

## Concurrent session

8:00 AM

Saturday, January 25, 2020

### 376 MOTOR AND COGNITIVE DEVELOPMENTAL SCORES IN OFFSPRING OF PREGNANT SMOKERS AT 12 MONTHS OF AGE

T Batish\*, K Milner, J Harris, A Vu, S Saxton, C Morris, C McEvoy. *Oregon Health and Sciences University, Portland, OR*

10.1136/jim-2019-WMRC.376

**Purpose of study** In some studies, prenatal smoke exposure has been associated with decreased cognitive, motor, and behavioral function in the offspring. We conducted the current analysis to determine whether the neurodevelopmental scores collected by domain on the Ages and Stages Questionnaire (ASQ) scores at 12 months of age differed between offspring of prospectively identified pregnant smokers versus nonsmokers.

**Methods used** The validated ASQ-3 was obtained at 12 months of age for offspring delivered to pregnant smokers randomized to vitamin C versus placebo during pregnancy and offspring of pregnant nonsmokers also studied prospectively. Z-scores for each ASQ domain were calculated using the normative data obtained from the ASQ-3 user's guide. The raw scores and Z-scores per domain were compared between groups using the Wilcoxon signed rank test.

**Summary of results** ASQ results were obtained in 204 offspring of smokers and 32 of nonsmokers. The demographics of the two groups were: Smokers: 19% non-white, 87% government assisted or self-paid/none insurance status, 54% ≤ high school education, 8 cigarettes/day at randomization into the study at <23 weeks of gestation. Nonsmokers: 6.3% non-white; 6.3% government insurance; 6.3% ≤ high school education. The offspring of smokers had significantly lower scores in the problem solving (Z score of -0.04 in smokers versus 0.32 in nonsmokers) and personal social (Z score of 0.04 in smokers versus 0.45 in nonsmokers) domains. See table 1.

**Conclusions** This data suggests a potential difference in problem solving and personal social domains in offspring of smokers versus nonsmokers. However, we are limited by our sample size to be able to adjust for other important covariates. Further study with longer follow-up and more detailed neurodevelopmental testing is needed.

**Abstract 376 Table 1** Motor and cognitive scores in offspring of smokers and nonsmokers

ASQ Domain	Offspring of Smokers (n=204)	Offspring of Nonsmokers (n=32)
Communication	51.3 ± 9.6	53.8 ± 8.5
Gross Motor	54.0 ± 10.2	53.1 ± 13.4
Fine Motor	54.6 ± 7.6	55.6 ± 6.6
Problem Solving	48.6 ± 10.4	52.5 ± 8.2*
Personal Social	46.2 ± 12.5	51.1 ± 9.7*

### 377 THE IMPACT OF TELE-BEHAVIORAL HEALTH IN RURAL AMERICAN INDIAN COMMUNITIES

S Yang\*, MK Lieng, J Mouzoon, I Sigal, JP Marcin, M Pakyurek, B Restrepo, JS Hoch, PM Yellowlees. *University of California Health System, Sacramento, CA*

10.1136/jim-2019-WMRC.377

**Purpose of study** Past studies on tele-behavioral health show that virtual psychiatric, substance abuse, and other mental health services are linked to improved quality of life and symptoms across demographically and diagnostically diverse groups of patients. However, there are still large geographically isolated populations, including American Indians, without access to behavioral health services and even less data demonstrating the effectiveness of tele-behavioral health services among these marginalized populations. The purpose of this study is to evaluate the impact of tele-behavioral health services provided to rural American Indian populations on patient-centered measures among both pediatric and adult patients.

**Methods used** Using our existing telehealth network with five Indian Health Services clinics located in rural American Indian tribal areas, we administered mental health surveys during patient-intake using five validated clinician-rated instruments: PHQ-9, GAD-7, PROMIS, DUDIT-C, CBCL; and two provider-observed validated instruments: CGI and GAF. For patients with more than one visit, the first two visits were compared using paired *t*-tests in R.

**Summary of results** Preliminary data from the past five months show a total of 122 completed tele-behavioral health appointments. From those, 17 self-reported mental health surveys and 59 provider-observed measures were completed. The baseline characteristics abstracted shows poor to moderate mental health symptoms for all patients across all validated instruments, with the exception of the drug usage disorder test, DUDIT-C, scoring low in usage. Furthermore, the data shows that for seven individuals who had more than one tele-health encounter over the 5 month period, there was a 4.42-point increase in GAF (95% CI: 1.10 to 7.76) from 60.3 to 64.7 which shows an improvement on the GAF scale from 'Moderate symptoms' to 'Some mild symptoms.'

**Conclusions** Rural American Indian communities significantly suffer from mental health illnesses as well as barriers to care. The preliminary analysis of the short pre- and post- test evaluation indicate that tele-behavioral health services have the potential to improve mental health measures and illnesses in rural American Indian communities. Data collection will continue until March 2021.

### 378 PRIMARY CARE SCREENING PRACTICES FOR LEARNING DISABILITIES

<sup>1,2</sup>S Jonnalagadda\*, <sup>1</sup>R Boada, <sup>2</sup>A Talmi. <sup>1</sup>*Children's Hospital Colorado, Aurora, CO*; <sup>2</sup>*University of Colorado School of Medicine, Aurora, CO*

10.1136/jim-2019-WMRC.378

**Purpose of study** Regular screening can improve overall development through identification of children at risk for learning disabilities (LD) and facilitate more timely access to intervention. Failure to identify and address LD can result in academic failure, internalizing symptoms, and behavioral challenges. Currently, LD concerns are identified in the primary care setting when there are presenting concerns or through general developmental screens. We hypothesize that learning disabilities are

insufficiently identified using current primary care screening practices. This study aims to: a) characterize children who screen positive for learning concerns within our primary care clinic, b) compare percent of children who screen positive to prevalence rates of learning disabilities in the population and c) determine if a plan for intervention was documented by the primary care provider.

**Methods used** In the initial phase, we will retrospectively analyze electronic medical record data collected over an 18-month period. Children between ages 6 to 17 years with a positive screen for educational difficulties will be selected. Screens will be considered positive if the parent answers affirmatively to a question regarding school difficulties on the clinic's psychosocial patient questionnaire. Data regarding other associated variables such as co-morbid conditions and socioeconomic status will also be obtained, to see how they correlate with positive LD screen status. Interventions in response to the positive screen will also be documented.

**Summary of results** Data collection and analysis is ongoing. Interim results including descriptive statistics of patients with positive screen will be presented.

**Conclusions** Results will be used to determine feasibility of integrating a specialized learning disability screener into current clinic workflow. We hypothesize that a specialized screener will improve identification of children at risk for learning disabilities when compared to current practice.

### 379 DEVELOPING TEAM NEMO: RESTRUCTURING THE HIGH-RISK INFANT FOLLOW UP (HRIF) CLINIC FOR THE IMPLEMENTATION OF EVIDENCE-BASED GUIDELINES FOR EARLY DIAGNOSIS OF CEREBRAL PALSY (CP)

S Iyer, K Jiang\*, S Espinosa, K Kesavan. *UCLA, Los Angeles, CA*

10.1136/jim-2019-WMRC.379

**Purpose of study** Recent guidelines recommend early diagnosis and early intervention to improve outcomes in children with CP. The HRIF clinic at University of California Los Angeles (UCLA) is part of a multi-site study aimed at implementing these guidelines and decreasing the age of CP diagnosis to under 12 months. Team NEMO (Neurodevelopment and Early Movements Observation) was formed to facilitate the implementation.

**Methods used** Setting:

2 HRIF clinics at UCLA.

Implementation stages:

Exploration – leadership commitment, review of current practices, addressing barriers to implementation using SWOT analysis, IRB approval

Installation – selecting staff, training, process flow design, redesign in clinic structure, schedule of visits

Initial implementation – data collection, refining process flow design, weekly team meetings, monthly site calls

Full implementation – monitoring fidelity of process flow, sustaining gains, making plans for further expansion to other sites

Patients who qualify for HRIF were identified during their stay in the neonatal intensive care unit (NICU). Babies who did not qualify for HRIF but with abnormal general movements assessment were also referred to the HRIF. Babies were seen in the HRIF clinic starting at 3-4 months corrected gestational age.

**Summary of results** Compared to the year before implementation, the mean age of CP diagnosis decreased from 15.4 months to 12.03 months. Total number of new diagnosis of CP increased from 4 to 8. The number of high-risk for CP diagnosis increased from 0 to 17, with average age for high risk of CP diagnosis being 3.7 months. The number of visits for babies under 4 months increased from 45 to 134. No-show rate decreased from 20% to 13%

**Conclusions** The NEMO program successfully implemented the guidelines, resulting in decrease in average age of cerebral palsy diagnosis to 12 months.

### 380 PRIMARY CARE MANAGEMENT OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN CHILDREN AGED 2 – 5 YEARS

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10.1136/jim-2019-WMRC.380

**Purpose of study** Attention-deficit/hyperactivity disorder (ADHD) affects approximately 2% of US preschool-age children. Little is known regarding preschool ADHD diagnosis and management by primary care providers (PCPs). This study assessed (1) rates of PCP diagnosis of ADHD in preschool-age children, (2) PCP adherence to select aspects of ADHD clinical practice guidelines, and (3) patient factors influencing variation in PCP diagnosis and management.

**Methods used** Retrospective cohort study of electronic health record (EHR) data from all office visits of children aged 2-5 years, seen  $\geq 2$  times between 2015 and 2019, in 10 practices of a community-based California primary health-care network. Study outcomes included ADHD diagnosis (symptom- or disorder-level), and adherence to guidelines in (1) documentation of comorbidities at or after an ADHD diagnosis, (2) choice of ADHD medication, and (3) follow-up of medicated patients.

**Summary of results** Of 29,408 eligible children aged 2 to 5 years, 195 (0.7%) carried an ADHD diagnosis (0.04%-0.85% from 2-5 years, respectively). Of those, 109 (56%) had only symptom-level ADHD diagnoses (e.g., hyperactivity); 105 (54%) had documented comorbidities (e.g., language delay/disorder). ADHD medications were prescribed only to children aged 4-5 years (40/195 (21%)); 34 of those 40 received stimulants as the first-line medication, and 19 of 40 had a follow-up visit within 2 months. In logistic regression models, children with public or military insurance were more likely to have an ADHD diagnosis (OR=1.64; CI: (1.17, 2.26); OR=2.22; CI: (1.32, 3.56)); ADHD patients initially diagnosed at a younger age and those with military insurance were more likely to have documented comorbidities (OR=1.06 (1.03, 1.10); OR=2.94; CI: (1.064, 3.529)).

**Conclusions** The rates of PCP diagnosis of ADHD in preschoolers in this network were below estimated population prevalence. PCPs mostly followed guidelines in identification of comorbid conditions and in choice of stimulant medications, but had low rates of timely follow-up. Preschool-age children with ADHD may have remained undetected, with evidence of sociodemographic disparities in diagnosis of young children with ADHD.

### 381 EARLY CHILDHOOD INTERVENTION SERVICES IN SEX CHROMOSOME ANEUPLOIDIES (SCA)

N Tartaglia, S Howell, S Davis, TG Thompson\*. *University of Colorado, Aurora, CO*

10.1136/jim-2019-WMRC.381

**Purpose of study** Children with SCA such as XXY, XYY, XXX, and XYY have higher rates of early developmental delays and many require special education supports. However, research on early childhood outcomes in SCA is limited and was conducted prior to current special education law and practices. It is critical to update our understanding of current community and educational supports for children with SCA in order to guide families and providers, and to inform early childhood systems and policy. This study examines parent-reported publicly funded intervention services in young children with SCA and parent perception of early childhood providers' knowledge of SCA conditions.

**Methods used** Data were collected from a larger electronic REDCap survey (N=550) examining community and educational supports in parents of children 0-21 with a confirmed SCA diagnosis. Participants were recruited from clinics and advocacy organizations. Questions focused on participation in early intervention/birth to 2 services (EI) and early childhood special education/preschool (ECSE) and took 5-20 minutes to complete. The current subset (N=105) included US children who had not yet entered Kindergarten.

**Summary of results** Results show that over half of all children receive some kind of EI or ECSE therapy (EI=59%, ECSE=58.5%) and that tetrasomy SCA conditions (XXYY, XXY, XXXX) (EI=87%, ECSE=100%) are more likely to receive therapies than trisomy conditions (XXY, XYY, XXX)(EI=54%, ECSE=48%)(p=0.023). Speech therapy is the most common therapy for both EI and ECSE groups across all SCA conditions. Most children receive 1 hour or less of EI therapies per week (96%) and the majority (72%) of preschool students are in inclusive classroom settings. Over half (57%) of parents report their child's early childhood therapist and/or teachers have little to no knowledge of SCA conditions, and none(0%) were rated as 'highly informed.'

**Conclusions** Medical and developmental providers should be aware of the frequent need for EI in infants and young children with SCA so that appropriate evaluations and interventions can be implemented in a timely manner. Parent report on the limited knowledge of SCA in early childhood providers and teachers justifies a need to train therapists, teachers, and policy makers in the unique developmental needs in children with SCA.

### 382 ETHNIC DISPARITIES IN REFERRALS AND SERVICES RECEIVED AFTER NICU FOLLOW-UP EVALUATIONS IN A SINGLE CENTER IN CALIFORNIA

RD Rodriguez\*. *UC Davis MIND Institute, Sacramento, CA*

10.1136/jim-2019-WMRC.382

**Purpose of study** The NICU population is at an increased risk for neurodevelopmental impairments. Many of them are not

being appropriately referred to Early Intervention (EI) for reasons that have not been fully explored. Families of low SES or minority groups may have more difficulty accessing these services. We hypothesized that 1-Non-White ethnicities have lower EI referral rates from High Risk Infant Follow-up (HRIF) clinics compared to Caucasians and 2-of those referred to EI, Non-White children have the lowest receipt of EI services compared to Caucasians.

**Methods used** This was a secondary analysis of data collected from HRIF visits through the California Perinatal Quality Care Collaborative (CPQCC) database at UC Davis from 2010-2014. Eligible patients were those who were evaluated at  $\geq 18$  months and had a documented subsequent visit for which EI referrals were warranted.

**Summary of results** 135 individuals met inclusion criteria. Across individuals, the average age was 20.3 months at the 1st visit (SD=2.6, range=18-29). More Non-Whites were referred for speech (p=0.003) and developmental (p=0.03) services than Caucasians. A smaller percentage of Non-Whites were receiving PT (p=0.04), OT (p=0.04) and vision (p=0.01) services at the 1st visit. At the subsequent visit, barely half of those referred for speech therapy, and less than one third of those referred for other services (PT, Behavior, OT) were receiving appropriate services.

**Conclusions** Part C of the IDEA is intended to enhance the development of infants and toddlers with disabilities, minimize the need for special education and maximize the potential for independent living. Contrary to our hypotheses, we found that Non-Whites are being appropriately referred; however, further investigation into the reasons why Non-White children are not receiving appropriate services is warranted, such as individual barriers (medical complexity, language, culture, finances and family priorities, etc.) or systems issues (geography, wait list and capacity, budgets, eligibility differences). There is an urgent need to identify, document and understand the reasons for these disparities in services and develop targeted interventions to optimize development in this population.

### 383 VISION LOSS AND PSYCHOPATHOLOGY

JR Mark\*, AG Kulinich, LM Scher, MJ Mannis. *UC Davis School of Medicine, Sacramento, CA*

10.1136/jim-2019-WMRC.383

**Purpose of study** By examining the associations between vision loss and various types of psychopathology within the current literature, this manuscript will provide ophthalmologists, psychiatrists, and psychologists insight into the relationships between vision and psychopathology to foster cross-professional relations. Topics explored include mental health consequences of vision loss, functional neurological disorders and deception syndromes, eye specific personality changes, Charles Bonnet syndrome, and vision disorders associated with psychosis.

**Methods used** A narrative literature review was conducted using PubMed, Google Scholar, and Scopus internet search engines. Study types examined included reviews, case studies, survey analyses, population-based studies, and twin studies among others.

**Summary of results** The prevalence and magnitude of mental health comorbidities appear to depend on eye pathology among other factors. Nevertheless, visual impairment in general correlates with depression and a decline in overall quality of life and mental health. When patients with functional neurological disorders or deception syndromes present to ophthalmologists, understanding their symptoms and motivations is crucial for proper management. Patients with myopia and keratoconus are alleged to have unique personalities; however, research shows openness is the only trait correlated with myopia, while a proposed 'keratoconus personality' is unfounded. The vivid hallucinations of Charles Bonnet syndrome typically do not bother patients and simple physician reassurance is usually enough to ease the anxious patient. Usher syndrome involves congenital deafness and progressive blindness in young children with shown links to psychosis and schizophrenia. Finally, aripiprazole is an atypical antipsychotic that can rarely cause blurred vision; however, when used as dual therapy for depression management, incidence of adverse ocular effects can be greatly increased.

**Conclusions** With recognition of the bidirectional psychosomatic ophthalmological landscape, doctors can form treatment plans with mental and emotional health considerations starting at the first visit. The literature suggests that co-management of these patients with an ophthalmologist alongside a psychiatrist or psychologist could more effectively manage their holistic care.

## Clinical epidemiology and health disparities

### Concurrent session

8:00 AM

Saturday, January 25, 2020

#### 384 OUTCOMES IN PEDIATRIC GLAUCOMA

<sup>1</sup>C Kapoor\*, <sup>2</sup>A Jiang, <sup>2</sup>JD Brandt. <sup>1</sup>University of California, Davis, School of Medicine, Sacramento, CA; <sup>2</sup>UC Davis Eye Center, University of California, Davis, Sacramento, CA

10.1136/jim-2019-WMRC.384

**Purpose of study** To determine visual outcomes and risk factors for vision loss for patients with childhood-onset glaucoma, to externally validate a provisional glaucoma severity scale, and to explore potential additional risk factors impact long term visual outcomes.

**Methods used** Retrospective review of electronic medical records of patients with a history of pediatric glaucoma. Data collected included initial presentation characteristics such as age, IOP, and refraction status, prior surgeries, acquired and non-acquired ocular conditions, glaucoma subtype, number and types of glaucoma surgeries, unilateral and bilateral disease, insurance type, patient adherence to prescribed follow-up (number of no-show appointments), along with demographic characteristics. Univariate analysis was used to determine associations between each putative factor and ultimate visual outcome.

**Summary of results** 177 patients with a diagnosis of childhood glaucoma were identified; 153 eyes of 93 patients met inclusion criteria. Male:Female ratio was 49:51. Mean age at presentation was  $4.69 \pm 6.23$  years. Mean duration of follow-up was  $9.64 \pm 3.60$  years. Ethnicity (non-Hispanic and Hispanic or Latino) was associated with poor visual outcomes ( $p=0.005$ ). Of our 93 patients, 52 (56%) had private insurance, 33 (35%) had Medicaid, and 8 (9%) had unknown insurance type; private insurance was associated with a better outcome ( $p=0.021$ ). Many patients missed appointments ( $3.98 \pm 5.44$  average no-show rate) but increased no-shows were associated with poor visual acuity ( $p=0.024$ ).

**Conclusions** Previously-documented risk factors for poor visual outcome include glaucoma subtype and ethnicity. We identified new risk factors including increased no-show appointments and non-private insurance type as strongly correlated with poor visual outcomes. These factors' influence on visual outcomes can help develop targeted interventions for glaucoma care.

#### 385 EXCESS IODINE EXPOSURE: A CONTINUED RISK FOR SUBCLINICAL HYPOTHYROIDISM IN INFANTS

<sup>1,2</sup>C Shin\*, <sup>2</sup>R Lin, <sup>2</sup>S Maddasani, <sup>2</sup>H Zhang, <sup>2</sup>A Zidan, <sup>2</sup>S Chen, P Wu <sup>2</sup>, <sup>2</sup>A Goswami, <sup>2,3</sup>B Afghani. <sup>1</sup>UC San Diego, La Jolla, CA; <sup>2</sup>UC Irvine, School of Medicine, Irvine, CA; <sup>3</sup>CHOC Hospital of Orange County, Orange, CA

10.1136/jim-2019-WMRC.385

**Purpose of study** The fetus and newborn infants are sensitive to the thyroid suppressive effects of excess iodine. The purpose of this study was to see whether exposure to excess iodine during pregnancy or lactation continues to be a risk to the newborn infants.

**Methods used** A literature search was utilized through search engines, PubMed, Google Scholar, and Cochrane using keywords, 'iodine', 'neonate', and 'thyroid'. Studies included must have measured iodine concentration in urine and/or breast milk as well as thyroid function tests in the newborns or infants. Case reports were excluded.

**Summary of results** 4 studies met our inclusion criteria. All of the studies took place outside of the United States. Sources of excess iodine included water, household salt and seaweed products. Most studies showed an association between iodine excess, measured in urine or breast milk and the development of subclinical hypothyroidism. Because of lack of long term follow-up, it is unclear if the abnormal thyroid function tests persisted. Other limitations included lack of baseline sampling in some studies and lack of controls that would take into account other possible sources of excess iodine or other factors that could lead to abnormal thyroid tests.

**Conclusions** Our literature review suggests that excessive iodine intake in certain countries worldwide continues to pose a health risk to newborns. Iodine intake as measured in the breastmilk or urine is associated with development of subclinical hypothyroidism. Healthcare professionals should be aware of socio-economic and cultural factors that could lead to intake of excess iodine. To minimize the risk to the newborn, pregnant mothers should be educated about the sources of excess iodine.

**Abstract 385 Table 1** Correlation of thyroid function and concentration of iodine in breast milk and urine

First Author, Year, Location	Source of Iodine Transmission during Pregnancy and Postnatal	Subject Age Number of Subjects	Breast Milk Iodine Concentration (BMIC)	Urinary Iodine Concentration of Infant (UIC)	Values (Mean or Range) fT4 Level TSH Level Tg Level	Presence of Hypothyroidism based on UIC	P-value
Aakre, 2016, Algeria	High iodine concentration in groundwater refugee camps	Baseline: 0-6 months, n=111 Follow-up at 3 years, n=76	Median=479 ug/L at baseline	Mean at baseline=722 ug/L Mean at 3 year follow-up=458 ug/L	Measurement at 3 year f/u fT4: 11.2-21.8 pmol/L TSH: 0.2-15.3 mIU/L Tg: 10.7-158 ug/L	27 children with subclinical 1 child with overt at follow up Association with smaller weight for age	0.003
Nepal, 2015, Nepal	High concentration of iodine in household salt and groundwater	Healthy subjects seen at well child visits age=6-24 months n=696	Not recorded as not all subjects were fed breastmilk	407 ug/L	fT4: 16.9 pmol/L TSH: 2.9 mIU/L Tg: 21.7 ug/L	41 (7.4%) of 568 subclinical 4 (0.7%) of 568 overt	0.6
Chung, 2009, South Korea	Seaweed soup intake, high in iodine	Infants born at n=31 at baseline n=19 at week 3 n=10 at week 6	Median Week 1: 2529 ug/L Week 3: 1153 ug/L Week 6: 822 ug/L	UIC at week 3 Subclinical Hypothyroidism group: 1651.3 ug/L No Hypothyroidism: 913.2 ug/L	For those with UIC>225 ug/L Week 1 (n=11): mean fT4=1.68 ng/dL and TSH=6.01 μU/ml Week 3 (n=16): mean fT4=1.47 ng/dL, TSH=1.47 μU/ml Week 6 (n=9): mean fT4=1.18 ng/dL, TSH=12.43 μU/ml	N (%) with Subclinical Hypothyroidism Week 1: Not Reported Week 3: 8 (42%) Week 5: 5 (50%)	<0.05
Nishiyama, 2004, Japan	Seaweed-incorporated diet during pregnancy	34 neonates had a positive hypothyroidism newborn screen Group A (serum iodine >17 ug/L) Group B (serum iodine <17)	Group A: 325 ug/L Group B: 144 ug/L Group C: 144 ug/L	Congenital hypothyroidism subjects: 181 ug/L Controls: 122 ug/L L	Group A: mean fT4=18.5 pmol/L, TSH=38.7 μU/ml Group B: mean fT4=18.8 pmol/L, TSH=19.4 μU/ml Controls: mean fT4=20.6 pmol/L, TSH=2.9 μU/ml	Excess iodine in urine associated with subclinical hypothyroidism in 15 (44%) of those with positive newborn screen compared to normal controls	<0.05

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### ENCOUNTERS WITH EMERGENCY MEDICAL SERVICES PRIOR TO FATAL OVERDOSE: AN OPPORTUNITY TO INTERVENE?

<sup>1</sup>A Rollins\*, <sup>2</sup>L Barnard, <sup>1</sup>M Sadinle, <sup>2</sup>R Harruff, <sup>1</sup>CR Counts, <sup>1,3</sup>T Rea, <sup>2,1</sup>J Hood. <sup>1</sup>University of Washington School of Medicine, Seattle, WA; <sup>2</sup>Public Health Seattle and King County, Seattle, WA; <sup>3</sup>King County Emergency Medical Services, Seattle, WA

10.1136/jim-2019-WMRC.386

**Purpose of study** Although Emergency Medical Services (EMS) is often involved in acute lifesaving measures in overdose situations, little is known about the nature of EMS care provided to persons prior to fatal overdose. We evaluated the nature and frequency of EMS encounters with persons who suffered overdose death in the year prior to death.

**Methods used** We conducted a retrospective cohort study of all residents who had fatal overdose in King County, Washington in 2018 to determine if they had an EMS encounter during the year prior to death. Information was abstracted from EMS and medical examiner records. Death records were matched to EMS records using probabilistic linking followed by manual review validation; T-tests were used for statistical analysis.

**Summary of results** During 2018, there were 387 deaths due to overdose, 69% (N=266) involved an opioid and 54% involved a stimulant. Among the 387 decedents, 39.5% (n=153) had one or more EMS encounters in the study interval distinct from their death event, representing a total of 710 EMS encounters. Demographic characteristics were similar between those who did and did not have an EMS encounter (66% vs. 71% male, 77% vs. 80% white race, average age 48 vs. 46 years respectively). However, a large proportion with an EMS encounter were homeless (29% vs 9%, p=0.002).

Among those with an encounter, 37% (n=56) had an encounter within a month and 58% (n=89) within 3 months of their death. Sixty percent (n=91) had ≥2 EMS encounters and 23% (n=35) had ≥6 EMS encounters in the year prior to their death. The most common reason for an EMS encounter was drug(s) or alcohol which occurred in 52% of encounters, followed by injury/trauma (12%) and behavioral or psychiatric complaints (7%). Most encounters (81%) were transported to the hospital.

**Conclusions** Over one third (40%) of drug-overdose decedents had one or more EMS encounters in the year prior to their death. EMS may be an efficient strategy to identify those at high risk of overdose death. Future studies should evaluate

other characteristics of persons who have multiple encounters with EMS but do not die from overdose.

### 387 EVALUATION OF DEPRESSION AND ANXIETY IN WOMEN WITH POLYCYSTIC OVARY SYNDROME BY PHYSICIAN TRAINEES

SH Pakhdikian\*, Y Fernandez-Sweeny, F Dong, AL Nelson. *Western University of Health Sciences, Pomona, CA*

10.1136/jim-2019-WMRC.387

**Purpose of study** Polycystic ovary syndrome (PCOS) is the most common endocrinopathy that affects reproductive-aged women. Estimates are that up to 40% of women with PCOS have depression and/or anxiety, which far exceeds prevalence in the control population. Although not used as criteria to formally diagnose PCOS, it is important to assess patients for these associated conditions. The aim of this study was to survey resident physicians in California in select specialties, known to work with women, to understand their screening and diagnosis practices for PCOS, while also exploring their attitudes about mental health.

**Methods used** We surveyed PGY  $\geq 2$  residents in Family Medicine, Internal Medicine, Obstetrics and Gynecology, and fellows in Endocrinology and Reproductive Endocrinology. The questionnaire asked about demographics, patient population, screening methods, and opinions on mental health-related statements. 22 individuals initiated the survey, 13 completed it in its entirety.

**Summary of results** All participants reported their care for women with PCOS. 57% of resident physicians said they would routinely screen women for post-partum depression. However, nearly 42% rarely assessed women for mental health risks or only screened if there was evident history. On average, physicians were neutral (on a 5-point Likert Scale) when asked if they found it easy to talk to their patients about mental health issues. They also collectively disagreed on their ability to provide options for referral to mental health services in their practice.

**Conclusions** With the growth and impact of research on behavioral medicine, we have seen an increase in confidence in discussing mental health. However, based on our findings resident physicians do not feel skilled in their ability to provide these services. Future studies should aim to enhance the structure of the clinical interview to include mental health risks and assessments to better determine the correlation of mental health consequences of this diagnosis in the full range of patient populations.

### 388 DOES INTENTION TO BREASTFEED AMONG EXCLUSIVE MARIJUANA USING MOTHERS DIFFER COMPARED WITH OTHER SUBSTANCE USERS?

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10.1136/jim-2019-WMRC.388

**Purpose of study** Coincident with increased legalization, marijuana (MJ) use is increasing among pregnant women and

women of reproductive age. However, mothers' intention to breastfeed (BF) when using MJ around the time of pregnancy is unclear. Therefore we sought to compare intention to BF among mothers exclusively using MJ with those using electronic cigarettes (ecig), tobacco products, multi-substances, and non-users.

**Methods used** This is an interim analysis of surveys from parents of live singletons merged with birth certificate data. Subjects were categorized into 5 groups: ecig use only (ECO), marijuana use only (MJO), tobacco products only (TPO), multi-substance users (MSU;  $\geq 2$  of, marijuana, illicit drugs, ecig & tobacco), & non-users (NU; neither ecig, tobacco, marijuana). Due to small numbers exclusive illicit drug users were not able to be analyzed separately. Intention to BF was compared across groups. Also assessed were adverse life events in the peri-conceptual period such as partner incarceration, job loss, & homelessness. Logistic regression controlled for race/ethnicity, age, education, & adverse life events.

**Summary of results** Of 935 mothers: 1% were ECO, 3% were MJO, 9% were TPO, 9% were MSU, 78% were NU. In bivariate analysis, NU were older & ECO & MJO were younger. NU were more likely to be educated, married & along with ECO-employed. MSU had the highest rates of adverse life events. NU had the highest rates of intention to BF (78%) & were significantly higher than TPO and MSU ( $p < 0.001$ ). MJO were just as resolved to BF as NU. In adjusted models, there was no difference in intention to BF between MJO and NU.

**Conclusions** Mothers using exclusive MJ are similarly committed to BF as non-users. As studies suggest providers focus on legal issues when counseling MJO mothers, our findings highlight the need for clinicians to discuss potential newborn exposure via BF in discussions with MJO women- both pre and postnatally.

### 389 RACE AND ETHNICITY MORE INFLUENTIAL THAN SOCIOECONOMIC STATUS FOR DETERMINING EXCLUSIVE BREASTFEEDING SUCCESS

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10.1136/jim-2019-WMRC.389

**Purpose of study** The American Academy of Pediatrics recommends exclusive breastfeeding for the first six months of life. Less than 25% of families meet this goal. This study examined predictors of exclusive breastfeeding success.

**Methods used** This prospective, secondary study analyzed breastfed (BF) and non-breastfed (nBF) neonates (greater than 35 weeks gestational age) at nursery discharge and 30 days of age.

**Summary of results** At nursery discharge, the BF cohort's (n=346) mean birthweight of  $3.4 \pm 0.4$ kg was greater than the nBF cohort (n=43) mean birthweight of  $3.3 \pm 0.5$ kg ( $p < 0.004$ ). There were more vaginal deliveries (76% vs. 56%,  $p < 0.006$ ) and non-Hispanic fathers in the BF cohort vs. nBF cohort (76% vs. 58%,  $p < 0.008$ ). While not statistically significant, there was a trend of more non-Hispanic mothers and White mothers in the BF cohort. At 30 days of age, the BF cohort (n=135) was more likely to have non-Hispanic fathers (85% vs. 70%,  $p < 0.002$ ), and White mothers (80% vs. 69%,  $p < 0.07$ ) than the nBF cohort (n=70). Non-Hispanic mothers



were 2.8 times more likely to exclusively breastfeed than mothers who were Hispanic, after adjusting for mode of delivery, birth weight, and socioeconomic status (SES) at 30 days (odds ratio 2.8 (95% CI 1.1-6.9),  $p=0.03$ ). Infants with Non-Hispanic fathers were 2.7 times more likely to exclusively breastfeed than mothers whose partners' were Hispanic, after adjusting for mode of delivery, birth weight, and SES at 30 days (odds ratio 2.7 (95% CI 1.1-6.3),  $p=0.03$ ). There was no difference in SES between groups at 30 days of age.

**Conclusions** This study supports ethnic/racial differences in exclusive breastfeeding rates. Paternal ethnicity may provide an additional indicator of breastfeeding disparities. Addressing disparities in exclusive breastfeeding rates may warrant additional investigations into culturally-inclusive, family-centered, and prenatally-initiated interventions.

### 390 ED UTILIZATION VARIES BY RACE/ETHNICITY IN PREMATURE INFANTS

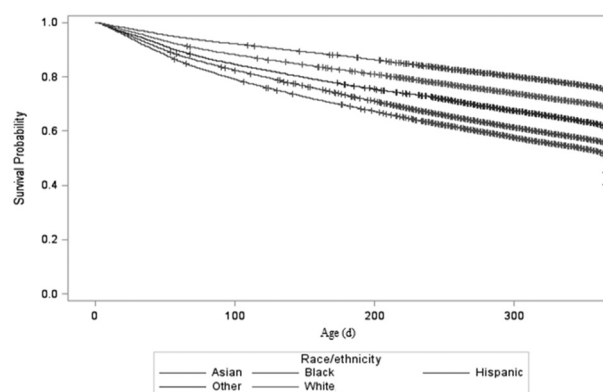
<sup>1</sup>KL Karvonen\*, <sup>2</sup>RJ Baer, <sup>2</sup>L Jelliffe-Pawlowski, <sup>1</sup>M Pantell. <sup>1</sup>UCSF, San Francisco, CA; <sup>2</sup>UCSF PTBI, San Francisco, CA

10.1136/jim-2019-WMRC.390

**Purpose of study** While racial/ethnic disparities in preterm birth are well-documented, less is known about differences in post-discharge health outcomes. We sought to investigate emergency department (ED) use by race/ethnicity in very preterm infants (<32 weeks gestational age [GA]), late and moderate preterm infants ([LMPT] 32-36 weeks GA), and all preterm infants (<37 weeks GA).

**Methods used** Cohorts were derived from a California database of infants born between 2007-2011 maintained by the California Office of Statewide Health Planning and Development. A Kaplan-Meier table illustrating time to ED visit by race/ethnicity was constructed. Logistic regressions were used to predict outcomes by race/ethnicity among cohorts compared to white infants controlling for: Model 1-none; Model 2-GA, birthweight, and sex; Model 3-additionally adjusting for maternal BMI, smoking, drug/alcohol use, hypertension, diabetes, mental health disorders, and prenatal care; and Model 4-additionally adjusting for maternal education, insurance status, and WIC use.

**Summary of results** Racial/ethnic differences in time to ED visit are shown in figure 1. Hispanic and Black very preterm infants were more likely to visit the ED (model 4 OR 1.4 95% confidence interval [CI] 1.3-1.5, model 4 OR 1.4 CI 1.3-1.6). Hispanic and Black LMPT infants and all premature infants were more likely to visit the ED (model 4 OR 1.3 CI 1.3-1.4, model 4 OR 1.4 CI 1.3-1.5). Very premature and LMPT Asian infants were less likely to visit the ED (model 4 OR 0.8 CI 0.7-1.0, model 4 OR 0.8 CI 0.7-0.8).



Abstract 390 Figure 1 Racial/ethnic differences in time to ED visit

**Conclusions** There are racial/ethnic disparities in ED utilization among preterm infants over the first year of life, with Black and Hispanic infants more likely to visit the emergency room compared to White non-Hispanic infants.

### 391 DO STANDARDIZED SCRIPTS IMPROVE INTERPRETER ACCEPTANCE BY SPANISH-SPEAKING FAMILIES?

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10.1136/jim-2019-WMRC.391

**Purpose of study** Language barriers are known contributors to health care disparities and are modifiable. In particular, by providing a certified interpreter to limited English proficient (LEP) patients, studies have shown improved satisfaction, better understanding and less medical testing. The purpose of this study was to determine if an optimal way to offer an interpreter exists.

**Methods used** This randomized study of LEP Spanish-speaking mothers admitted to the Mother Baby Unit at Oregon Health and Science University was conducted over a 16-month period. Using block randomization, subjects were offered an interpreter using an assigned unique scripted question: (1) In what language do you prefer to receive your medical care?; (2) Would you like an interpreter?; (3) A free hospital interpreter is available for you, would you like an interpreter?. A sample size of convenience was utilized. Data were analyzed using ANOVA, chi-square test, and Fisher's exact test.

**Summary of results** 55 subjects were randomized by assigned question. Overall interpreter use was 80% (44/55). There was a significant difference in interpreter utilization based on scripted question 1-3: 82% (14/17) vs 64% (14/22) vs 100%

Abstract 391 Table 1 Utilization and demographics

	All subjects (n=55)	Question 1 (n=17)	Question 2 (n=22)	Question 3 (n=16)	p-value
Interpreter Utilization, n(%)	44 (80)	14 (82)	14 (64)	16 (100)	0.02
Maternal age (yr), mean ± SD	33.2±5.9	31.5±6.4	33.7±5.8	34.4±5.3	0.34
Parity, mean ± SD	3.1±1.5	3.2±1.4	2.9±1.5	3.2±1.6	0.70
Vaginal delivery, n(%)	37 (69)	11 (65)	14 (66)	12 (75)	0.80
Public insurance, n(%)	53 (98)	17 (100)	20 (95)	16 (100)	0.99
Gestational age (wk), mean ± SD	38.5±1.5	38.2±1.4	38.5±1.5	38.7±1.6	0.61

(16/16), respectively ( $p=0.02$ ). The most common reasons for declining an interpreter were a family member or friend who offered to interpret and self-reported English-proficiency.

**Conclusions** All subjects offered an interpreter with Question 3 accepted interpretation services. Although limited by sample size, the results highlight an important finding, that the way an interpreter is offered impacts utilization. By choosing the right words, we may temper the language barrier that exists for many families and ultimately decrease health care disparities. This further underscores the need for heightened focus on how to best communicate with LEP patients.

## Endocrinology and metabolism III

### Concurrent session

8:00 AM

Saturday, January 25, 2020

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#### PROMISCUOUS NF $\kappa$ B ACTIVATION INDUCES PANCREATIC $\beta$ CELL DEATH FOLLOWING GENOTOXIC STRESS

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10.1136/jim-2019-WMRC.392

**Purpose of study** Intrauterine growth restriction (IUGR) affects 5-15% of gestations and is associated with an increased risk of developing Type II Diabetes Mellitus (T2DM). However, the mechanisms linking IUGR and T2DM are unknown. Although multifactorial, T2DM partially develops because of oxidative stress leading to genotoxic damage in pancreatic  $\beta$  cells. Recent *in vivo* studies have shown that NF $\kappa$ B inhibitory protein levels are chronically lower in IUGR pancreatic islets. Chronically reduced NF $\kappa$ B inhibitory protein levels in the islet may sensitize IUGR individuals to genotoxic insult and hasten  $\beta$  cell dysfunction in T2DM. In this study, we sought to determine whether lowering the NF $\kappa$ B activation threshold by decreasing total cellular inhibitory protein content could sensitize pancreatic  $\beta$  cells to genotoxic stress and diabetes development.

**Methods used** To assess the role of NF $\kappa$ B in the response to genotoxic stress, MIN6 immortalized murine insulinoma cells were exposed to streptozotocin (STZ, 0.5-8mM, 0-24h), or were transfected with siRNA against the NF $\kappa$ B inhibitory protein I $\kappa$ B $\beta$  and exposed to STZ. Cell death following transfection and STZ exposure was evaluated by trypan blue exclusion. Expression of the NF $\kappa$ B target gene iNOS was measured by RT-qPCR. To assess the role of I $\kappa$ B $\beta$  in diabetes pathogenesis *in vivo*, adult (6-8 wk) male wild type (WT, C57Bl6/J) and I $\kappa$ B $\beta$ <sup>-/-</sup> mice were exposed to multiple low-dose streptozotocin (MLDS, 40 mg/kg IP) and blood glucose was measured weekly for 7 weeks following exposure to monitor for hyperglycemia and diabetes.

**Summary of results** STZ exposure induced dose-dependent cell death in MIN6 cells. Following transfection, cell death was increased compared to dose-matched control. siRNA transfection and subsequent STZ exposure induced iNOS gene

expression compared to STZ exposure alone. Taken together, these results demonstrate that decreased I $\kappa$ B $\beta$  sensitizes MIN6 cells to genotoxic stress. *In vivo*, I $\kappa$ B $\beta$ <sup>-/-</sup> mice developed hyperglycemia and diabetes more rapidly than WT mice following MLDS exposure, indicating that lower inhibitory protein levels sensitize the pancreas to genotoxic stress and directly contribute to  $\beta$  cell dysfunction *in vivo*.

**Conclusions** Lower NF $\kappa$ B inhibitory protein levels sensitize pancreatic  $\beta$  cells to genotoxic stress and may help to explain the link between IUGR and T2DM.

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#### PSYCHOLOGICAL TREATMENT RESOURCE USE IN PATIENTS WITH TYPE 1 DIABETES WHO ENDORSED DEPRESSIVE SYMPTOMS OR SUICIDAL IDEATION

KR Stanek\*, EM Youngkin, S Majidi. *University of Colorado, Aurora, CO*

10.1136/jim-2019-WMRC.393

**Purpose of study** Studies have shown higher depression rates in youth with type 1 diabetes (T1D) compared to the general population. Literature on suicidal ideation in T1D and how to provide appropriate follow-up for youth with depression or suicidal ideation is sparse. The objectives of this study were to evaluate the psychological resource use in adolescents with T1D after initial endorsement of depressive symptoms and/or suicidal ideation (SI), and to compare T1D and psychological characteristics between those who utilized resources versus those who did not.

**Methods used** Patients at the Barbara Davis Center who scored positive for depressive symptoms or endorsed SI using the Patient Health Questionnaire 9 (PHQ-9) were identified by retrospective chart review. At time of PHQ-9 screening, patients with positive scores met with a provider or psychologist and were provided psychological resources for follow-up. T1D characteristics and use of psychological resources before and after the initial screen were recorded. Chi-square, t-tests, and descriptive analyses were used for data analysis.

**Summary of results** Of 1376 screened, 200 patients were identified with positive depressive symptoms (n=169) and/or positive SI (n=101). Of those identified, 52% (n=104) utilized psychological resources; specifically, 30% therapy, 5% psychiatric medications, and 17% both. Those who utilized resources had a higher initial PHQ-9 score (13.6 vs. 12.0,  $p=0.02$ ), were female (53.2% vs. 37.5%,  $p=0.03$ ), and utilized a continuous glucose monitor less often (22.1% vs. 34.4%,  $p=0.01$ ). There was no difference between groups in race, age, T1D duration, insulin pump use, average follow-up PHQ-9 score, SI at initial screen or follow-up, or HbA1c.

**Conclusions** Although depressive symptoms and SI is common in the pediatric T1D population, only half those who have a positive screen utilize the resources given, indicating additional education and follow-up are needed to help patients obtain the appropriate counseling needed. While no changes in glycemic management were seen in those who utilized resources, HbA1c changes are gradual; thus, a longer interval may be needed to determine if HbA1c does improve. Future studies should investigate how to improve utilization of resources in youth with depressive symptoms or SI, particularly in males.

### 394 DIAGNOSIS OF NEONATAL DIABETES WITH RARE PDX1-MUTATION

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10.1136/jim-2019-WMRC.394

**Case report** Diabetes mellitus is becoming more common in older children but it's extremely rare in infants. While type 1 and type 2 have a multifactorial etiology, neonatal diabetes is caused by single-gene mutations. This is a case of an infant with persistent hyperglycemia found to have a PDX1-gene mutation, which causes less than 1% of neonatal diabetes.

A 1-month-old boy born term weighing 2523 grams presented with a fever of 39.5°C. His bloodwork incidentally showed a hyperglycemia of 371mg/dL along with glucosuria, without a history of increased urine output or weight loss. The patient was not in diabetic ketoacidosis. His random c-peptide was suppressed. The full sepsis workup was negative. In the hospital, his hyperglycemia persisted above 300mg/dL requiring a basal-bolus regimen with insulin lispro and insulin glargine for blood sugar control. Ultimately, the patient's genetic workup revealed that he was heterozygous for a pathogenic variant in the PDX1 gene.

Neonatal diabetes usually presents before six months of age. PDX1 is just one of more than 20 known causative genes of monogenic diabetes. Early signs of diabetes mellitus like polyuria and polydipsia are easily missed in this age set. Consequently, most infants present with failure to thrive, severe dehydration and diabetic ketoacidosis. The course and treatment of neonatal diabetes depends on the genotype. Therefore, genetic testing is strongly advised for any infant presenting with diabetes less than one year of age.

Persistent hyperglycemia in an infant should draw concern for neonatal diabetes, especially in the context of a history of IUGR, glucosuria and osmotic polyuria. Genetic testing should be performed in these cases. The clinical course of neonatal diabetes depends on the genotype. In this case, the infant presented with persistent hyperglycemia requiring basal-bolus regimen, but the mild phenotype allowed the patient to be successfully weaned off insulin.

Sources:

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### 395 CHARACTERIZATION OF TWO FOUNDER LINES OF ALDOSE REDUCTASE KNOCKOUTS CREATED USING CRISPR/CAS9

B Pham\*, B Shieh, M Pedler, M Petrash. *University of Colorado School of Medicine, Aurora, CO*

10.1136/jim-2019-WMRC.395

**Purpose of study** In high glucose environments such as diabetes, the enzyme aldose reductase (AR) acts to metabolize glucose to sorbitol which is thought to contribute to diabetic complications, including cataract, posterior capsular

opacification, retinopathy, and neuropathy. It is therefore imperative for the research community to use a standardized model to understand AR-linked pathologies. In this study, we took advantage of CRISPR/Cas9 to create mutations in the AR gene that knocked out AR activity (ARKO), which may reduce the risk of diabetic complications. We hope to use these models for future work in understanding the aforementioned pathologies.

**Methods used** Single guide RNAs (gRNAs) following CRISPR/Cas9 editing on exon3 of the AR gene and in vitro fertilization (IVF) was performed. Founders were characterized with DNA sequencing, protein western blot, and tissue histology.

**Summary of results** DNA sequencing, protein western blot analysis, and tissue histology verified a 16 nucleotides deletion and 4 nucleotides insertion, respectively, in two founder lines of ARKO mice. Transmission of mutant alleles followed expected Mendelian patterns in pedigrees from both founder lines. Functional deletion of AR gene expression was shown in ARKO eye, heart, and kidney tissues where AR is more abundant in wild type mice. Furthermore, structural differences were not seen in these tissues when compared to wild type mice.

**Conclusions** Two founder lines of ARKO mice were produced and characterized in our study. We believe that these lines can serve as an important base in tackling diabetic pathologies and understanding their mechanisms.

### 396 DO VERY LOW LEVELS OF LOW DENSITY LIPOPROTEIN CHOLESTEROL INHIBIT CORTISOL PRODUCTION IN TYPE 1 DIABETES?

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10.1136/jim-2019-WMRC.396

**Case Report** Low density lipoprotein cholesterol (LDL-C) is an important causal risk factor for atherosclerotic heart disease. Lowering LDL-C significantly reduces the risk of cardiovascular morbidity and mortality. However, because cholesterol is required for adrenal steroid hormone biosynthesis, there is a concern that very low levels of LDL-C can adversely affect cortisol production. Our study examined the cortisol response to cosyntropin (ACTH) stimulation testing in a patient with type 1 diabetes mellitus (T1DM) with very low LDL-C levels.

A 64 year old male with T1DM, hypothyroidism, hypertension and hyperlipidemia was seen in our clinic. The patient had a coronary artery calcium scan (CAC) which showed a total score of 424 Agatston units (very high risk). The CAC score coronary artery breakdown was the following: Left main coronary artery: 0; right coronary artery: 109; left anterior descending coronary artery: 307; and circumflex coronary artery: 8. The patient previously was taking atorvastatin 20 mg daily. The atorvastatin dose was increased to 40 mg daily

**Abstract 396 Table 1** ACTH stimulation test, LDL-C 25 mg/dl

Minutes	Cortisol level µg/dL
0	09.6
30	26.8
60	29.9

and 10 mg daily of ezetimibe was added. His LDL-C previously was 70 mg/dL. While the patient was on 40 mg of atorvastatin and 10 mg of ezetimibe, his LDL-C was lowered to 25 mg/dl after the above medical therapy. Due to a concern for inhibition of cortisol biosynthesis by statins, an ACTH stimulation test was done that showed a normal adrenal response. In addition, the patient had no signs nor symptoms of adrenal insufficiency.

This case illustrates that very low levels of LDL-C may be safe and do not inhibit cortisol response to ACTH stimulation test in T1DM patients. This may be important for T1DM patients with cardiovascular disease who would benefit from a low LDL-C.

### 397 IMPAIRED CATABOLISM OF CALCITRIOL: A RARE CAUSE OF HYPERCALCEMIA AND CALCIPHYLAXIS

<sup>1,2</sup>C Schmid\*, <sup>1,2</sup>SC Fernandes, <sup>1,2</sup>R Klein. <sup>1</sup>VA Portland Health Care System, Portland, OR; <sup>2</sup>Oregon Health and Sciences University, Portland, OR

10.1136/jim-2019-WMRC.397

**Case report** A 62-year old male with multiple medical co morbidities including chronic kidney disease (CKD) requiring dialysis presented to the hospital with altered mental status and hypercalcemia. Review of records revealed intermittent hypercalcemia dating back 17 years. The patient denied use of calcium supplements or calcitriol. Examination revealed a frail, cachectic gentleman with areas of dry gangrene on his hands consistent with calciphylaxis. Laboratory evaluation showed serum calcium ranging from 10.3-12.5 (NI 8.4-10.4 mg/dL), ionized calcium 1.34-1.40 (NI 1.13-1.32 mmol/L), phosphorus 4.5-6.1 (NI 2.5-4.5 mg/dL), serum creatinine 4.4 (NI 0.7-1.2 mg/dL), intact parathyroid hormone (PTH) 33 (NI 10 – 65 pg/ml), 25-hydroxyvitamin D 39 (NI 20 – 100 mg/dL) and 1,25 dihydroxyvitamin D of 82-115 (NI 18-72 pg/mL). SPEP, UPEP and PTH-RP were unremarkable. Hypercalcemia was attributed to an excess of 1,25-D. He was treated with pamidronate and had improvement in serum calcium. Unfortunately, the patient expired. Autopsy found no evidence of granulomatous disease or occult malignancy. Testing for abnormal metabolic clearance of vitamin D returned after his death showing an elevated 25 hydroxyvitamin D to 24,25-dihydroxyvitamin D ratio (68.97, normal <25 ng/mL), indicating reduced activity of 24-hydroxylase. This enzyme catalyzes the hydroxylation of the biologically active form of vitamin D (1,25-D) and its precursor (25-hydroxyvitamin D) to inactive calcitric acid for excretion. *CYP24A1*, the gene encoding the cytochrome P450 component of the mitochondrial 24-hydroxylase enzyme, is expressed in target tissues for vitamin D.

**Conclusions** Disorders due to impaired 24-hydroxylase activity span a wide clinical range extending from life-threatening infantile hypercalcemia to chronic mild hypercalcemia. Circulating levels of active 1,25-D are dependent upon the activity of 1-alpha-hydroxylase (responsible for synthesis) and 24-hydroxylase (responsible for deactivation). This case demonstrates the crucial role of 24-hydroxylase activity, even in the setting of CKD. Defective 24-hydroxylase activity should be considered in the differential diagnosis for patients with chronic hypercalcemia and elevated 1,25-D levels.

## Genetics II

### Concurrent session

8:00 AM

Saturday, January 25, 2020

### 398 MYH7 FAMILIAL VARIANT IDENTIFIED BY ULTRA-RAPID WHOLE GENOME SEQUENCING IN A NEONATE: IMPLICATIONS ON MANAGEMENT AND FAMILY

E Osborn\*, C DeFillippo, K Herman, SP Shankar. University of California, Davis, Sacramento, CA

10.1136/jim-2019-WMRC.398

**Case report** We report the implications on management and impact on families from ultra-rapid whole genome sequencing (ur-WGS) in critically ill neonates. A 6-month-old male presented to the emergency room initially at 3 months of age with respiratory distress, fatigue and poor feeding. Clinical evaluation, including chest x-ray, electrocardiogram and labs were consistent with heart failure; echocardiogram revealed severe mitral valve regurgitation, dilated left atrium and ventricle, and prominent left ventricle trabeculations. Medical therapies resulted in improvement of mitral valve regurgitation, and he was managed by cardiology as an outpatient. At 5 months of age, he was readmitted with respiratory symptoms similar to his previous presentation. Cardiology referred him to genetics as his degree of heart failure was worse than expected for his mitral valve regurgitation. Familial history was significant for a paternal grandfather with an 'enlarged heart'. Ur-WGS was positive for a heterozygous, paternally inherited myosin heavy chain 7 (*MYH7*) c.1618T>C Phe540-Leu37 likely pathogenic variant. Pathogenic variants in *MYH7* cause dilated and hypertrophic cardiomyopathy, and ventricular noncompaction consistent with the phenotype in our patient. This rare variant has been reported previously as segregating with disease in a large family with dilated cardiomyopathy with an autosomal dominant inheritance pattern with incomplete penetrance, and as a *denovo* variant in another individual with clinical features of left ventricular noncompaction. These results aided in providing more directed care for our patient and his family. Following his mitral valve replacement, the pediatric cardiology team planned for more rigorous heart failure management due to positive genetic test results for *MYH7* related cardiomyopathy. The family also received counseling about recurrence risk for parents and siblings, and were extended the opportunity for family members to receive targeted genetic testing. However, the father had emergency insurance alone and required assistance with finding free cardiac care. This highlights the importance of appropriate pre- and post-counseling of families in this rapid genomic era.

### 399 VCP INHIBITOR CB-5083: A POTENTIAL TREATMENT FOR VCP INCLUSION BODY MYOPATHY

C Cheng\*, L Weiss, L Ta, T Ton, TA Do, V Kimonis. University of California, Irvine, Irvine, CA

10.1136/jim-2019-WMRC.399

**Purpose of study** Mutations in the Valosin-containing protein (*VCP*) cause inclusion body myopathy with early-onset Paget

disease and frontotemporal dementia (IBMPFD) through VCP hyperactivity. Studies in drosophila models of IBMPFD indicate that VCP inhibitors can improve the disease pathology. CB-5083 is a novel competitive inhibitor of VCP. Here, we aim to test for CB-5083 safety at doses that are beneficial while avoiding the off target effects in the IBMPFD mouse model. We hypothesize that treating IBMPFD patient myoblasts and mouse models of IBMPFD with CB-5083 can ameliorate disease phenotypes.

**Methods used** VCP R155H mouse, as an IBMPFD mouse model display pathological features that recapitulates many aspects of human patients. Control and VCP R155H mice were gavaged daily with 15mg/kg CB-5083 or vehicle for five months. Body weight, rotarod testing and grip strength were monitored monthly. Electroretinogram (ERG) and optical coherence tomography (OCT) were performed to assess the CB-5083 toxicity on vision. Immunoblotting and immunohistochemistry analysis were performed in muscle tissue to evaluate cellular pathology.

IBMPFD patient-derived myoblasts were treated with variable dosage of CB-5083. Immunoblotting, immunohistochemistry and MTT analysis were performed to measure cellular pathology and survival.

**Summary of results** CB-5083 treatment in VCP R155H knock-in mice resulted in functional improvements in Rotarod behavior. Muscle biopsy pathology showed reduction of TDP43, suggesting that CB-5083 may lead to improvement of disease pathology. Importantly, no significant visual abnormalities were observed after 5-month chronic treatment of CB-5083.

Furthermore, treatment of patient-specific IBMPFD myoblasts showed that myoblasts tolerated up to 300nM CB-5083 dosage. Improvement in the typical disease pathology was also observed.

**Conclusions** The IBMPFD mouse model tolerated the CB-5083 treatment with improved motor behavior and cellular pathology, which was further corroborated by improved cellular pathology in patient-derived myoblasts with CB-5083 treatment. Our results suggest that CB-5083 is a potential safe and effective therapy in patients with IBMPFD.

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#### FURTHER DELINEATING A RARE, YET CLINICALLY SIGNIFICANT FEATURE OF CROUZON SYNDROME WITH ACANTHOSIS NIGRICANS: ODONTOGENIC TUMORS

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10.1136/jim-2019-WMRC.400

**Purpose of study** Distinguishing between Crouzon syndrome and Crouzon syndrome with acanthosis nigricans (CAN) is important as the two are genetically and clinically distinct syndromes. CAN is typically due to one recurrent pathogenic variant, p.Ala391Glu, in the *FGFR3* gene, while Crouzon syndrome is due to variants in the *FGFR2* gene. CAN is associated with similar facial features to Crouzon syndrome making diagnosis difficult. However, other features often present in CAN include choanal atresia, apnea, posterior fossa abnormalities, renal and skeletal anomalies, and rarely, odontogenic tumors. Here we report a 13-year-old girl initially followed for Crouzon syndrome found to have molecularly confirmed CAN with multiple odontogenic tumors.

**Methods used** We reviewed the current literature for cases of CAN and performed a retrospective chart review of our

cohort of patients seen in the craniosynostosis clinic at Stanford Children's Hospital.

**Summary of results** We identified 38 cases of CAN in the literature. Of these cases, only three are reported with odontogenic tumors, and only one underwent successful resection. We report a case of a 13-year-old girl who had an abnormal head shape at 4 months of age. At 10 months of age, she was noted to have Chiari I malformation, hydrocephalus, and bicoronal craniosynostosis; she was clinically diagnosed with Crouzon syndrome. Over time, she was noted to have obstructive sleep apnea, global developmental delay, acanthosis nigricans, and at age 11, extensive odontogenic tumors. At age 13, she was evaluated by genetics and molecular testing revealed the p.Ala391Glu variant in the *FGFR3* gene consistent with the diagnosis of CAN. While she is monitored closely, her odontogenic tumors are so extensive she is unlikely to be a candidate for maxillary advancement or surgical resection.

**Conclusions** Due to phenotypic similarities with Crouzon syndrome, there may be delays in diagnosis or even underdiagnosis of CAN. Accurately distinguishing the two syndromes is crucial to enable proper genetic counseling and clinical surveillance, hopefully, allowing for early surgical intervention. Identifying odontogenic tumors on physical exam is difficult, thus we would advocate for 3D CT scan after a new diagnosis of CAN and periodically to evaluate for tumor development.

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#### PATIENTS WITH GENETIC VARIANTS OF UNKNOWN SIGNIFICANCE FOR PRIMARY CILIARY DYSKINESIA: A CASE SERIES

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10.1136/jim-2019-WMRC.401

**Purpose of study** Primary Ciliary Dyskinesia (PCD) is a rare autosomal recessive genetic disorder affecting ciliary structure and function and causing oto-sino-pulmonary disease. There are several diagnostic modalities to help confirm PCD including genetic testing.

Genetic testing for PCD is ever expanding, however the clinical significance of certain gene variants is not well established. Exploring these variants of unknown significance (VUS) may provide further insight into their clinical relevance. This case series seeks to characterize the clinical presentations and course of a subset patients with VUS for PCD

**Methods used** Retrospective chart review of 11 cases were selected from patients of the UCSF Fresno Pediatric Pulmonology Clinic in Fresno, CA. Ten individuals had genetic testing performed due to symptoms and clinical history suspect for PCD. There was 1 case of PCD diagnosed via TEM. Diagnostic clinical predictors were included from the European Respiratory Society (PICADAR score) and American Thoracic Society criteria. Pulmonary function testings (PFT) and respiratory cultures were recorded as well.

**Summary of results** More than half (n=6) of the subjects were female, over the age of 13 years, and had PICADAR scores  $\geq 4$ . A majority fulfilled at least 2 of the American Thoracic Society (ATS) criteria for PCD. All gene variants were associated with autosomal recessive disorders, primarily PCD, as well as Kartagener (n=1), infantile nephronophthisis (n=1), and Usher syndrome (n=1). Most patients had positive

Abstract 401 Table 1 Gene variants and clinical history of the sample

Patient	PCD1	PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9	PCD10
Gene Variant	DNAAF2- AR, heterozygous, p.A38qV (c.1142C>T)	DNAH11- AR, heterozygous, c.11678C>T (p.Thr3893Met)	DNAH11- AR, heterozygous, c.5396T>C (p.Ile1799Thr)	CCDC103- AR; c.2731G>A (p.Glu911Lys)	CCDC40- AR, heterozygous, c.2731G>A (p.Glu911Lys)	DNAH11- AR, heterozygous, c.569A>T (p.Tyr190Phe)	CCDC114- AR, heterozygous, c.1537G>T (p.Asp513Tyr)	DNAAF1- AR, heterozygous, c.2114C>G (p.Ala705Gly)	DNAH11- AR, heterozygous, c.168C>G (p.Asp56Glu)	DNAI1- AR, +Kartagener, heterozygous, c.335C>G (p.Pro112Arg)
Gene variant	ADGRV1- AD/AR, heterozygous, c.17342A>G	DNAH8- AR, heterozygous, c.7536G>C (p.Glu2512Asp)	CR21orf59- AR, heterozygous, c.104A>G (p.Tyr35Cys)	DNAH1- AR, heterozygous; c.283C>T (p.Arg95Cys)	DNAH8- AR, heterozygous, c.6ffG>A (p.Gly215Glu)	DNAH5- AR, heterozygous, c.1892G>A (p.Arg631His)	DNAH11- AR, heterozygous, c.2077A>T (p.Asn693Tyr)///GAS8- AR, heterozygous, c.244C>T (p.Arg82Trp)	RSPH1- AR, heterozygous, c.559C>T (p.Arg187Cys)	DNAH8- AR, heterozygous, c.3130_3132del (p.Lys1044del)	INVS- AR infantile nephronophthisis, heterozygous, c.1436A>G (p.Asn479Ser)
Clinical Summary	history of asthma, chronic rhinosinusitis, recurrent otitis media, pulmonary hypoplasia and dextrocardia	a history of asthma, recurrent sinusitis, dysautonomia, reflux	chronic productive cough, recurrent fevers and recent findings of LLL infiltrate and bronchiectasis; delayed umbilical cord closure	history of multiple failed extubations, bowel perforation, CLD, interstitial emphysema, bronchiolitis and obliterans vs BPD, ventriculomegaly	history of chronic chest tightness with sinus/ respiratory infection, heart burn and food impaction symptoms	recurrent sinus infections + cough occur every 2-3 months	recurrent severe respiratory infection and aspergillosis; otitis media, sinusitis, pneumonia	recurrent and chronic sinusitis, recurrent croup	hx of CLD, developmental and recurrent pseudomonas infection, difficulty breathing in the NICU requiring intubation; sibling with likely PCD	history of recurrent croup and chronic rhinosinusitis; recurrent sinusitis, bronchitis, otitis media

CLD- Chronic lung disease; BPD- bronchopulmonary dysplasia; \*\*PCD 7 was the only patient with a 3rd gene variant

respiratory cultures for *Pseudomonas*, *Penicillium*, and *Aspergillus* species.

**Conclusions** Further studies are warranted to characterize clinical course and establish correlation of management therapies for patients with PCD. This also further supports the development of a PCD gene consortium, ideally pushing further research on diagnostic and management algorithms for both atypical PCD and patients with PCD VUS without confirmed disease.

#### 402 NEVUS COMEDONICUS SYNDROME: EXPANSION OF THE EXTRA-INTEGUMENTARY PHENOTYPE

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10.1136/jim-2019-WMRC.402

**Purpose of study** Nevus comedonicus (NC) is a subtype of epidermal nevus originating from the hair follicle. It has been hypothesized that NC is due to somatic mutations in several candidate genes (e.g. *FGFR2*, *NEK9*). Levinsohn et al. identified somatic mutations in *NEK9* in three cases of localized NC, each in highly conserved residues. *NEK9* encodes a kinase important for centrosome separation. We hypothesize that the degree of mosaicism and tissue involvement of *NEK9* leads to a broader NC syndrome than previously reported.

**Methods used** Chart review, physical examination, and literature review.

**Summary of results** Here we describe a 5 yo boy with leg length discrepancy, tibial dysplasia, metatarsus adductus, hemiparesis, tethered cord and agenesis of the corpus callosum with subcortical heterotopia. His skin exam was notable for

many open comedones arranged in a Blaschkolinear distribution along bilateral axillae, chest and abdomen consistent with NC. The Blaschkoid pattern of the NC suggests a somatic mosaic event. In addition, extensive skeletal and nervous system findings suggest broader involvement. Molecular testing is scheduled on skin biopsy with paired blood for *NEK9*.

**Conclusions** We are learning that the phenotypic spectrum of various mosaic conditions is broad (e.g. *PIK3CA*-related conditions). A few isolated cases of NC are now reported to be secondary to mosaic *NEK9* variants. Our case provides evidence of a broader NC syndrome with multiorgan involvement, which we hypothesize is due to somatic *NEK9* variants in other tissue types, most often of the neurologic, ocular and musculoskeletal systems. Levinsohn et al. showed that mutations in *NEK9* impair follicular cell differentiation in NC, although precise mechanisms in other ectoderm/mesoderm derived tissues has yet to be explored. The patient we present has significant systemic involvement; with unique features such as tibial dysplasia, metatarsus adductus, and cortical abnormalities. It is possible that similar to isolated NC, that other isolated phenotypes (e.g. isolated tibial dysplasia not due to NF1) could be secondary to somatic *NEK9* variants.

#### 403 MITOCHONDRIAL COMPLEX III DEFICIENCY IN AN ADOLESCENT WITH TRISOMY 21

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10.1136/jim-2019-WMRC.403

**Case report** Mitochondrial Complex III Deficiency, nuclear type 2 (MC3DN2) is a rare autosomal recessive, severe progressive neurodegenerative disorder which results from a

deficiency in the TTC19 gene. This encodes a respiratory chain protein that maintains the structural and functional integrity of the mitochondrial electron transport chain. There have been limited case reports of MC3DN2, to date 12 cases have been identified.

A 15-year-old male with Trisomy 21 consulted his pediatrician endorsing 3 weeks of toe-walking, ataxia and bilateral ankle contractures. One week later he developed dysphagia and dysphonia. On exam he had dysarthria, bilateral lower extremity hypertonia, hyperreflexia of the patellar tendons, wide based gait, pes cavus and positive Romberg sign. His complete blood count and metabolic panel, inflammatory markers, creatine kinase, and thyroid studies were normal. A lumbar puncture was normal and negative for oligoclonal bands, fungal, and bacterial cultures. A MRI of the head showed stable cerebellar atrophy and a right-sided brainstem lesion involving the olivary nucleus and the posterior medullary pyramid. He was diagnosed with a demyelinating disease of unclear etiology. He received a 5-day course of high dose intravenous steroids and a repeat MRI showed no improvement. Upon follow up with his pediatrician, he was referred to genetics and mitochondrial sequencing was sent. Mitochondrial sequencing revealed a positive compound heterozygous mutation in the TTC19 gene and he was diagnosed with MC3DN2.

The symptoms seen in MC3DN2 are neurological, developmental, or behavioral in origin. The manifestations noted in this patient were dysphagia, aphasia, ataxia and muscle weakness. The patient's neurologic status rapidly declined with loss of fine and gross motor skills, urinary and fecal incontinence, progression of dysphagia, loss of speech, and eventual death in a span of 9 months after diagnosis despite treatment with a mitochondrial cocktail. Studies show that there is a marked variation in rates of disease progression— progressive over decades to rapid progression to death.

This case illustrates the variable clinical presentation and rarity of MC3DN2 in the medical community; as well as its rapid progression to death in this patient with Trisomy 21.

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#### SKELETAL DYSPLASIAS: A STANDARDIZED PROTOCOL FOR PRENATAL DIAGNOSIS

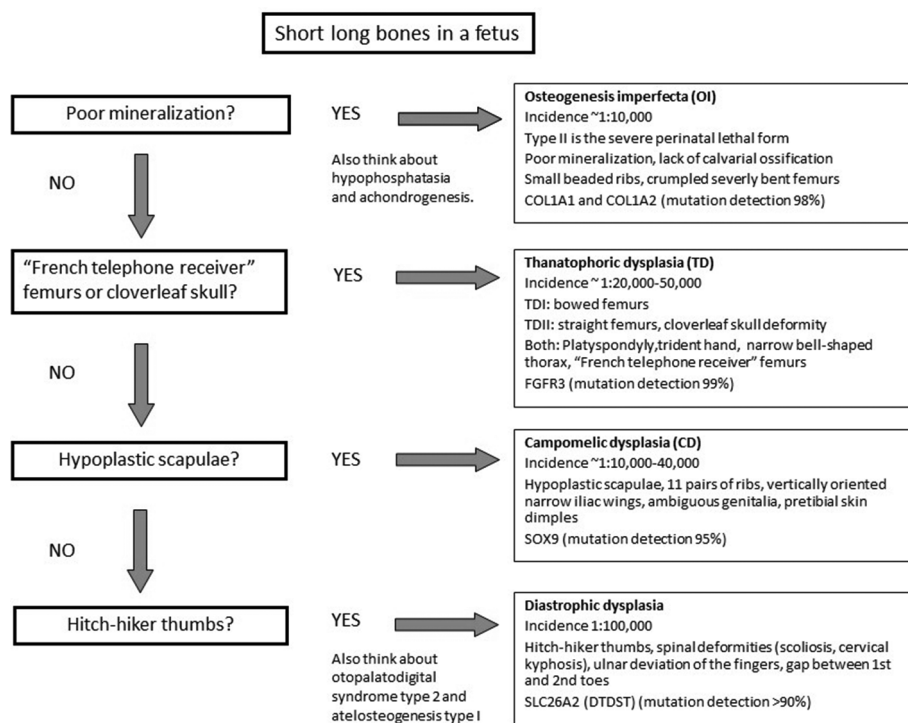
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10.1136/jim-2019-WMRC.404

**Purpose of study** Develop an easily applicable standardized protocol for stepwise ultrasonographic evaluation of a fetus with short long bones suspected to have a skeletal dysplasia.

**Methods used** Prospective evaluation of fetuses suspected to have a skeletal dysplasia through a protocol developed at our institution based on a published guideline for the evaluation of a fetus with short long bones. All were re-evaluated following delivery or termination.

**Summary of results** Of 15 eligible fetuses, our protocol identified a probable diagnosis in 8 (53%) prenatally by ultrasound. In the 7 remaining, 3 had a 'possible' diagnosis (20%) and 4 were 'unknown' (27%). Postnatally, diagnosis was confirmed in all 8 probable cases: thanatophoric dysplasia (TD, n=4), osteogenesis imperfecta (OI, n=2), diastrophic dysplasia (1) and Ellis van Creveld (1). Of the 3 'possible' diagnoses the following were observed: achondroplasia to unknown, Roberts phocomelia to TD, achondroplasia to Costello syndrome. In the 'unknown' category, 3 diagnoses were made postnatally: Kniest dysplasia, bent-bone dysplasia and mild OI. One 'possible' and one 'unknown' diagnosis



Abstract 404 Figure 1

remain as 'unknown', despite extensive clinical and radiographic review by experts.

**Conclusions** We successfully identified the diagnosis by ultrasound in more than half (53%) of the cases. We observed that it was important to use the term 'possible' and 'unknown' when diagnosis was unclear, as the form of skeletal dysplasia remained uncertain postnatally. We believe that we can improve our detection rate by adding criteria for RASopathies and bent bone dysplasia as prenatal diagnostic criteria has been recently published for these conditions. We plan to perform a prospective analysis using our improved criteria.

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#### NOVEL FINDINGS IN A *PLCB4*-RELATED DISORDER: HYPERINSULINISM, VASOSPASM, AND CARDIAC HYPERTROPHY

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10.1136/jim-2019-WMRC.405

**Purpose of study** *PLCB4* plays a role in endothelin signaling, regulating vascular tone in conjunction with nitric oxide and other factors. The gene is also implicated in auriculocondylar syndrome, an autosomal dominant condition characterized by ear and jaw anomalies. We describe two cases associated with *de novo* variants in the same codon of *PLCB4* with novel features including vasospasm, hyperinsulinism and cardiac hypertrophy. One individual presented without overt ear and jaw anomalies.

**Methods used** Clinical phenotyping, chart review, whole exome sequencing and functional studies on patient-derived fibroblasts.

**Summary of results** Patient 1 was born with macrosomia, hyperinsulinism, and cardiac hypertrophy. Postnatally, she developed marked digital and renal artery spasm as well as pulmonary hypertension requiring inhaled nitric oxide. Her appearance was notable for micrognathia, question mark ears and lower extremity melanocytosis. At 4.5 months she developed rapid onset of poor peripheral perfusion and passed away secondary to cardiac and respiratory decompensation. Trio exome sequencing revealed a *de novo* p.D630V variant in *PLCB4*. Patient 2 also exhibited hyperinsulinism and biventricular cardiac hypertrophy. She did not have jaw or ear anomalies but exhibited hypotonia and melanocytosis on her lower extremities. During infancy she exhibited abnormal movements. Brain MRI identified Moyamoya disease. She also experienced episodes of vasospasm of her peripheral vasculature. Exome sequencing showed a *de novo* p.D630N variant in *PLCB4*. She passed away at age 2 years due to cardiorespiratory failure after a neurosurgical procedure.

**Conclusions** Somatic mutations p.D630V and p.D630N have been previously observed in uveal melanoma and are suspected to play a role in driving tumorigenesis. The fact that both individuals carry mutations in the same codon, separate from typical auriculocondylar hotspot codons 360 and 621 suggest a distinct mechanism of action. Substitutions at codon 630 of *PLCB4* appear to be associated with vasospasm, cardiac hypertrophy and early death with or without typical features of auriculocondylar syndrome. Functional studies from patient-derived fibroblasts are underway; we hypothesize that

these variants in *PLCB4* may act via endothelin signaling to promote vasoconstriction.

## Global health III

### Concurrent session

8:00 AM

Saturday, January 25, 2020

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#### LONG-TERM FEASIBILITY, SUSTAINABILITY, AND COST-BENEFIT ANALYSIS OF REUSABLE MENSTRUAL HYGIENE MANAGEMENT PRODUCTS IN A POPULATION OF ADOLESCENT FEMALES IN A REMOTE HIMALAYAN COMMUNITY

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10.1136/jim-2019-WMRC.406

**Purpose of study** Menstrual hygiene management (MHM) is often neglected in rural and remote communities due to many factors including: access, availability, education, sanitation, and cultural beliefs. This study aimed to better understand MHM practices and factors that influence them as well as assess the use, preference, and practicality of reusable pads and menstrual cups in a rural and remote school in the Indian Himalayas.

**Methods used** In this cohort study, female students  $\geq 13$  years of age who have undergone menarche were recruited during annual health screens. In 2017, all participants were provided with locally made products: 1 menstrual cup and 4 reusable pads, and cleaning supplies. Product preference was then assessed over 24 months with individual interviews and questionnaires.

**Summary of results** Of the 42 eligible females recruited, 100% chose to participate, 23.8% attended follow-up interviews and 48% completed follow-up questionnaires. In 2018, 80%, 30%, and 20% of participants preferred using the reusable pad, menstrual cup, and disposable pad, respectively. However, in 2019, product preference shifted to 42.9%, 9.5%, and 47.6%, respectively. Common reasons stated for discontinuation of reusable products included wearing-down of the product and having lost the product. Overall, a significant preference for the reusable pad compared to the menstrual cup was observed ( $p < 0.05$ ). Additional analysis of the perceived benefits and challenges of using reusable products was also assessed, including pain and discomfort (16.7% pad, 60.0% cup), fear (11.1% pad, 83.3% cup), leaks (21.2% pad, 66.7% cup), and difficulty cleaning (57.9% pad, 0.0% cup). While participants had significantly more fears about using the cup ( $p < 0.01$ ), they found the cup easier to clean than the reusable pads ( $p < 0.05$ ). Preliminary thematic analysis revealed that adequate menstrual blood containment, cost, and discreteness are important factors affecting MHM preferences among our participant population.

**Conclusions** Overall, the findings suggest that reusable MHM products are feasible, culturally acceptable, cost-effective, and sustainable alternatives for women living in remote, resource-limited settings.



#### 407 IMPROVED MATERNAL IODINE STATUS DURING FIRST TRIMESTER GESTATION WITH PRECONCEPTION NUTRITION SUPPLEMENTATION: THE WOMEN FIRST MATERNAL PRECONCEPTION NUTRITION TRIAL

<sup>1</sup>A Young\*, <sup>1</sup>J Kemp, <sup>1</sup>C Uhson, <sup>2</sup>A Hendricks, <sup>1</sup>J Westcott, <sup>3</sup>S Ali, <sup>3</sup>S Saleem, <sup>4</sup>A Garces, <sup>4</sup>L Figueroa, <sup>5</sup>M Somannavar, <sup>3</sup>S Goudar, <sup>1</sup>M Hambidge, <sup>1</sup>NF Krebs. <sup>1</sup>Univ of CO School of Medicine, Denver, CO; <sup>2</sup>Univ of CO Denver, Denver, CO; <sup>3</sup>Aga Khan Univ, Karachi, Pakistan; <sup>4</sup>Institute of Nutrition in Central America and Panama (INCAP), Guatemala City, Guatemala; <sup>5</sup>KLE Academy of Higher Ed and Research's JN Medical College, Karnataka, India

10.1136/jim-2019-WMRC.407

**Purpose of study** Iodine deficiency remains common globally, with ~25% of low and middle-income country households without iodized salt. With its critical role in embryogenesis, iodine supplementation prior to conception may be especially important for fetal development. This study compared the effect of preconception nutrition supplementation (*vs* no supplementation) on maternal iodine status at 12 wk gestation and birth length in 3 low resource settings in the Women First Trial.

**Methods used** Women in Guatemala, India and Pakistan (n~100/arm/site) were randomized to receive multi-micronutrient fortified lipid-based nutrient supplements until delivery, starting  $\geq 3$  mo prior to conception (Arm 1), or starting at ~12 wk gestation (Arm 2) after sample collections. Urine iodine ( $\mu\text{g}$ )/creatinine (g) ratios (I/Cr) were determined at 12 wk. Cutoff for deficiency was I/Cr<150. Birth outcomes included length-for-age Z-score and rates of stunting (LAZ<-2) according to I/Cr status.

**Summary of results** At 12 wk mean  $\pm$ SD I/Cr for Arm 1 *vs* Arm 2 was significantly higher for Guatemala ( $308 \pm 276$  *vs*  $200 \pm 137$ ,  $p < 0.0004$ ) but not India ( $309 \pm 260$  *vs*  $243 \pm 306$ ,  $p = 0.09$ ) or Pakistan ( $187 \pm 110$  *vs*  $205 \pm 132$ ,  $p = 0.30$ ). Prevalence of deficiency was lower in Arm 1 *vs* Arm 2 in Guatemala (30% *vs* 44%,  $p = 0.06$ ) and India (24% *vs* 47%,  $p < 0.0004$ ); >40% were deficient for both arms in Pakistan. For combined sites and arms, means of birth LAZ were  $-0.71 \pm 0.94$  and  $-0.59 \pm 1.07$  ( $p = 0.12$ ) for I/Cr deficiency *vs* sufficiency ranges, respectively; newborn stunting rates did not differ by group.

**Conclusions** The preconception intervention resulted in improved iodine status during the first trimester in 2 of the 3 sites. The prevalence of iodine deficiency at 12 wk in all sites suggests opportunities for enhanced implementation of iodine fortification programs.

#### 408 INCREASED DELIVERY SUPPORT FOLLOWING A SUSTAINABLE BIRTH CENTER PROGRAM IN A MOUNTAINOUS DISTRICT OF NEPAL

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10.1136/jim-2019-WMRC.408

**Purpose of study** Maternal and neonatal mortality have not improved in all regions of low resource countries with most of the recent progress occurring in urban areas. Health systems in the mountainous regions of Nepal have significant challenges in offering services. The neonatal mortality rate in the mountainous regions of Nepal are nearly double that of urban areas (45.6 *vs* 25.3 per 1,000 births).

This study aims to evaluate a sustainable birth center facilitation and birth attendant training program in a mountainous district of Nepal.

**Methods used** Solukhumbu District has a population of 100,000 people and is in a mountainous region of Nepal. A program was created with collaboration from the local community, the Ministry of Health, Nepali and US based NGOs, and the University of Utah. Preexisting health posts in villages were equipped with delivery equipment. Health post staff were trained using the American Academy of Pediatrics and World Health Organization programs Helping Babies Survive and Helping Mothers Survive. The local community provides ongoing salary for the birth attendants and operating costs of the birth centers.

Women who delivered within the last two years were interviewed before and after implementation of the program. Interviews took place in 9 villages in Solukhumbu District between December 2015 and March 2019. Interviews were conducted in Nepali and data was analyzed using STATA.

**Summary of results** 363 women were interviewed prior to implementation and 243 women were interviewed following implementation. Prior to implementation 34.4% (125/363) of women interviewed delivered at a birth facility compared to 58.0% (141/243) following implementation [ $p < 0.001$ , Chi square]. Prior to implementation 39.9% (144/361) of women interviewed delivered with a trained birth attendant present compared to 60.9% (148/243) following implementation [ $p < 0.001$ , Chi square].

**Conclusions** Following implementation, there was an increased prevalence of women delivering at birth facilities supported by a trained birth attendant. This intervention shows promise in making quality birth health services more accessible to women and infants living in mountainous regions of Nepal. We hope to expand this pilot program into other mountainous districts as well as other low resource areas of the world.

#### 409 HILLS BEYOND HILLS; AN ANALYSIS OF HEALTH CONDITIONS IN NORTHERN HILL TRIBES OF THAILAND

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10.1136/jim-2019-WMRC.409

**Purpose of study** The rural Hill Tribes of Northern Thailand are home to over fifty indigenous villages, and five main tribes. Inhabitants are refugees from Burma, Tibet, and China who migrated and settled in Northern Thailand's forests 4,500 years ago. Between June 13th and June 20th, 2019, thirty-four medical students embarked on a medical mission trip with the Where There Is No Doctor non-profit organization, established and led by Dr. David Mar Naw. During the trip, students set up a medical clinic in two villages, serving the people of the Lahu tribe. Students became increasingly aware of the lack of available information about traveling to the Northern Hill Tribes. This project aims to provide an informational analysis of classic demographics, diagnoses, and treatments seen in the Northern Hill tribes, so that future medical providers traveling to this region can come prepared to provide better care.

**Methods used** Participants for this study were the Hill Tribe people of northern Thailand seeking medical care from health-care providers of *Where There is No Doctor* organization. Patient information was protected through the use of a

random number generator. Healthcare providers first obtained subjective information through a questionnaire consisting of age, gender, past medical history, surgical history, social history and symptoms. Vital signs and objective information was then obtained using standard medical equipment. Patients were further questioned about chief complaint and associated symptoms with Dr. Naw, followed by administration of medications and a treatment plan.

**Summary of results** Results of the analysis showed a total of eighty-one participants, twenty-two of whom were pediatric patients (<18 years old), fifty-one were adult patients (aged 18 to 65), and five were geriatric patients (aged 65+). For the population seen as a whole, the most prevalent conditions observed were musculoskeletal pain (22 patients), poor appetite (20) and gastritis (18). The medications most frequently used were Omeprazole (19), Paracetamol (20), Vitamin B6 (24), and Analgesic Cream (22).

**Conclusions** With this clinical profile, future healthcare providers traveling to the Northern Hill tribes can be better prepared for their journey, and as a result, will make a lasting impact on the communities served.

#### 410 ASSESSMENT OF THE SICKLE CELL DISEASE SCREENING PROGRAM IN THE INDIGENOUS THARU POPULATION IN NEPAL

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10.1136/jim-2019-WMRC.410

**Purpose of study** In 2015, UBC medical students, in collaboration with a Nepali community-based organization, CP Nepal, began screening for sickle cell disease (SCD) among the indigenous Tharu population in Dang, Nepal and estimated the prevalence of sickle cell trait to be 9.3%. SCD is an inherited disorder that causes painful vasoocclusive crises and significantly impacts quality of life. The Nepalese government has recognized SCD as a health crisis and funds treatment for those with a formal diagnosis of SCD. Since 2015, our team has worked with CP Nepal to equip local health posts with trained staff and laboratory capability to increase screening rates. This study examines the screening statistics collected since 2015 to evaluate the effectiveness of these initiatives.

**Methods used** Following the initial mass screening, 3 health posts continued providing screening in the community. From 2015-August 2019, data was collected by CP Nepal on screening rates and diagnostic test results of those that screened positive. Data was stored on a password encrypted excel spreadsheet.

**Summary of results** From 2015-2019, 4029 individuals were screened for SCD. In 2015, 2899 were screened (272 positive, 96 trait, 4 disease). In 2016, 144 were screened (24 positive, 5 trait, 2 disease). In 2017, 668 were screened (62 positive, 60 trait, 2 disease). In 2018, 114 were screened (14 positive, 12 trait, 1 disease). In 2019, 204 were screened (12 positive, 11 trait, 1 disease). Of those that got diagnostic testing, 184 individuals had sickle cell trait, and 10 had SCD.

**Conclusions** Organizing a mass screening appears to be the most effective in screening a high number of individuals. Although screening rates are variable, an increasing proportion

of those that screen positive are getting further diagnostic testing. In 2019, 2 new health posts were established, which may explain the increased screening rates compared to 2018. Screening rates may be reaching a plateau due to saturation, thus future teams should expand efforts to surrounding regions. A limitation of this study is that the data is missing false positive screening rates and number of people getting treatment. Future studies should investigate the barriers that prevent those who screen positive from getting diagnostic testing and accessing treatment.

#### 411 IMPROVING COMMUNITY AWARENESS OF SICKLE CELL DISEASE THROUGH EDUCATIONAL MODULES IN THE INDIGENOUS THARU POPULATION OF NEPAL

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10.1136/jim-2019-WMRC.411

**Purpose of study** Sickle cell disease (SCD) is an inherited hemoglobinopathy which leads to increased morbidity and mortality and decreased quality of life. The prevalence of the sickled hemoglobin allele is estimated to be 9.3% among the indigenous Tharu population in Dang, Nepal. While the Nepalese government offers funding for those with a SCD diagnosis, a major barrier preventing access to care is lack of awareness about the disease and the screening process. Since 2015, our team has attempted to address this gap by delivering educational modules about SCD to communities in Dang, in hopes of improving health literacy and encouraging individuals to get screened. This study examines the effectiveness of these modules by comparing participants' understanding of the disease before and after their delivery.

**Methods used** Educational modules developed by our team cover SCD symptoms, pathophysiology, heritability, and the process of diagnosis and treatment in Nepal. Modules were delivered to community mothers' groups in the local language by community health workers trained by our team. Binary response questionnaires assessing understanding of SCD and willingness to get screened were administered before and after the educational sessions. Participant responses were coded and analyzed using SPSS.

**Summary of results** A total of 81 mothers (mean age=36.1 years) participated in the study. Participants' overall survey scores improved by 28.2% from pre- to post-educational questionnaires (mean score 51.9% pre-module (SD 11.9%), 80.1% post-module (SD 24.2%),  $P<0.001$ ). Prior to the module, only 11.1% of participants reported having been screened. After the module, 86.8% of those not screened reported that they would get screened, and 88.2% would get their children screened.

**Conclusions** The data suggests that the educational modules were effective in improving participants' knowledge about SCD and communicating the importance of getting screened, as the majority of participants reported willingness to get themselves and their children screened in the future. Further studies should investigate the impact of the educational modules on screening, diagnosis and treatment. Low literacy among the local population may limit the validity of the questionnaires.

#### 412 HEALTH EDUCATION FOR PARENTS AND CAREGIVERS OF PEDIATRIC PATIENTS AT THE UGANDA CANCER INSTITUTE

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10.1136/jim-2019-WMRC.412

**Purpose of study** The Uganda Cancer Institute (UCI) sees patients with little understanding of cancer and low health literacy. There are widespread myths about cancer in Uganda, leading to late presentations requiring complex care. This project aimed to increase understanding of cancer and its treatment among parents and other caregivers at the UCI.

**Methods used** A community assessment and literature review on health education in low-literacy populations were conducted, and 5 UCI pediatric nurses and 10 caregivers were interviewed about cancer knowledge gaps, understanding of treatments, barriers to care, and preferred method of education. Based on these interviews, visual materials were identified as the most effective tools. A 20-page, 9'x12' flipchart for use by nurses educating caregivers and patients was produced. Input from nurses and doctors led to the content used for a pilot study with 10 adult, English-speaking caregivers of UCI patients. Revisions were made to the materials based on caregiver feedback from the pilot study, and a final flipchart was printed.

**Summary of results** Caregivers engaged most with topics that related to their family's experience with cancer. These experiences were the basis of each topic covered in the final flipchart. After receiving one-on-one health education using the flipchart, 9 caregivers identified at least 1 sign of cancer, 8 identified at least 1 healthy food for children on chemotherapy, and 10 identified at least 1 side effect of chemotherapy. The project was presented at a meeting of 30 UCI staff, which started a conversation about expanding the project and carrying it forward, with acknowledgment that all UCI staff must be involved in educating patients.

**Conclusions** This project increased understanding of cancer in caregivers at the UCI and encouraged UCI staff to work together to address gaps in health literacy. Multiple departments will be involved in successfully carrying the project forward, including Pediatrics, Social Work, Emergency, and IT. Projecting the flipchart on waiting room TVs, and displaying a poster summarizing the flipchart are methods that will ensure health education is regularly delivered. Encouraging cancer survivors and their families to share their personal experiences in their villages will help spread this project's messages in Uganda.

#### 413 HELPING BABIES BREATHE – AN EVALUATION OF PROGRAM EFFECTIVENESS IN RURAL GUJARAT, INDIA

A Patil\*, A Judkins, B Fassl, LN Donovan, K Maves, MA Budge, A Beckstead. *University of Utah, Salt Lake City, UT*

10.1136/jim-2019-WMRC.413

**Purpose of study** Helping Babies Breathe (HBB) is a protocol designed for health workers to successfully navigate 'The Golden Minute' and reduce asphyxia-related neonatal deaths. This study aims to evaluate the effectiveness of HBB in reducing neonatal mortality in a rural community hospital in Gujarat, India.

#### Abstract 413 Table 1 Delivery and death registrar data

	2014	2015	2016	2017	2018	2019
Deliveries	382	538	374	414	687	25
Number of Stillbirths	4	3	5	0	1	0
Number of Neonatal Deaths	1	3	2	8	6	0
Neonatal Mortality Rate	2.62	5.58	5.35	19.32	8.73	0
Stillbirth Rate	10.47	5.58	13.37	0	1.46	0
Perinatal Mortality Rate	13.09	11.15	18.72	19.32	10.19	0

**Methods used** This study took place in the Mota Fofalia Pediatric Center in Gujarat, India between April 2014 and July 2018. All birth attendants completed standardized HBB training in April 2014 and subsequent data-driven, refresher training annually. Trained observers measured HBB compliance during the study timeline using a form previously validated for rural India. Information was collected about resuscitation equipment preparation and resuscitation care provided to infants. A retrospective review of the hospital death registrar was performed to evaluate trends in stillbirth and neonatal mortality since program implementation.

**Summary of results** The hospital death registrar recorded a total of 2395 births from 2014 to 2018. Deliveries increased steadily from 382 to 687 respectively. A decrease in stillbirths was found after the implementation of the HBB program from 10.47 to 1.46 per thousand live births in the four-year period. An overall decline in stillbirths of 2 per 1000 each year ( $R^2=0.42$ ) was noted. Additionally, perinatal mortality rate decreased from 13.09 to 10.19, between 2014 and 2018 respectively. Neonatal mortality rate also increased over this time period from 2.62 to 8.73 per thousand live births (table 1).

**Conclusions** Implementation of the HBB training program has led to a reduction in stillbirth from 2014 to 2018 in the pediatric center, lending to the idea that deaths due to previous 'stillbirths' may have been due to secondary apnea and not true stillbirths. Further evaluation should be pursued to evaluate the cause of the observed increased in neonatal mortality rate.

## Neonatology general V

### Concurrent session

8:00 AM

Saturday, January 25, 2020

#### 414 IMPACT OF PROBIOTIC ADMINISTRATION IN PRETERM INFANTS

S Iqbal\*, M Underwood, K Kuhn-Riordon. *UC Davis Children's Hospital, Sacramento, CA*

10.1136/jim-2019-WMRC.414

**Purpose of study** Poor growth in the early postnatal period is associated with long-term neurodevelopmental impairment, short stature, and metabolic disorders in preterm neonates. Probiotic *Lactobacillus* and *Bifidobacterium* strains decrease late onset sepsis, necrotizing enterocolitis, and mortality in

**Abstract 414 Table 1** Probiotic comparison

	L. reuteri (N=29)	B. infantis (N=19)	P value
Gestational age, weeks (median IQR)	28 (25, 30)	27 (26, 29)	0.68
First feeding, day (median IQR)	1 (1,2)	2 (1,2)	0.37
Full enteral feeding, day (median IQR)	14.5 (10, 24.5)	14 (11.5, 19)	0.25
Length of stay, days (median IQR)	68 (58, 111)	57 (46.5, 101.5)	0.44
Delta z score weight (mean SD)	-0.77 (0.86)	-0.89 (0.46)	0.37
Delta z score length (mean SD)	-0.82 (1.5)	-1.13 (1.0)	0.25
Delta z score HC (mean SD)	-0.85 (1.5)	-0.70 (1.2)	0.44
Max alkaline phos (mean SD)	413 (119)	462 (150)	0.24

preterm infants, but studies of the impact of probiotics on growth have been mixed. We examined growth parameters, maximum serum alkaline phosphatase and the fecal microbiota in a cohort of preterm infants treated with either *Lactobacillus reuteri* 17938 (BioGaia, BioGaia AB, Stockholm, Sweden) or *Bifidobacterium infantis* EVC001 (Evivo, Evolve Biosystems, Davis CA).

**Methods used** This cohort study includes premature infants with a gestational age <33 weeks at UC Davis Children's Hospital with consent obtained from the parents. All infants received either mother's milk or donor milk. Probiotics were continued until 34 weeks. Fecal samples were collected twice weekly from infants from the time of enrollment to a corrected gestational age of 36 weeks. Change in z scores from admission to discharge was calculated for weight, length, and head circumference (HC) for each infant.

**Summary of results** Sequencing of the 16S ribosomal RNA gene has been completed and the bioinformatics analysis is in process for 48 very low birth weight infants. The table summarizes feeding and growth data.

**Conclusions** There was no difference between the two probiotic groups in growth or feeding tolerance. We are currently analyzing the fecal microbiota for differences between the two probiotic groups for  $\alpha$ -diversity,  $\beta$ -diversity, and abundance of microbes associated with sepsis and necrotizing enterocolitis (e.g. Enterobacteriaceae). We are also examining correlations between growth delta z-scores and relative abundance of key bacterial taxa.

#### 415 ANALYSIS OF NON-HUMAN PROTEINS/PEPTIDES IN HUMAN BREAST MILK BY MASS SPECTROMETRY

<sup>1</sup>SS Bai-Tong\*, <sup>2</sup>K Luskin, <sup>1</sup>M Ghasseman, <sup>1</sup>J Kitsen, <sup>1</sup>D Motazavi, <sup>1</sup>K Bertrand, <sup>1</sup>C Chambers, <sup>1</sup>SL Leibel, <sup>1</sup>S Leibel, <sup>1</sup>B Geng. <sup>1</sup>University of California San Diego, San Diego, CA; <sup>2</sup>Scripps Clinic, San Diego, CA

10.1136/jim-2019-WMRC.415

**Purpose of study** Human breast milk is shown to decrease the risk of atopic diseases in full term babies. But its allergenic effects on preterm babies and the etiology of its protective effect have not been established. We aim to perform a broad analysis of non-human proteins and peptides in human breast milk using mass spectrometry.

**Methods used** Four breast milk samples were obtained from Mommy's Milk, a human milk research biorepository in San Diego for mass spectrometry analysis. Two samples were from preterm infant's mothers and two were from term infants' mothers. Mothers filled out food and environmental exposure surveys when donating their breast milk. We

utilized the University of Nebraska Allergen Protein Database and The Universal Protein Resource (UniProt) protein sequence database to identify a total of 2211 protein/peptide sequences.

**Summary of results** Each sample had between 806 and 1007 proteins/peptides, with 37 to 44 non-human proteins/sample encompassing 26 plant and animal species. Bovine proteins/peptides were the most numerous; seven unique *Bos taurus* proteins/peptides were found in all samples. Cat, dog, mosquito, salmon, and crab were detected in all four samples. All maternal donors ingested fish, shellfish and tree nuts. Aeroallergen proteins/peptides, including dust mite and mold were identified in all samples. Two almond proteins were detected in three samples. Two samples contained latex and chicken. One sample contained several unique proteins/peptides, including carrot, two molds (including *Penicillium citrinum*) and American house dust mite-like protein.

**Conclusions** These findings represent the first breast milk mass spectrometry analysis with identification of known allergenic proteins from food and the environment. The correlation between the exposure of allergenic protein in human milk and the development of atopic disease is unclear. This raises the question of whether breast milk can serve to induce sensitization or tolerance in infants. We are currently conducting a prospective study aiming to analyze allergenic peptides in preterm infants' milk feeding and their risk of atopic disease later on in life.

#### 416 HUMAN BETA-DEFENSIN 2 ATTENUATES MALNUTRITION-INDUCED LUNG INJURY

A Hanhauser\*, S Wedgwood, M Underwood. University of California Davis, Sacramento, CA

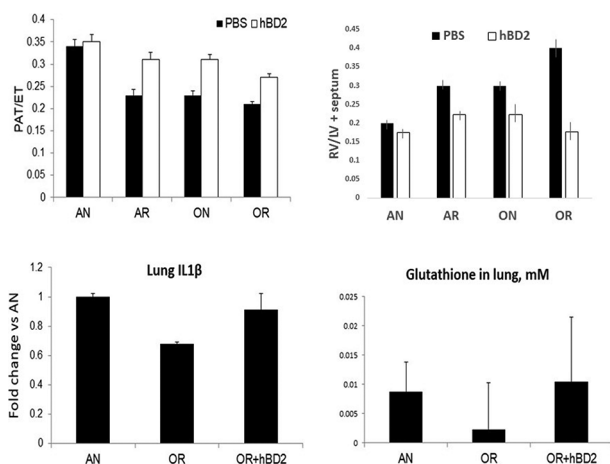
10.1136/jim-2019-WMRC.416

**Purpose of study** Poor post-natal growth is associated with bronchopulmonary dysplasia and pulmonary hypertension (PH) in extremely preterm infants. In a rodent model, we have shown that postnatal growth restriction (PNGR) causes intestinal dysbiosis and PH. Human beta-defensin 2 (HBD2) is a broad spectrum antimicrobial peptide produced by many epithelial cells including enterocytes in the distal small bowel and colon. We hypothesized that HBD2 would attenuate malnutrition-associated dysbiosis and PH.

**Methods used** Newborn rats were assigned to a litter size of 17 (PNGR) or 10 (normal growth), and exposed to room air or 75% oxygen for 14 days. Some PNGR+hyperoxia pups were treated with recombinant HBD2 by gavage. Echocardiograms were performed on day 14 to determine the ratio of pulmonary acceleration time (PAT) to pulmonary ejection time (ET); decreased PAT:ET indicates PH. Pups were then euthanized and plasma and tissues harvested. Fulton's index (RV weight divided by LV weight + septum weight), was quantified to identify RV hypertrophy. Lung expression of IL1 $\beta$  and glutathione (GSH) were analyzed as a marker of inflammation and oxidative stress respectively.

**Summary of results** HBD2 attenuated malnutrition-induced PH and RVH and reversed associated changes in IL1 $\beta$  and GSH (figure 1).

**Conclusions** Malnutrition causes intestinal dysbiosis leading to injury in the developing lung. Alterations in inflammatory cytokines and markers of oxidative stress are promising mechanisms. The decrease in lung IL1 $\beta$  with malnutrition was



**Abstract 416 Figure 1** HBD2 attenuated malnutrition-induced PH and RVH and reversed associated changes in IL1β and GSH

unexpected and was reversed by treatment with HBD2. Investigation of changes in the gut microbiota with administration of HBD2 is warranted.

**417 GROWTH OUTCOMES IN PRETERM INFANTS LESS THAN 1250 GRAMS AT BIRTH FED HUMAN MILK WITH HUMAN MILK BASED FORTIFIER VERSUS BOVINE MILK BASED FORTIFIER**

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10.1136/jim-2019-WMRC.417

**Purpose of study** Comparison of growth outcomes in preterm infants less than 1250 grams at birth fed with human milk with human milk-based fortifier (EHM) versus bovine milk-based fortifier (HMF).

**Methods used** Retrospective data collection on preterm infants less than 1250g at birth admitted to NICU from January 2016 to May 2019 who were fed with human milk with human milk-based fortifier (EHM) (26cal/oz) or bovine milk-based fortifier (HMF) (24cal/oz). Congenital anomalies or genetic syndromes were excluded. Demographics, clinical outcomes and anthropometric measurements at birth and at discharge were collected.

**Summary of results** There were 53 preterm infants included in the study. EHM compared to human milk with HMF, had higher discharge weight (2925g vs 2552.5g; p=0.004), discharge weight percentiles (19% vs 4.5%; p=0.006); and

**Abstract 417 Table 1** Demographics and growth outcomes of the study population

	Human milk with human milk-based fortifier (N=25)	Human milk with bovine milk-based fortifier (N=28)	p value
Gestational Age (weeks)*	26 (25, 27.7)	27.64 (26.9, 28.9)	0.019
Birth weight (grams)*	900 (755, 1005)	967.5 (737.5, 1125)	0.504
Birth weight (percentile)*	61 (38, 79)	31 (13.5, 60)	0.008
Length at birth (cm)*	33.5 (32, 36.5)	35.12 (32.75, 37)	0.604
Female n (%)	14 (56)	16 (57.14)	0.933
Cesarean-section n (%)	15 (60)	21 (75)	0.243
Discharge weight (grams)*	2925 (2761, 3335)	2552.5 (2256, 2887.5)	0.004
Discharge weight (percentile)*	19 (11, 27)	4.5 (1, 20)	0.006
Discharge length (cm)*	47.5 (46, 48.5)	45.2 (43.7, 47)	0.015
Gestational age at discharge (weeks)*	39.7 (38.9, 40.9)	38.4 (37.4, 40.5)	0.136

\*Median (25<sup>th</sup> percentile, 75<sup>th</sup> percentile)

**Abstract 417 Table 2** Clinical outcomes

Outcome	Human milk with human milk-based fortifier (N=25)	Human milk with bovine milk-based fortifier (N=28)	p value
Small for gestational age at birth n (%)	24 (96)	23 (82)	0.2
Extrauterine growth restriction n (%)	4 (16)	17 (60.7)	0.001
Retinopathy of prematurity			
Stage 0 n (%)	15 (65.2)	20 (74.1)	0.79
Stage 1 n (%)	7 (30.4)	6 (22.2)	
Stage 2 n (%)	1 (4.3)	1 (3.7)	
Bronchopulmonary dysplasia n (%)	12 (48)	9 (32.1)	0.24
Necrotizing enterocolitis n (%)	2 (8)	2 (7.1)	0.91
Central line associated blood stream infection n (%)	0 (0)	1 (3.6)	0.34

discharge length (47.5cm vs 45.2cm; p=0.015). (Table1) Extrauterine growth restriction was significantly lower in preterm infants fed EHM (16% vs 60.7%, p=0.001). There was no significant difference in clinical outcomes between infants fed EHM and human milk with HMF. (Table 2)

**Conclusions** Preterm infants fed EHM at higher caloric intake resulted in fewer infants with extrauterine growth restriction. Despite lower gestational age in infants fed EHM, the corrected gestational age at discharge was not significantly different from infants fed human milk with HMF.

**418 GROWTH FAILURE IN NEONATES WITH GASTROSCHISIS**

<sup>1</sup>K Strobel\*, <sup>2</sup>K Kramer, <sup>3</sup>E Fernandez, <sup>4</sup>C Rottkamp, <sup>5</sup>C Uy, <sup>1</sup>T Romero, <sup>2</sup>R Keller, <sup>4</sup>F Poulain, <sup>1</sup>D Deugarte, <sup>1</sup>KL Calkins. <sup>1</sup>UCLA, Los Angeles, CA; <sup>2</sup>UCSF, San Francisco, CA; <sup>3</sup>UCSD, San Diego, CA; <sup>4</sup>UCD, Sacramento, CA; <sup>5</sup>UCI, Irvine, CA

10.1136/jim-2019-WMRC.418

**Purpose of study** Early growth failure is associated with later developmental delays. Growth studies in infants with gastroschisis are limited. In this multi-site study, our aim was to investigate growth failure in hospitalized infants with gastroschisis.

**Methods used** We included neonates with gastroschisis treated at the 5 sites in the University of California Fetal Consortium (UCFC). The UCFC developed guidelines to standardize care of infants with gastroschisis, including a feeding approach. Growth failure was characterized by changes in z-scores from birth to 14 and 30 days (d) of age, and discharge (D/C) (mild, z-score decrease of 0.8-1.2; moderate, >1.2-2; severe, ≥2; or none). Regression analysis from birth to discharge for z-scores was performed, and a mixed model was used to assess growth failure predictors.

**Abstract 418 Table 1** Proportion of infants with growth failure

	Mild growth failure	Moderate growth failure	Severe growth failure
Weight z-score			
14 d	21%	4%	0%
30 d	16%	11%	0%
Discharge	13%	12%	3%
Length z-score			
14 d	15%	14%	2%
30 d	17%	17%	8%
Discharge	16%	15%	11%

**Summary of results** Among 129 infants, the median (IQR) gestational age was 37 weeks (35-37). Length of stay was 32 d (23-60), and complicated by small for gestational age (SGA, 29%) and necrotizing enterocolitis (4%). Weight and length z-scores at 14 d, 30 d, and D/C were less than birth ( $p < 0.01$  for all); there was no difference for HC. At least 25% of the infants developed growth failure for weight and length at 14 d to D/C (Table 1). D/C Growth failure (defined by length) was associated with weight and length z-score changes over time ( $p < 0.05$  for both). Gestational age was associated with D/C growth failure OR=0.83, (CI 0.68, 1.01,  $p=0.066$ ).

**Conclusions** In a cohort of infants with gastroschisis, growth failure occurred despite implementation of guidelines. This suggests that nutritional practices are inadequate and complicated by the pathobiology of gastroschisis, inflammation and intestinal dysmotility.

#### 419 PATHOLOGICAL FETAL GROWTH RESTRICTION RESULTS IN REDUCTION IN LEAN MASS GROWTH THAT PERSISTS INTO THE NEONATAL PERIOD

H Hesse\*, C Levek, A Wilcox, C Driver, J Steller, H Galan, J Hobbins, L Brown. *University of Colorado, Aurora, CO*

10.1136/jim-2019-WMRC.419

**Purpose of study** Fetal growth restriction (FGR), defined by an estimated fetal weight (EFW)  $< 10\%$ , does not differentiate constitutionally from pathologically small fetuses. Fetuses with pathological FGR by International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) criteria demonstrate reduced fat and lean mass compared to FGR fetuses who do not meet criteria. Among FGR fetuses, we hypothesized that those meeting ISUOG criteria would have reduced neonatal lean mass.

**Methods used** In this prospective cohort study of fetuses with an EFW of  $< 10\%$ , ISUOG criteria were applied to the last ultrasound prior to delivery revealing either pathological FGR [FGR-P: umbilical artery pulsatility index (PI)  $\geq 95\%$ , cerebroplacental ratio (CPR)  $\leq 5\%$ , middle cerebral artery PI  $\leq 5\%$ , or EFW  $\leq 3\%$ ;  $n=23$ ] or constitutionally small (FGR-C: EFW 3-10% + normal Dopplers;  $n=20$ ). Weight, height, and head circumference (OFC) were obtained at birth. Air Displacement Plethysmography (ADP) and anthropometrics with skin folds were used at 40-44 weeks to estimate lean and fat mass and were compared by linear models adjusted for postmenstrual age (PMA).

**Summary of results** At birth, FGR-P were born earlier (36.7 vs 38.2 wks), shorter (44.3 vs 47.4 cm), lighter (2.1 vs 2.7 kg), and had smaller OFC (31 vs 33.2 cm;  $P < 0.01$ ). At 40.4 wks PMA, weights were similar, but FGR-P neonates were shorter by 1.9 cm (95% CI: 0.5-3.3) and had smaller OFC by 0.8 cm (0.2-1.5) and chest circumference by 2.7 cm (0.4-5.0;  $P < 0.05$ ). Percent fat mass by ADP trended lower in FGR-P by 4% ( $P=0.08$ ), with no difference in skin fold measurements between groups.

**Conclusions** FGR-P neonates had persistent reductions in length and head/chest circumference but had similar weights and fat mass compared to FGR-C neonates, indicating that catch up growth in the neonatal period in FGR-P is mostly fat mass. Increased fat relative to lean mass may contribute to future metabolic disease risk in fetuses with pathological FGR.

#### 420 RACIAL/ETHNIC AND REGIONAL DIFFERENCES IN PREVALENCE AND PREDICTORS OF MEDICAL COMPLEXITY AMONG A NATIONAL COHORT OF VLBW INFANTS

KE Hannan\*, SL Bourque, C Levek, S Tong, S Hwang. *University of Colorado, Aurora, CO*

10.1136/jim-2019-WMRC.420

**Purpose of study** To describe the prevalence and predictors (patient- and hospital-level) of medical complexity, defined as having Complex Chronic Conditions (CCC) or Technology Dependence (TD), in a nationally representative sample of very low birthweight (VLBW,  $< 1500\text{g}$ ) infants.

**Methods used** We performed a retrospective, cross-sectional analysis of hospital discharge data (2009 & 2012) from the Healthcare Cost and Utilization Project's (HCUP) Kids' Inpatient Database (KID). We included infants with ICD9 codes indicating birthweight  $< 1500\text{g}$  and complete demographic information. Primary outcomes were CCC or TD and combined outcome of CCC or TD or death during birth hospitalization. CCC was defined using ICD9 codes indicating a medical condition expected to last  $> 12$  months and involving either several organ systems or extensive involvement of 1 organ system. TD was defined using ICD9 codes indicating medical complexity arising from dependence upon medical technology (device). All analyses were weighted to estimate national and regional prevalence of CCC, TD, and death.

**Summary of results** Our cohort consisted of 58,597 VLBW infants, representing a population of 78,683. A weighted percent of 39.4% (95% CI 38.9-39.8) had any CCC/TD and 56.3% (95% CI 55.9-56.7) had the combined outcome of CCC/TD or death. After adjusting for demographic characteristics, hospital characteristics, and birthweight, females (AOR 0.71, 95% CI 0.68-0.73), non-Hispanic black infants (AOR 0.92, 95% CI 0.88-0.97), and those in an urban non-teaching hospital (AOR 0.83, 95% CI 0.80-0.87) were less likely to have the combined outcome of CCC/TD or death. Compared to infants in the Northeast, those in the Midwest (AOR 1.09, 95% CI 1.02-1.15) and South (AOR 1.07, 95% CI 1.02-1.13) were more likely to experience the combined outcome, while those in the West (AOR 0.93, 95% CI 0.88-0.99) were less likely to experience the combined outcome.

**Conclusions** Almost 40% of VLBW infants discharged following birth hospitalization have medical complexity. Both patient and hospital-level characteristics are independently associated with CCC/TD. Understanding the prevalence and predictors of CCC/TD among VLBW infants provides critical data to inform future interventions to improve care and outcomes during hospitalization and after discharge home.

#### 421 UTILITY OF BIRTH CERTIFICATE DATA FOR EVALUATING HOSPITAL VARIATION IN ADMISSIONS TO NEONATAL INTENSIVE CARE UNITS

<sup>1</sup>E Haidari, <sup>1</sup>H Lee\*, <sup>2</sup>J Illuzzi, <sup>3</sup>H Lin, <sup>2</sup>X Xu. <sup>1</sup>Stanford University, Stanford, CA; <sup>2</sup>Yale School of Medicine, New Haven, CT; <sup>3</sup>Yale School of Public Health, New Haven, CT

10.1136/jim-2019-WMRC.421

**Purpose of study** Efforts to study potential overuse of NICU admissions and hospital variation in practice are often hindered by lack of an appropriate data source. Birth certificates contain a data element measuring NICU admission and may offer a means for research in this area, as they

can be linked to data sources containing diagnoses. Although multiple studies have evaluated the quality of birth certificate data elements, accuracy of the NICU admission measure remains largely unknown. To address this knowledge gap, we examined the concordance of hospital-level NICU admission rates between birth certificate data and the California Children's Services (CCS) data to inform the utility of birth certificate data in studying hospital variation in NICU admissions.

**Methods used** We analyzed birth certificate data from California in 2012 and linked it to hospital-specific summary data from CCS regarding NICU admissions. NICU admission rates were calculated for both datasets while using CCS data as the gold standard. Difference between birth certificate-based and CCS-based NICU admission rates was assessed using Wilcoxon signed rank test, and concordance between the two rates was evaluated using Lin's concordance correlation coefficient and Kendall's W concordance coefficient.

**Summary of results** Among a total of 103 hospitals that were linked between the two datasets, birth certificate data generally underreported NICU admission rates compared to CCS data (7.72% vs 11.51%,  $p < 0.001$ ). However, in a subset of 35 hospitals where the difference in NICU admission rates between the two datasets was small, birth certificate-based NICU admission rate showed good concordance with the rate from CCS data (Lin's concordance correlation coefficient=0.91, 95% confidence interval: 0.84-0.95, Kendall's W concordance coefficient=0.99,  $p < 0.001$ ). Hospitals with good concordance data did not differ from other hospitals in the institutional characteristics assessed.

**Conclusions** For a selected subset of hospitals, birth certificate data may offer a reasonable means to investigate hospital variation in NICU admissions.

## Neonatology – perinatal biology II

### Concurrent session

8:00 AM

Saturday, January 25, 2020

422

#### NFκB SIGNALING MEDIATES THE HEPATIC INNATE IMMUNE RESPONSE TO CHORIOAMNIONITIS IN LATE GESTATION FETAL SHEEP

L Nguyen\*, M Zarate, E Chang, P Rozance, R Wilkening, S Wesolowski, C Wright. CU Anschutz, Aurora, CO

10.1136/jim-2019-WMRC.422

**Purpose of study** Inflammation is a key component of the many complications associated with exposure to chorioamnionitis. However, the current paradigm holds that the developing innate immune response is biased against a pro-inflammatory state. Thus, we sought to determine whether the acute hepatic innate immune response contributes to the pro-inflammatory state associated with chorioamnionitis.

**Methods used** Late gestation (125 d) fetal sheep were catheterized (hepatic vein and abdominal aorta) and exposed to

intraamniotic lipopolysaccharide (IA LPS; 20 mg/mL) ( $n=13$ ). Fetal blood samples were collected (0,1,5 hrs) to examine the acute physiologic and endocrinologic response. Hepatic expression of pro-inflammatory target genes and NFκB mediated innate immune signaling pathways were assessed by qPCR and Western blot. To determine cell-type specificity of the innate immune response, hepatocytes and hepatic macrophages were isolated from fetal liver and assessed for LPS-induced pro-inflammatory genes expression.

**Summary of results** IA LPS resulted in fetal metabolic acidosis, increased norepinephrine and cortisol levels within 5 hours of exposure. Interestingly, hepatic expression of primary innate immune response genes (IL1A, IL1B, TNF, IL6, IL8) significantly increased within 1 hour of exposure, prior to measurable changes in blood gas values, and serum norepinephrine and cortisol. Increased expression of primary response genes was temporally correlated with hepatic NFκB activation as determined by the degradation of inhibitory protein, IκBα, and the nuclear translocation of NFκB subunits (p65/p50). To identify the cells responsible for LPS-induced NFκB activation and primary response gene expression, hepatocytes and hepatic macrophages were isolated and exposed to LPS. Compared to the hepatocytes, the expression of key primary response genes was enriched in hepatic macrophages, implicating this cell population is central to the fetal innate immune response.

**Conclusions** The hepatic innate immune response to an in-utero inflammatory challenge by IA LPS includes NFκB signaling and primary response gene expression. These results suggest a dynamic response between inflammatory stress signaling and metabolic disturbances and targeting these pathways may attenuate injury associated with inflammation.

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#### LATE GESTATION FETAL HYPERGLUCAGONEMIA RESULTS IN LOWER FETAL WEIGHT AND DECREASED UTEROPLACENTAL NUTRIENT UPTAKE

S Cilvik, S Wesolowski, L Brown, P Rozance\*. University of Colorado Anschutz Medical Campus, Aurora, CO

10.1136/jim-2019-WMRC.423

**Purpose of study** Fetal glucagon concentrations are elevated in intrauterine growth restriction. Glucagon receptors are expressed in the placenta, with one previous study suggesting that glucagon may inhibit umbilical uptake of certain amino acids. We hypothesized that chronic fetal hyperglucagonemia would result in decreased amino acid transfer to the fetus and decreased growth.

**Methods used** Late gestation fetal sheep received a direct intravenous infusion of glucagon (5 or 50ng/kg/min;  $n=7$  and 5, respectively) or a vehicle control ( $n=10$ ). After 8-10 days, uterine and umbilical blood flows were measured utilizing the  $^3\text{H}_2\text{O}$  transplacental diffusion technique. Uteroplacental and umbilical (fetal) uptake rates of oxygen, glucose, lactate, and amino acids were calculated using the Fick principle. All glucagon-exposed fetuses were grouped and compared to controls using the unpaired Student's t-test to best evaluate global trends related to hyperglucagonemia.

**Summary of results** Fetuses receiving glucagon had 13% lower fetal weight compared to controls ( $p < 0.05$ ). Fetal

hyperglucagonemia resulted in 30% higher fetal oxygen concentrations ( $p < 0.05$ ), 42% lower lactate ( $p < 0.01$ ), and significantly lower concentrations of nearly all amino acids. Glucose concentrations were not different. Uterine blood flow was 33% lower in hyperglucagonemic fetuses ( $p < 0.05$ ), while umbilical blood flow was similar between groups. Fetal hyperglucagonemia resulted in lower uteroplacental uptakes of oxygen by 32% ( $p < 0.001$ ), glucose by 34% ( $p < 0.01$ ), and several amino acids by 53-79% (valine, isoleucine, leucine, arginine, serine, proline, methionine, tryptophan;  $p < 0.05$ ). Placental lactate production was 33% lower than control following chronic hyperglucagonemia ( $p < 0.05$ ). Fetal uptakes of valine, isoleucine, leucine, phenylalanine, proline, and tyrosine were 36-51% lower than control ( $p < 0.05$ ), while fetal glucose and oxygen uptakes showed no significant change.

**Conclusions** These results demonstrate that fetal hyperglucagonemia has a significant impact on maternal uterine blood flow and maternal transfer of nutrients to the placenta. This leads to a reduction in fetal nutrient supply, particularly of the branched chain amino acids, and may contribute to lower fetal weight.

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#### MECHANISM UNDERLYING INCREASED CARDIAC EXTRACELLULAR MATRIX DEPOSITION IN PERINATALLY NICOTINE INDUCED TRANSGENERATIONAL MODEL

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10.1136/jim-2019-WMRC.424

**Purpose of study** Previously, we demonstrated transgenerational transmission of perinatal nicotine-induced lung phenotype. Although perinatal nicotine exposure predisposes to offspring cardiac fibrosis, the underlying mechanisms involved and whether this phenotype is also transmitted transgenerationally are unknown. MiR-1 is known to target fibronectin and MIAT, a long non-coding RNA, is implicated in cardiac injury. We hypothesized that perinatal nicotine exposure alters the expression of miR-1 and MIAT transgenerationally.

**Methods used** Pregnant Sprague-Dawley rat dams (F0) received either nicotine (1 mg/kg once daily s.c.) or placebo from e6 to postnatal day (PND) 21. Following delivery at term, the F1 pups breastfed ad lib. At PND21, some pup hearts were collected and some pups were weaned as breeders to generate F2 and F3 offspring, but without any subsequent exposure to nicotine. F3 hearts were collected at PND21 for analysis. For *in vitro* studies, neonatal primary cardiac fibroblasts (NPCF) and cardiac myocytes (CM) were isolated and treated with nicotine ( $10^{-9}$ M) for 72h to 7 days. MIAT levels were modulated by siRNA and the expression of MIAT, miR-1, and fibronectin was determined by qRT-PCR, western blotting, and immunohistochemistry.

**Summary of results** Perinatal nicotine exposure increased expression of fibronectin at PND21 in F1 ( $p < 0.05$ ; N=5) and F3 hearts ( $p < 0.05$ ; N=7) while decreasing miR-1 and increasing MIAT levels ( $p < 0.05$ ). Nicotine treatment of cultured NPCF and CM increased MIAT levels, while it suppressed miR-1 expression ( $p < 0.05$ ). MIAT knockdown

resulted in miR-1 induction, with a decrease in fibronectin expression in cardiac fibroblasts ( $p < 0.05$ ).

**Conclusions** Perinatal nicotine exposure is associated with increased fibronectin deposition in F1 and F3 offspring, increased cardiac MIAT levels, and decreased miR-1 expression. These data provide a mechanistic basis for increased ECM deposition in the perinatally nicotine exposed offspring heart and for the first time demonstrate the transmission of perinatal nicotine-induced predisposition to cardiac fibrosis transgenerationally.

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#### EFFECT OF PERINATAL NICOTINE EXPOSURE ON MATERNAL/OFFSPRING GUT MICROBIOME AND SHORT CHAIN FATTY ACID PROFILES, AND THE DEVELOPING LUNG

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10.1136/jim-2019-WMRC.425

**Purpose of study** Alterations in maternal gut microbiome play an important role in the development of respiratory diseases such as asthma in offspring. Although nicotine adversely affects the developing lung directly whether there is a role of altered maternal/offspring gut microbiome in mediating this effect is unknown. Since bacterial metabolites [e.g., short chain fatty acids (SCFAs)] and/or possibly the bacteria themselves cross the placental barrier, we hypothesize that the effects of perinatal nicotine exposure on the developing lung in part are mediated via alterations in maternal/offspring gut microbiome and/or their metabolic consequences. We determined the effect of perinatal nicotine exposure on maternal/offspring gut microbiome and SCFA profiles and how SCFA levels affect the key lung developmental pathways.

**Methods used** Pregnant Sprague Dawley rat dams received diluent or nicotine (s.c.) 1mg/kg once daily from e6 until postnatal day (PND) 21. Pups delivered at term and breastfed ad libitum. At PND21, dams and pups were killed to collect ceca for microbiome profiling and blood for SCFA profiling. Additionally, e14 fetal rat lung explants were cultured for 5 days  $\pm$  butyric acid, propionic acid, or acetic acid ( $10^{-9}$  and  $10^{-6}$ M for each), following which key lung developmental markers were analyzed by q-RT-PCR.

**Summary of results** Comparison of the relative abundance of intestinal flora among offspring at genus level showed increased lactobacillus (15 to 49%), but decreased bacteroides (22 to 9%) abundance in the nicotine exposed group (N=3;  $p < 0.05$ ). Consistent with these data, concentrations of fecal SCFAs, especially butyric acid, which is produced predominantly by bacteroides were reduced in both maternal and offspring sera. Fetal lung explants cultured in lower concentrations of SCFAs ( $10^{-9}$ M vs  $10^{-6}$ M) resulted in lower expression of lung maturation markers such as PPAR $\gamma$  and surfactant protein B ( $p < 0.05$ ).

**Conclusions** Perinatal nicotine exposure results in altered offspring gut microbiome, especially, decreased abundance of SCFAs producing bacteroides, which provides a novel mechanism underlying perinatal nicotine exposure induced alterations in lung maturation and development.



#### 426 ENDOTOXEMIA IMPAIRS NEONATAL AND JUVENILE HEPATIC SELENOCYSTEINE SYNTHESIS AND SELENOENZYME DEFENSE

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10.1136/jim-2019-WMRC.426

**Purpose of study** Pediatric sepsis is a major cause of childhood morbidity and mortality. Nutritional status contributes to host response after sepsis, and selenium (Se) is an essential micronutrient with potential to improve outcomes during life threatening infection. Se levels decrease during sepsis and inversely correlate with risk of multiorgan dysfunction, pneumonia, and death. However, Se replacement has not improved outcomes in septic adults. The liver is primarily responsible for converting Se into the bioactive amino acid selenocysteine (Sec). We have previously demonstrated endotoxemia decreases hepatic factors for Sec synthesis in adult mice, which may obstruct the therapeutic potential of Se replacement during illness. It is unknown if this phenomenon is experienced in younger mice. We hypothesized endotoxemia would impair hepatic Se processing both in neonatal and juvenile mice.

**Methods used** Male and female P7 and P21 C57/B6 mice were exposed to IP LPS (5 mg/kg) and sacrificed at 0, 6 and 24 hr. Hepatic mRNA and protein expression for factors essential in Se processing (PSTK, SepsecS/SLA, Sephs2/Sps2, SBP2, EEFSec, Scly) and selenoenzymes (SelenoP, Gpx1, Msrb1, TrxR1) were measured by qPCR and Western blot.

**Summary of results** LPS decreased hepatic mRNA of factors for Sec synthesis at 6 hr, including PSTK, SepsecS, Sephs2, Scly and Eefsec, in P7 and P21 mice ( $p < 0.05$ ,  $n = 4-5$ ). At 24 hr, mRNA remained low only in the P7 mice ( $p < 0.05$ ,  $n = 4-5$ ). Protein expression for Sps2 decreased at 24 hr in P7 and P21 mice. Protein for PSTK decreased at 6 hr at both ages and remained low at 24 hr only in P7 mice ( $p < 0.05$ ,  $n = 4-5$ ). Hepatic transcription of SelenoP, Gpx1, Msrb1 and TrxR1 decreased at 6 and 24 hr in P7 mice. SelenoP and Msrb1 mRNA decreased at 24 hr in P21 mice ( $p < 0.05$ ,  $n = 4-5$ ).

**Conclusions** Endotoxemia downregulates numerous hepatic factors for Sec synthesis and selenoenzymes in P7 and P21 mice. This downregulation demonstrates delayed recovery in P7 mice. We speculate that neonates may be more susceptible to hepatic oxidative stress during infections due to an exaggerated decrease in hepatic Sec and selenoenzyme production.

Support: CCTSI Child Maternal Health Mentored Grant (L.S), NHLBI HL132941 (C.J.W.).

#### 427 UMBILICAL CORD MILKING WITH VENTILATION IN PERINATAL ASPHYXIA AND MECONIUM ASPIRATION

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10.1136/jim-2019-WMRC.427

**Purpose of study** Placental transfusion is currently not recommended for neonates in need of resuscitation at birth due to concerns about delaying positive pressure ventilation (PPV). Umbilical cord milking (UCM) during PPV with an intact cord may potentially combine the benefits of placental transfusion without delaying the onset of PPV. The objective of this study was to evaluate pulmonary and systemic hemodynamics

and gas exchange following UCM and PPV in a model of birth asphyxia, meconium aspiration syndrome (MAS) and persistent pulmonary hypertension of the newborn (PPHN).

**Methods used** Twelve near-term gestation (142/150d) lambs were asphyxiated by umbilical cord occlusion. MAS was induced by instilling meconium into the lungs during gasping leading to PPHN. Lambs were randomized to UCM+PPV or immediate cord clamping (ICC). Lambs were ventilated for an hour and preductal blood gases, left pulmonary (Qlpa) and carotid (Qca) blood flows were monitored.

**Summary of results** Baseline characteristics were similar between the groups. Following ICC, Hgb decreased after birth. With UCM+PPV, Hgb was stable and O<sub>2</sub> delivery to the brain was significantly higher compared to the ICC group. Qca decreased and Qlpa increased with ventilation in both groups.

**Abstract 427 Table 1** Comparison of ICC followed by PPV vs. UCM+PPV before cord clamping – mean (SEM)

Group	Immediate cord clamping followed by PPV (n=6)	Umbilical cord milking + PPV before cord clamping (n=6)
Birth weight (g)	3065 (421)	3210 (269)
Gender – Male (%)	2 (33%)	3 (50%)
Multiplicity (single/twin/triplet)	2/3/1	2/4/0
Fetal asphyxia gas pH	6.92 (0.03)	6.92 (0.07)
Fetal asphyxia lactate (mmol/L)	6.6 (0.7)	7.1 (0.4)
Baseline Hgb (g/dL)	13 (0.8)	11.6 (0.8)
Baseline fetal carotid flow (ml/kg/min)	28 (4)	33 (5)
Baseline fetal pulmonary flow (ml/kg/min)	32 (12)	34 (7)
PaO <sub>2</sub> /FiO <sub>2</sub> at 5 min after delivery	203 (26)	205 (44)
<b>At 60 min after delivery</b>		
Carotid flow (ml/kg/min)	15 (1.2) †	20 (2.9) †
Pulmonary flow (ml/kg/min)	91 (24) †	93 (11) †
Body Temperature (°C)	36.3 (0.3)	36.8 (0.4)
Blood Gas pH	7.23 (0.04) †	7.19 (0.05) †
Blood Gas Hgb (g/dL)	11.9 (0.6) †	12.3 (0.6)
Blood Gas Lactate (mmol/L)	3.4 (0.7) †	3.6 (0.4) †
Arterial oxygen content (CaO <sub>2</sub> ) ml/dL	14.1 (0.4)	15.1 (0.7)
Oxygen delivery to the brain ml/kg/min	2.1 (0.2)	3 (0.3)*
Oxygen extraction by the brain (%)	25.2 (2.9)	17.6 (2.4)

† p-values < 0.05 compared to baseline. \*p-value < 0.05 compared to the ICC group.

**Conclusions** Lambs with perinatal asphyxia tolerated UCM +PPV with an intact cord did not have a decrease in Hgb and had higher oxygen delivery to the brain at 60 min after birth compared to lambs with immediate cord clamping.

#### 428 CONTINUOUS CHEST COMPRESSIONS WITH ASYNCHRONOUS VENTILATIONS INCREASE CEREBRAL BLOOD FLOW

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10.1136/jim-2019-WMRC.428

**Purpose of study** Current guidelines recommend interrupted chest compressions (CC) at a 3:1 compression-to-ventilation (CV) ratio in severely bradycardic newborns. In neonates, heart rate is the primary determinant of cardiac output and achieving a higher rate of CC may increase blood flow. We

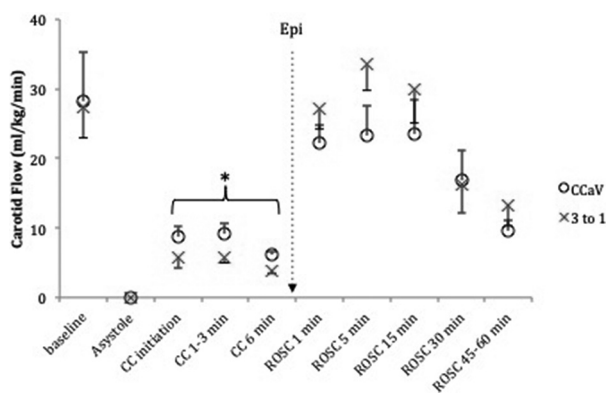
hypothesize that continuous CC with asynchronous ventilations (CCCaV) leads to quicker return of spontaneous circulation (ROSC) and better hemodynamics compared to 3:1 CV resuscitation.

**Methods used** Sixteen near-term lambs (142/147d) were asphyxiated by cord occlusion to cardiac arrest. Lambs were randomized to 3:1 CV or CCCaV (120 CC/min and asynchronous ventilations at 30/min). After 5min of asystole ventilation was provided by a T-piece resuscitator with CC started after 30s. First dose of epi was given at 6min if ROSC was not achieved.

**Summary of results** There were no differences in baseline characteristics between groups (table 1). Incidence and time of ROSC was similar in both groups (table 1). Lambs that received CCCaV had significantly greater left carotid blood flow compared to 3:1 CV ( $8.1 \pm 3.3$  vs  $5.3 \pm 2.5$  ml/kg/min,  $p=0.01$ ; figure 1). There was no difference in systolic, diastolic and mean BP between groups.

Abstract 428 Table 1

Group	3 to 1 (n=8)	CCCaV (n=8)	p value
Weight kg (SD)	3.9 (1.1)	4.0 (0.9)	0.90
Sex M:F	5:3	4:4	1
Time to asystole (min)	15.1 (5.4)	13.1 (2.4)	0.37
ROSC	7/8 (88%)	7/8 (88%)	1
Time to ROSC	5.1 (2.4)	6.1 (1.1)	0.32
ROSC without Epi	3/8 (38%)	3/8 (38%)	1



Abstract 428 Figure 1

**Conclusions** In this model, CCCaV showed greater carotid blood flow compared to 3:1 CV resuscitation. Clinical studies assessing the neurodevelopmental outcomes comparing CCCaV to 3:1 CV during newborn resuscitation are warranted.

**429 REPROGRAMMING OF FIBROBLAST CELLS INTO INDUCED TROPHOBLAST STEM CELLS AS A MODEL FOR STUDYING PLACENTAL DEVELOPMENT**

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10.1136/jim-2019-WMRC.429

**Purpose of study** Trophoblast stem cells (TSCs), the precursors to placental differentiated cells, have unique self-renewal properties and have the ability to differentiate into many trophoblast cell subtypes. These qualities make TSCs important to study as they are highly involved in development and placenta functioning. Recent studies have identified certain genes that are involved in the differentiation of TSCs. Through overexpression of these genes, it may be possible to reprogram differentiated cells back into their TSC state.

**Methods used** To study the possible effects of these various genes, plasmid constructs were made with our genes of interest. RNA from cell lines rich in TSCs was used to make a cDNA library, from which the cDNAs for the target genes were amplified by PCR. These amplified genes were cloned into a retroviral expression *E. coli* shuttle vector using the Gibson Assembly method. Midscale plasmid purification was performed and the DNA was transduced into fibroblast cells to validate the function of the constructs.

**Summary of results** Our initial qPCR results indicated that these transduced genes were well expressed in the fibroblast and HEK293 cells. With confirmed expression of these genes, we need to determine if there is also production of protein products, and if these transcription factors lead to reprogramming of the fibroblast cells into induced TSCs (iTSCs).

**Conclusions** Upon successful reprogramming, iTSCs can be used to study gene expression patterns in the differentiation of TSCs into their differentiated daughter cells. This will also allow for greater understanding of placental-related pregnancy complications.

**Pulmonary and critical care II**

**Concurrent session**

**8:00 AM**

**Saturday, January 25, 2020**

**430 VARIOUS SULFONAMIDES ARE PROTECTIVE IN LUNG ISCHEMIA-REPERFUSION INJURY BOTH BY CARBONIC ANHYDRASE INHIBITION AND OTHER MECHANISMS**

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10.1136/jim-2019-WMRC.430

**Purpose of study** Recent studies from our laboratory have demonstrated the protective action of carbonic anhydrase (CA) inhibition against ischemia-reperfusion (I/R) injury in the heart. However, the mechanisms involved have not been fully elucidated and may involve non-CA inhibition mediated pathways. To examine these for the first time in the lung, we studied effects of acetazolamide (AZ), benzolamide (BZ), and a non-CA inhibiting analog of acetazolamide (n-methyl acetazolamide-NMA) in acute lung I/R injury.

**Methods used** 30 healthy male rats (300-350 g, 6-8 weeks old) were randomly classified into six groups: 1. Sham (n=5). 2. I/R injury (n=5) treated with saline. 3. I/R injury + 30

mg/kg BZ pretreatment (n=5). 4. I/R injury + 30 mg/kg AZ pretreatment (n=5) and 5. I/R injury + 30 mg/kg NMA pretreatment (n=5). Rats in the sham group underwent left thoracotomy without any hilar clamp or treatment. For the IR injury groups, the left main pulmonary artery and bronchus were clamped for 60 minutes and then blood flow was reestablished for 90 minutes, after which measurements were taken and tissue samples obtained.

**Summary of results** Az, NMA, but not BZ, significantly reduced the fall in PaO<sub>2</sub>/F<sub>I</sub>O<sub>2</sub>, a measure of gas exchange efficiency, caused by lung I/R injury. The rise in lung wet to dry weights (reflecting pulmonary edema), and protein extravasation (reflecting capillary permeability) were reduced by all pretreatments. The lungs in pretreatment groups showed less neutrophilic infiltration, alveolar edema and hemorrhage. Lastly, drug pretreatments all reduced HIF-1 activation, suggestive of less tissue hypoxia with I/R injury.

**Conclusions** Our data demonstrate that pretreatment with AZ, BZ and NMA all protect against and mitigate the extent of damage with I/R in the lung. The protection appears to involve direct effects of CA inhibition, but in the case of NMA, other actions independent of CA inhibition that may include either anti-oxidative or hypoxia-mediated Ca<sup>++</sup> signaling changes, as has been shown in the uninjured hypoxic pulmonary vasculature.

#### 431 INTENSIVE REGISTERED RESPIRATORY THERAPIST ATTENTION MAY REDUCE LENGTH OF STAY AND READMISSION RATE IN ACUTE EXACERBATIONS OF COPD

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10.1136/jim-2019-WMRC.431

**Purpose of study** Acute exacerbations of chronic obstructive pulmonary disease (AECOPD) are common and lead to significant morbidity and mortality. Institutional AECOPD quality measures such as hospital length of stay (LOS) and readmission rates are increasingly important. Prior studies demonstrated benefit from patient education (e.g. inhaler technique), appropriate medications (e.g. mist inhalers for patients with reduced inspiratory ability), and a follow up plan. Bundling these proven methods, our institution implemented a Registered Respiratory Therapist (RRT)-directed program, identifying AECOPD patients and personalizing management. We aim to analyze the effect of this RRT program on hospital LOS and readmissions as well as the improvement in patient symptoms over time.

**Methods used** We will perform a retrospective case control study comparing a well-described cohort of AECOPD patients who received intensive RRT attention to AECOPD patients who received standard care. Intensive RRT attention is defined as daily inpatient visits by an RRT COPD Case Manager inculcating patient education, customized medication selection, and a follow up plan. Usual care includes a one-time RRT evaluation with medication recommendations. We aim to analyze the 800 subjects per group enrolled over the last 6 years to show a reduction in LOS by 0.5 days in the intensive group. The power analysis of our cohort size is acceptable to detect a difference of 10% using a paired t test. We will also

compare readmission rates and COPD Assessment Tool (CAT) scores.

**Summary of results** We expect a reduction in LOS by 1.5 days and readmissions among AECOPD patients in the intensive RRT program. We also expect an improvement (decrease) in symptoms for patients who receive appropriate medications and instructions.

**Conclusions** Use of a dedicated COPD RRT program will likely significantly improve meaningful clinical and institutional quality outcomes in AECOPD patients.

#### 432 PROVISION OF SMOKING CESSATION RESOURCES IN THE CONTEXT OF LUNG CANCER SCREENING

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10.1136/jim-2019-WMRC.432

**Purpose of study** Evidence-based lung cancer screening (LCS) with low-dose chest CT is now widely recommended for high-risk current and former smokers. The potential benefits of screening may go beyond early cancer detection, as shared-decision making (SDM) presents a 'teachable moment' to reinforce cessation and provide resources for current smokers. However, there are few studies on smoking cessation practices in the context of LCS in a clinical setting. The objective of this study was to understand smoking cessation initiation and practices during LCS SDM encounters.

**Methods used** This is a retrospective study of participants in a multi-center LCS program with a SDM clinical encounter who were current smokers at time of screening (n=469). The LCS tracking database and EHR were manually reviewed for patient demographics and clinical encounter information. The Charlson Comorbidity Index (CCI) was determined through automated review of all ICD-10 codes. The primary outcome was provision of smoking cessation resources, defined as: documented referral to cessation resources, referral for nicotine replacement and/or provision of prescription medication. Participant and provider factors associated with the primary outcome were evaluated using chi-squared testing and multivariable logistic regression.

**Summary of results** The majority of study participants were men (70%), with a median age of 62 years and smoking history of 50 pack-years. The median CCI was between 2 and 3. 71% of encounters had some discussion of smoking, but only 21% of participants were referred to tobacco service, 31% were provided nicotine replacement resources and 17% were provided related prescriptions. In a multivariable model, the provision of smoking cessation resources was half as likely in participants with higher levels of comorbidity CCI>2 (OR: 0.58, 95% CI: 0.37-0.90).

**Conclusions** Overall provision of smoking cessation resources among current smokers was low, particularly among patients with higher levels of comorbidity. Interventions are needed to improve smoking cessation counseling and resource utilization at the time of LCS encounter, and this may be especially important in patients and providers with chronic illness who face competing priorities for time and resources.

### 433 'VAPOR LUNG': ORGANIZING PNEUMONIA DUE TO ELECTRONIC CIGARETTE USE IN A PATIENT WITH SEVERE ASTHMA

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10.1136/jim-2019-WMRC.433

**Case report** A 24 year old healthy man with a history of childhood asthma presented to pulmonary clinic with 'atypical pneumonias' and wheezing. The patient was diagnosed with corticosteroid-dependent severe eosinophilic asthma (absolute eosinophil count of 2,378 cells/uL, FEV1 2.47 L (45% predicted)), with fungal sensitization. He was then hospitalized for an asthma exacerbation and also diagnosed with multiple new patchy bilateral mixed solid and ground glass opacities (GGO) on chest CT. An extensive serologic workup was negative (RF, anti-CCP, ANA, ANCA, anti-SSA/SSB, Ro, JO-1, TM/SCL 100, scleroderma panel). VATS lung biopsy revealed focal organizing pneumonia (OP) w/fibrin and acute inflammation without eosinophils. The patient reported using electronic (e)-cigarettes for 3-4 months before his first episode of GGO/pneumonitis. He was then started on azathioprine (as a steroid-sparing agent initially) added to prednisone. Over several months azathioprine was tapered off after some clinical improvement, however, the patient remained dependent on prednisone (10-50 mg/day). Despite prolonged steroid use and some improvement in symptoms and lung function (FEV1, FVC), his peripheral eosinophil count remained high (2,000 cells/uL) with elevated IgE at 717. Additional work up including stool parasite testing, and serologic testing (JAK2, BCR ABL, KIT, D816V, flow cytometry) were all unremarkable. While both Eosinophilic Granulomatosis with Polyangiitis (EGPA) and chronic eosinophilic pneumonia were considered, previous VATS lung biopsy did not reveal eosinophilic vasculitis thus ruling out EGPA, as well as malignancy and infection, and bronchoscopy with bronchoalveolar lavage did not reveal pulmonary eosinophilia. Hypereosinophilic syndrome was also considered and ruled out. Given the timing of his symptoms and the development of OP in temporal relationship to e-cigarette use, the patient was diagnosed with 'vapor lung' as a secondary injury to his background of asthma. Previous published literature has linked e-cigarettes with bronchiolitis obliterans organizing pneumonia (BOOP). We conclude that there may be a causal relationship between vaping and certain forms of lung injury including OP or BOOP.

### 434 IDENTIFYING ASTHMA AFTER WILDFIRES: A RESEARCH CLINIC BASED APPROACH

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10.1136/jim-2019-WMRC.434

**Purpose of study** Short-term health impacts of wildfires have been described, but long-term effects have not been studied. We hypothesize that high-dose, single-event exposures such as the Northern California Wildfires of 2017 and 2018 not only acutely and chronically worsen symptoms for patients with respiratory conditions, but also may cause incident asthma. We developed a research clinic protocol to identify new-onset asthma and worsening of known lung disease among wildfire survivors with self-reported respiratory symptoms.

**Methods used** The UC Davis Environmental Health Sciences Center launched an online survey covering a region affected by the 2018 Camp Fire and the lingering heavy smoke. The survey launched in May 2019, seven months post-fire. We then attempted to recruit survey respondents from a list of 137 respondents within Butte County, most with persistent respiratory symptoms. Those we reached were asked to attend a one-day pilot research clinic in Butte County on June 15, 2019. On short notice, the research team was assembled with three clinical research coordinators, two respiratory therapists, a UC Davis faculty physician, and an internal medicine resident. The protocol included validated respiratory symptom questionnaires, spirometry, measurement of exhaled nitric oxide, and exhaled breath condensate collected with our novel handheld device and stored for subsequent analysis.

**Summary of results** 22 patients were scheduled, 20 of whom attended and consented to undergo clinical examination. 8 participants had an Asthma Control Questionnaire score >10, and 6 had an Asthma Control Test score <20, suggesting significant respiratory symptoms in the past month. Among those subjects, only 1 had a forced expiratory volume in 1 second (FEV1) <80% and an FEV1/FVC (forced vital capacity) of <70%. Exhaled nitric oxide concentrations were elevated >30 ppb in 2 subjects, which corresponds to a specificity for asthma diagnosis of 0.84 and a sensitivity of 0.53.

**Conclusions** This clinic demonstrated a strong response with a low no-show rate and feasibility of the protocol. The data suggest that we can use this approach to identify both incident asthma and longitudinal respiratory symptom burden following wildfire exposure.

### 435 DERIVATION AND VALIDATION OF A DIAGNOSTIC PREDICTION MODEL FOR INTERSTITIAL LUNG DISEASE

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10.1136/jim-2019-WMRC.435

**Purpose of study** Interstitial lung disease (ILD) comprises a heterogeneous group of diffuse lung disorders that commonly result in pulmonary fibrosis. Diagnostic delays are common, with many patients experiencing disease progression before diagnosis. While high-resolution computed tomography (HRCT) is the gold standard for diagnosing ILD, characteristic abnormalities on pulmonary function testing (PFT) can increase suspicion for ILD. In this investigation we used PFT data to derive an ILD prediction model and screening tool (ILD-Screen).

**Methods used** PFT and CT databases were used to identify consecutive patients undergoing PFT over a two-year period with paired chest CT performed within 100 days of PFT. Relevant data were extracted from the PFT report and ILD status determined using a multi-reader approach. Logistic regression was used to identify variables associated with ILD with model coefficients used to construct a normalized ILD risk score, ranging 0-15. Those with score  $\geq 8.8$  were considered to have a positive ILD-Screen. HRCT was recommended for ILD-screen positive patients without prior CT imaging.

**Summary of results** Of 3294 patients undergoing PFT, 31% had a paired chest CT, including 16.9% with evidence of

ILD. Variables used to construct the ILD risk score included age, PFT indications, height, total lung capacity, forced expiratory volume in 1 second and diffusion capacity. Similar test performance was observed across cohorts, with the ILD-Screen having a sensitivity of 0.82 and specificity of 0.8 when applied prospectively. ILD-Screen positivity increased the odds of ILD by 19-fold (OR 18.9, 95% CI 13.6-26.4) and explained a significantly higher proportion of ILD risk (0.81) when compared to common ILD features, including cough (0.58), dyspnea (0.53) and lung crackles (0.66).

**Conclusions** The ILD-Screen has good sensitivity and specificity for detecting ILD. Systematic implementation of the ILD-Screen has potential to reduce diagnostic delays and facilitate early intervention. The benefit of such approach must be weighed against the cost and risk of false positives, which will be common due to the low prevalence of ILD. Further research is needed to determine the clinical implications of its use.

## Case reports II

### Concurrent session

10:15 AM

Saturday, January 25, 2020

#### 436 UNUSUAL PRESENTATION OF ACUTE HEPATITIS COMPLICATED BY PANCREATITIS IN A CHILD

OC Dogan\*, M Haight. *UCSF Fresno, Fresno, CA*

10.1136/jim-2019-WMRC.436

**Case report** A 2 year-old previously healthy boy presented with 1 day of nonbilious nonbloody emesis and diarrhea, in the setting of cough, congestion, and rhinorrhea for 1 week. Parent gave a total of Acetaminophen 1600 mg over 1 week, and 1 tablet of Aspirin 4 days prior to the presentation. Examination showed small ecchymosis on sternum. Initial labs included complete blood count, complete metabolic panel, lipase, toxicology screen, coagulation studies. They showed elevated values for white blood count at 17000/uL, alanine transaminase 2467 U/L, aspartate aminotransferase 3985 U/L, lipase 3302 U/L, amylase 1167 U/L, international normalized ratio 1.3, and prothrombin time 16.6 seconds. Salicylate, acetaminophen, and bilirubin levels were unremarkable. Investigations for infectious causes showed EBV DNA PCR of 18604 copies/ml with negative hepatitis A, B, and C, viral respiratory panel and stool pathogens. Abdominal computerized tomography scan showed mild pericholecystic fluid. Abdominal ultrasound was unremarkable. Hereditary pancreatitis panel, CMV PCR and HSV PCR were negative. He was subsequently diagnosed with acute hepatitis complicated by pancreatitis without cholestasis secondary to EBV infection.

This is an unprecedented presentation of acute hepatitis complicated by pancreatitis secondary to EBV infection in a child. In infants and young children, clinical course of EBV infection is generally silent. When complicated by hepatitis, EBV infection does not cause cholestasis, hyperbilirubinemia, or jaundice in younger populations. Our patient had viral

prodromal symptoms of cough, congestion, and rhinorrhea for 1 week, and then presented with emesis and diarrhea. Laboratory results revealed highly elevated levels of white blood count, transaminases, lipase, and amylase, and was diagnosed with acute hepatitis with pancreatitis. Infection with EBV may cause a viral prodromal episode with a complication of hepatitis. EBV-induced hepatitis with pancreatitis is very unusual and has been reported in 4 patients in the literature between ages of 8 to 11 years. This case is significant in that it illustrates the importance of investigations of infectious agents in children presenting with acute hepatitis with pancreatitis, as it influences further management and outcome prediction.

#### 437 RARE CASE OF INTRA-VENTRICULAR HEMORRHAGE IN A FULL TERM INFANT PRESENTING WITH HYPERBILIRUBINEMIA

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10.1136/jim-2019-WMRC.437

**Case report** A full term male born via normal spontaneous vaginal delivery to a diabetic mother presented at 3 days of age to his primary care physician's office with jaundice. He had a serum bilirubin level of 21.7 (above phototherapy threshold), and was admitted to the pediatric floor for management. Patient was 12% below birth weight, and started on phototherapy for presumed breastfeeding jaundice. Infant had persistent hyperbilirubinemia despite triple phototherapy, and developed a fever to 101.1F on hospitalization day 3, prompting concern for pathologic jaundice. A complete workup (hematologic, biliary and infectious) returned negative. Lumbar puncture was attempted but was unsuccessful. Throughout his stay, he was lethargic with poor feeding. He was then noted to have intermittent unilateral, shaking, concerning for seizures for which neuro-imaging and EEG were performed. A head ultrasound showed bilateral grade III germinal matrix hemorrhages with post-hemorrhage ventriculomegaly. MRI brain, MRA head, and MRV head showed no evidence of thrombosis or vascular malformation. Hemophilia studies were unremarkable. EEG showed no seizure activity. He was diagnosed with intra-ventricular hemorrhage (IVH) with no signs of hydrocephalus with the plan to follow up with neurosurgery outpatient. He was discharged on hospitalization day 9, after feeding improved with consistent weight gain, and bilirubin levels remained stable. Since discharge, interval head ultrasounds showed resolution of IVH. No further events occurred concerning for seizures. Patient currently feeding and growing well.

**Discussion** IVH is a known complication in low birth weight or pre-term infants but is rarely seen in full-term infants. Etiologies of IVH in a term versus pre-term infant differ. In this case, we suspect, birth trauma leading to asphyxia most likely led to IVH, in turn causing increased break down of RBC's, leading to hyperbilirubinemia. The lethargy, poor feeding, and fever can be attributed to the IVH, as well as the shaking episode which may have been a symptomatic seizure. Though rare, it is imperative to consider IVH in full term infants especially in the presentation of hyperbilirubinemia and lethargy, in order to evaluate for other contributing factors and monitor for signs/symptoms of hydrocephalus.

### 438 MOYAMOYA IN PREGNANCY, RETROSPECTIVE CASE REPORT AND LITERATURE REVIEW

BA Mocan\*, F Venter, M Gill, N Idemudia, S Jung, D Bell, C D'Assumpcao, S Ragland, K Sabetian. *Kern Medical-UCLA, Bakersfield, CA*

10.1136/jim-2019-WMRC.438

**Purpose of study** Moyamoya disease is a rare chronic occlusive cerebrovascular disease characterized by progressive stenosis at the terminal portion of the internal carotid artery and an abnormal vascular network at the base of the brain. Clinical manifestations include transient ischemic attacks, cerebral infarcts, and intracranial hemorrhages. Pregnancy invokes intravascular volume and intracerebral pressure changes from conception to delivery. Here we discuss the management of a pregnant patient diagnosed with moyamoya disease after stroke four years prior who presented to us with a transient ischemic attack.

**Methods used** Retrospective case report.

**Summary of results** A 24 year old G1P0 at 34 weeks gestation presented with sudden inability to swallow, speak, and right finger tingling lasting 10 minutes. She has residual left arm and facial weakness from a stroke four years prior and was diagnosed with Moyamoya disease at that time. Magnetic resonance imaging found no acute infarction or hemorrhage but showed old right frontotemporal encephalomalacia and old left caudate lacunar infarct. Magnetic resonance angiography found attenuation and irregularity of distal right and left internal carotid arteries with nonvisualization of the right distal internal carotid artery at the level of the circle of Willis and abrupt severe narrowing of the left internal carotid artery near the circle of Willis. There was severe attenuation of the right and left anterior and middle cerebral arteries. 16 hour continuous EEG was normal with no interictal epileptic discharges or seizure activity. There was concern for her proceeding with labor and vaginal delivery specifically in regards to valsalva causing increased intracranial pressure, which could cause intracranial hemorrhage, and hyperventilation, which could lead to vasoconstriction of small collateral blood vessels and cause cerebral infarct. Therefore the patient had cesarean section with no intra- or post-operative complications.

**Conclusions** Moyamoya disease in pregnancy requires awareness of physiological changes during labor and delivery, making cesarean section a favorable choice for optimal hemodynamic maintenance. Multidisciplinary team is recommended.

### 439 CRONOBACTER SAKAZAKII BACTEREMIA AND MENINGITIS IN A 4-WEEK-OLD FEMALE

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10.1136/jim-2019-WMRC.439

**Background** Cronobacter sakazakii is a foodborne pathogen that can cause life-threatening bloodstream infections and meningitis predominantly in neonates. It is associated with CNS complications, including abscess and cyst formation. We present a case of a neonate infected with this bacterium.

**Case** This is a 4-week-old female born at full term who presented with 1 day of fever, fussiness, and poor oral intake. The patient had 1 week of nasal congestion and had sick contacts at home. No vomiting, diarrhea, or rashes were reported. Birth history revealed that the mother was GBS positive during pregnancy but was treated appropriately before delivery.

On exam, the patient was febrile, ill-appearing, irritable, and tachycardic.

A full sepsis workup was performed. Ceftriaxone was started empirically. Initial labs revealed a WBC of 19,000, sodium of 133 and CSF which showed a bloody tap with RBC of 250,000/mms, WBC of 250/mms, 79% polymorphonucleocytes, protein of 279mg/dL, glucose of 64mg/dL. Urinalysis, Influenza/RSV swab, and CXR were unremarkable. Blood and CSF cultures grew Gram-negative bacilli that were speciated as Cronobacter sakazakii. Although the organism was sensitive to ceftriaxone, the antibiotic was switched to cefepime for concerns of resistance; gentamicin was added for a synergistic effect. MRI of the brain showed an arachnoid cyst, and serial imaging did not show further CNS complications. A repeat lumbar puncture proved CSF sterility and gentamicin was discontinued. Subsequent blood cultures were negative for growth. Fevers, irritability, oral intake, WBC, and electrolytes improved after starting antibiotics. The patient completed a 21-day course of IV antibiotics and was discharged home.

**Discussion** Cronobacter sakazakii infections are rare. The bacterium is highly virulent with a mechanism to survive even in stressful environments such as very dry climates. The CDC reports that the mortality rate for Cronobacter meningitis may be as high as 40%. It has been linked to the ingestion of contaminated powdered infant formula. Formula samples were sent to the Health Department for testing which returned negative. Cronobacter sakazakii should be considered as a pathogen for neonates with meningitis who live in arid environments in addition to the commonly expected organisms.

### 440 SPONTANEOUS CEREBELLAR ECTOPIA IN A PATIENT WITH COCCIDIOIDAL MENINGITIS

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10.1136/jim-2019-WMRC.440

**Introduction** Spontaneous cerebellar ectopia without acute trauma is rare. Meningitis has not yet been reported as a cause in the literature. We present a case of coccidioidal meningitis complicated by cerebellar ectopia.

**Case report** 22 year old Hispanic female with five year history of coccidioidal meningitis complicated by non-communicating hydrocephalus requiring ventricular peritoneal shunt with multiple revisions who is on posaconazole and biweekly intrathecal amphotericin B deoxycolate through an ommaya reservoir presented with acute encephalopathy. Two days prior to presentation, she had lumbar puncture for prognostic studies. She developed new onset headache, confusion and then somnolence, for which family brought patient to hospital. Imaging suggested shunt malfunction due to worsening hydrocephalus as the distal VP shunt was looped around the bladder. She developed fever upon admission. VP shunt and ommaya were removed and an external ventricular device was placed. Samples from VP shunt grew *Enterococcus faecalis*. The following day she become obtunded requiring intubation. Neuroimaging found obstructive hydrocephalus with compression on each side of the brainstem and downward pressure on the cerebellar tonsils, which extend 13mm below the foramen magnum. She exhibited right sided decorticate and left sided decerebrate posturing as well as right medial gaze palsy. EEG was

consistent with coma. EVD drainage was decreased from 20mmHg to 5mmHg and patient was placed in head-down position. She did not show any signs of improvement and 8 days later new VP shunt was placed. The following day she began to track with eyes and follow simple commands. One week later tracheostomy was placed and due to VP shunt malfunction underwent another revision. PEG was placed. After 23 ICU days, patient recovered enough to be stable for telemetry floor. After 6 days, she was transferred to acute rehab. At four months follow up, patient has no neurological deficits, performing all ADLs and is able to drive a vehicle.

**Conclusions** Cerebellar ectopia is not common and when it occurs the sequelae is permanent and prognosis is very poor. Spontaneous appearance and resolution without neurological sequelae is rarely seen and the mechanism is unknown.

#### 441 A RUPTURED MYCOTIC ANEURYSM IN A 17-YEAR-OLD MALE WITH STAPHYLOCOCCUS LUGDUNENSIS ENDOCARDITIS

RR Filbrandt\*, F Naem. *Valley Childrens Hospital, Madera, CA*

10.1136/jim-2019-WMRC.441

**Introduction** *Staphylococcus lugdunensis* is coagulase-negative staphylococcus (CoNS). Like other CoNS, it is considered a normal skin flora but can cause life threatening infections, including endocarditis. Mycotic aneurysm is a rare complication of endocarditis with reported mortality up to 80%. There have been limited case reports of mycotic aneurysms with *Staphylococcus lugdunensis* endocarditis. We report the first pediatric case of *Staphylococcus lugdunensis* endocarditis complicated by a mycotic aneurysm in a 17-year-old male.

**Case report** A 17-year-old male presented with a one month history of cough, fevers, night sweats, weight loss, and 2 weeks of right leg pain with difficulty ambulating. His exam was notable for a Grade 2/6 systolic murmur. Doppler study was unremarkable for a deep venous thrombosis of the right lower extremity. Blood culture resulted positive for *Staphylococcus lugdunensis*. Echocardiogram demonstrated moderate mitral regurgitation with mitral valve prolapse concerning for endocarditis. He was initially treated with Vancomycin then deescalated to IV Cefazolin based on susceptibilities. On day 12 of illness, he developed stabbing pain in his right anterior medial thigh and was found to have a tender, pulsatile mass. Doppler study revealed a femoral artery mycotic aneurysm. CT angiogram showed occlusion of the right profunda femoris artery with ruptured pseudoaneurysm. He underwent emergent embolization of the right profunda femoris artery without complications. Clinically he did well and completed a 6-week course of IV Cefazolin. Due to mitral valve prolapse with regurgitation he is a candidate for future valve replacement.

**Discussion** *Staphylococcus lugdunensis* associated mycotic aneurysm is a rare but serious complication requiring immediate intervention. To date, there have been two reported cases with *Staphylococcus lugdunensis* endocarditis complicated by mycotic aneurysm with one resulting in death due to rupture. Early diagnosis and intervention is critical in improving outcomes.

**Conclusion** This case illustrates the rare presentation of a mycotic aneurysm secondary to *Staphylococcus lugdunensis* endocarditis and reinforces the importance of early diagnosis and intervention to improve outcomes.

#### 442 UNILATERAL SYMPTOMATIC WEeping ELEPHANTIASIS NOSTRAS VERRUCOSA IN AN HIV PATIENT RESPONDED TO EMPIRIC CHEMOTHERAPY FOR KAPOSI SARCOMA

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10.1136/jim-2019-WMRC.442

**Introduction** Elephantiasis nostras verrucosa is a rare chronic lymphedema that causes progressive cutaneous hypertrophy. In a young HIV patient from Malawi, filariasis, Kaposi sarcoma, cutaneous fungal infection and lymphoma are possible causes of chronic lymphatic blockage. Here we share a challenging case of elephantiasis nostras verrucosa.

**Case report** A 33 year old Malawian who moved to US 12 years prior was diagnose with HIV seven years later but remained non-adherent to treatment. He developed progressive left lower extremity swelling one year prior with gradual cobble stoned hypertrophic changed from his foot to iliac crest. He started to have copious foul smelling drainage with complete disfiguration of his limb. Imaging found enlarged inguinal lymph nodes, subcutaneous edema, lytic L4 and a hypochoic liver lesions. All of his work up including filariasis and bartonella came back negative. Wound grew methicillin-resistant *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia*, and *Streptococcus agalactiae*. Core needle biopsies of L4 were inconclusive. Skin punch biopsies found perivascular chronic and lymphohistiocytic infiltrates with hyperkeratosis. Serum HHV 8 viral load was 1593 copies/ml. He also had monoclonal gammopathy of undermined significance, non-megaloblastic macrocytic normochromic anemia, and renal tubular acidosis type IV. Compressive wound care over four months of admission was complicated by worsening lymphatic drainage requiring intensive care to correct hypovolemic hypotonic hyponatremia. Possible diagnosis of Kaposi sarcoma despite inconclusive biopsies was discussed with him. He elected to receive liposomal doxorubicin monotherapy with improvement of lymphatic drainage and pain.

**Conclusions** Definitive diagnosis of etiology behind elephantiasis in HIV host is difficult and management of lymphedema and fluid loss remains challenging.

## Healthcare delivery research III

### Concurrent session

10:15 AM

Saturday, January 25, 2020

#### 443 CONCUSSION EDUCATION IN MEDICAL SCHOOL

L Ekman\*, A Dang, L Dhillon, T Alsky, D Baron. *Western University of Health Sciences, Pomona, CA*

10.1136/jim-2019-WMRC.443

**Purpose of study** Previous studies have found knowledge deficits amongst medical students and physicians regarding concussion symptoms, diagnosis, and management. This study evaluates the state of concussion education across medical schools in the United States and assesses medical students' general interest in receiving formal concussion education, with

the ultimate goal being to help educators better prepare medical students for their clinical years.

**Methods used** An electronic survey was distributed to current osteopathic medical students from all years of training across the nation. The survey was comprised of 14 questions in total, with four questions pertaining to responder demographics, six questions designed to assess knowledge in concussion diagnosis and treatment, and four questions assessing exposure to previous concussion education. Data was collected in aggregate. Results by year of training in medical school were analyzed via one-way ANOVA. Multiple comparison combinations between all four years of training were assessed via Tukey's HSD test.

**Summary of results** Preliminary collection of over 400 responses and analysis of the data show a statistically significant linear correlation between year of training in medical school and success in answering questions regarding correct identification of concussion symptoms, proper diagnosis, and management protocols. Interestingly, a large majority of responders indicated that they wanted to receive more formal concussion education, with a small minority feeling that they have received adequate concussion education to prepare them for their clinical years as a physician.

**Conclusions** While data collection is still ongoing, the preliminary results of our study suggest that as medical students progress in their years of training, so too does their knowledge of concussion diagnosis and management. However, both the total performance results on the knowledge assessment, and the results of the students' self-assessment of concussion knowledge, demonstrate that students at all academic levels lack a comprehensive understanding of concussion symptoms and management. The data from our study suggests both a desire and need from medical students to strengthen concussion education in medical schools across the country.

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#### MEDIC! A COURSE ON IMPROVISED MANAGEMENT OF TRAUMA PATIENTS FOR MEDICAL STUDENTS

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10.1136/jim-2019-WMRC.444

**Purpose of study** Physicians may be the first responders in a trauma situation when away from their clinic and equipment, and anecdotal reports prove this to be a real possibility. Considering the variable response time of emergency medical services, there is a need for training on trauma management in a low resource, out-of-hospital setting. Through their education medical students potentially have an advantage over the lay bystander, if provided adequate instruction. Searches via PubMed and MedEdPortal have demonstrated no currently existing curriculum to address this need.

**Methods used** The Medic! course trains students on trauma management with an emphasis on improvised techniques. Two 60-minute trial classes on hemorrhage and airway control with 13 first- and second-year medical students tested interest and viability. Before each class, students received the relevant chapters from the course manual. Sources for course development were a combination of PubMed articles, civilian emergency medical services, military combat medicine guidelines and the author's own Special Forces Medic training. Instruction stressed hands-on skills practice with both classmates and mannequins as patients.

**Summary of results** Success was measured through instructor observation of techniques during class and student feedback following the trial's conclusion. Evaluations revealed significant increase of an average 4 points on a 10-point scale in self-reported confidence levels performing various skills. Students' comments revealed that they overwhelmingly valued the course content's applicability and the amount of practical and hands-on training. The most consistent criticism was the desire for a longer class period (90 instead of 60 minutes).

**Conclusions** Creation of this course was part of a new curriculum development option for satisfying a medical school research requirement. The course content fulfills a gap in medical training, and the trial sessions of Medic! demonstrated this course's viability among medical students. It reinforces core curriculum lessons, prepares them to respond appropriately in a trauma situation, and instills confidence in the no-equipment, out-of-hospital setting. Future plans for the course are to conduct a full iteration during the author's fourth year of medical school.

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#### OCHO PASOS: A QUALITY IMPROVEMENT PILOT TO IMPROVE BREASTFEEDING SUPPORT IN OUTPATIENT CLINICS

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10.1136/jim-2019-WMRC.445

**Purpose of study** The documented health benefits of breastfeeding (BF) for mother and baby are numerous, yet a third of US mothers achieve only three months of exclusive BF despite the American Academy of Pediatrics (AAP) recommendation to exclusively BF for six months. National experts have recently published evidence-based guidelines for outpatient clinics to support longer durations of BF. Our pilot study sought to evaluate the feasibility of an intervention to improve support for BF in outpatient primary care clinics.

**Methods used** We compared evidence-based BF-friendly guidelines from the AAP, Academy of Breastfeeding Medicine, California's 9 Steps, and Washington's 10 Steps to create Ocho Pasos (Eight Steps) to tailor these guidelines to the New Mexico population. In 2018, we recruited an outpatient primary care clinic in rural New Mexico to participate in a 6-month pilot program using the Ocho Pasos as a framework to evaluate the clinic based on provider, staff, and patient interviews. After establishing a baseline, we focused on improving medical record documentation of BF supportive care through two Plan-Do-Study-Act (PDSA) cycles. Approximately 40 medical records were reviewed at baseline and at each subsequent medical record review (MRR).

**Summary of results** Providers and staff set a goal to improve documentation of mothers' intended BF duration. Documentation improved from 0% at baseline to 63.0% and 91.3% at the second and third MRR, respectively. A majority (16/17, 94.1%) of a convenience sample of mothers surveyed after their infants' well child checks reported discussing their intended duration of BF with their provider. Overall, providers and staff reported the quality improvement initiative was feasible and acceptable in terms of processes and instruments; however, staff did request that fewer medical records be reviewed to reduce the time burden.



**Conclusions** Our preliminary findings suggest that quality improvement initiatives aimed to implement evidence-based practices for BF support in an outpatient setting are feasible. We plan to refine and expand this initiative to other outpatient clinics in New Mexico.

#### 446 THE IMPACT OF TELEMEDICINE ON PSYCHIATRY CONSULTATIONS

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10.1136/jim-2019-WMRC.446

**Purpose of study** Synchronous telepsychiatry (STP) and asynchronous telepsychiatry (ATP) are two modes of telemedicine used in clinical practice to improve patient access to specialty psychiatric care. However, little is known about the types of clinical recommendations given by the psychiatrists in these visits and the response of the primary care physician (PCP) to those recommendations. This study aims to characterize and compare these recommendations in ATP versus STP.

**Methods used** This study is a secondary analysis of a randomized clinical trial comparing the effectiveness of ATP versus STP. Using the Consultation Liaison Outcome Evaluation System as a foundation, expert physicians and telemedicine researchers created an expanded framework for classifying psychiatrist recommendations and rating PCP adherence to those recommendations. Recommendations were classified into five groups ('Medication,' 'Diagnostic Action,' 'Psychotherapeutic,' 'PCP Follow-up Timing,' and 'Other') and thirteen sub-groups. After extracting recommendations from the baseline psychiatrist visit note, blinded reviewers rated PCP adherence to those recommendations ('Fully', 'Partially' or 'Not') using electronic medical record notes in the subsequent six months.

**Summary of results** To date, preliminary data have been abstracted on the baseline visits of 122 patients: 62 in ATP and 60 in STP. The patients were on average 54 years old (SD=15.4) and most were already taking a psychiatric medication (84%). Psychiatrists made an average of 6.4 recommendations in the baseline consultation (range, 2-14). In comparison to STP visits, ATP visits had a greater median number of recommendations (7 vs 6,  $p=0.049$ ). There were no statistically significant differences in the discussion of the five recommendation groups and the 13 subgroups. For example, medication recommendations were made in all the ATP visits (100%) and most of the STP visits (97%).

**Conclusions** Preliminary results indicate that there may be slight differences between the amount of recommendations in ATP and STP; and little variation in the recommendation profiles. Compared to similar literature, this study found a similarly large emphasis on medication recommendations. Future work will focus on comparing the adherence of the PCPs to the recommendations between STP and ATP.

#### 447 PRENATAL VACCINE KNOWLEDGE AND UPTAKE AMONG PREGNANT PATIENTS

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10.1136/jim-2019-WMRC.447

**Purpose of study** At a national level, half of pregnant women receive the flu vaccine and 54% receive the Tdap (Tetanus, Diphtheria, and Pertussis) vaccine as part of their prenatal care. We assessed vaccine literacy and uptake by pregnant women to identify potential knowledge gaps.

**Methods used** In summer 2019, we surveyed the generally low-income, English-speaking patients at UCLA-Harbor Medical Center Obstetrics clinic in Torrance as part of an IRB-approved (LABioMed and Western University) exempt protocol. Patients age  $\geq 18$  years at  $\geq 32$  weeks gestational age were approached. After verbal consent was obtained, the survey of 31 questions was administered on a one-to-one basis for 6 weeks.

**Summary of results** A total of 97 patients was approached; 92 participated. 51% of subjects were age 20-27 (age range 18-50); 52% were Hispanic/Latino, 25% African American, 5% Caucasian. Overall, 75% reported receiving the Tdap vaccine; 65% said they would accept the flu vaccine. When asked if they understood why the Tdap vaccine was important during pregnancy, 22% chose 'No' and 14% chose 'I Don't Know'. The primary reason (70%) for no vaccination was not remembering having been offered Tdap. Other explanations included religious conflicts and safety concerns. Of the 35% who would not receive the flu vaccine, 44% said they believed it is 'not effective,' 78% said they were concerned with 'getting sick or having side effects,' and 69% said they were concerned about 'safety risks it posed to themselves.'

**Conclusions** This population had higher vaccination rates than national published levels (75% vs 54% Tdap and 65% vs 50% Flu); however, there continues to be a substantial gap, especially for the flu vaccine. We found patients reported a deficiency in physician discussion regarding the Tdap, suggesting a need for improvement in vaccine education. Moreover, patients may have misconceptions regarding the flu vaccine that play a larger influence on their decisional process. To improve vaccine uptake, different educational strategies should be tailored to each vaccine.

#### 448 RISK STRATIFICATION IN HOSPITALIZED CHILDREN WITH MEDICAL COMPLEXITIES(CMC) & HEALTH OUTCOMES

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10.1136/jim-2019-WMRC.448

**Purpose of study** The Institute of Medicine reports CMC as a priority population with adverse health costs. This study implements standardized integrated tools into the electronic medical record for CMC to score acuity, complexity & disability to stratify risk upon hospitalization & assess current clinical outcomes in health utilization: Length of Stay, (LOS) & readmission rates (RR) as quality metric.

**Methods used** A 6-month retrospective observational study was conducted from May- Nov. 2018, for pediatric ward patients. CMC criteria was applied. Score complexity using 'Exeter' H.O.M.E.S (Hospitalization, Outpatient care, Medical chronic disorders, Extra services, & Social determinants) & a disability screener was integrated into EPIC. Complexity & disability was calculated for CMC(n=40) & randomized Non-CMC control(n=40). Clinical data, Social Determinants of Health (SDH), technology dependence, total number of

Abstract 448 Table 1 Risk based tools: degree of complexity &amp; effect on outcomes

SCORES (Mean results)	Children with Complex n=40	Non Complex Children(random) n=40	
<b>Exeter H.O.M.E.S.</b> (10=Most complex and high utilization)	<b>7.55</b> out of 10 Standard Deviation 2.04 Variance 4.15	<b>2.10</b> out of 10 Standard Deviation 2.18 Variance 4.7	MeanDifference=5.45/10 P-Value < 0.00001 (t-test) 99% CI Difference is significant
<b>Special Needs Score</b> (5=high disability)	<b>3.63</b> out of 5 Standard Deviation=1.15 Variance= 1.32	<b>2.0</b> out of 5 Standard Deviation 1.31 Variance=1.73	Mean Difference =2.9 P-Value < 0.00001 (t-test) 99% CI Difference is significant
<b>Number of Readmission</b> (in 6 months) after discharge	<b>2.1</b> Standard deviation=1.77	<b>1.3</b> Standard Deviation=0.47	p value < 0.0001 Difference is significant
<b>Number of Readmission</b> (90days) after discharge	<b>1.0</b> Standard Deviation=1.29	<b>1.4</b> Standard Deviation=0.59	P value =.108 CI 99% Difference is not significant
<b>Length of Stay (LOS)</b> <small>*Simon, Tamara D et al. "Children with complex chronic conditions in inpatient hospital settings in the United States." <i>Pediatrics</i> vol. 126,4 (2010): 647-53. doi:10.1142/peds.2009.3266</small>	<b>7.5 days</b> National Average (2006)= 5.2 days*	<b>2.1 days</b>	P-value 0.048 Statistically different

admission (TA), Length of Stay (LOS), number of Readmission (RR) (@ 3 & 6 months) prior to the study period were collected.

A statistical sample independent t-test analysis compared risk scores & utilization outcomes.

**Summary of results** CMC -Medical Device-19 of 40 (47.5%) CMC

19.5% of patients with high risk SDH.

**Conclusions** Complexity index & special needs scoring is important in risk stratification as it has a direct predictive effect on outcomes.

CMC patients have 3.5 times greater complexity & 1.5 times higher degree of disability. The results demonstrate increase health utilization with 3 times longer LOS & twice the (RR) over 180 days than the non-CMC patient group.

The longer LOS even when compared to national data from a 2006 National study is high, 7.5 vs 5.2 days. Surmisable contributing factors maybe related to higher social determinants (19.5%), poor access to care (22% of patients without PCP), & high technology dependence (47% for CMC).

## Hematology and oncology III

### Concurrent session

10:15 AM

Saturday, January 25, 2020

449

#### PROSTATE CANCER GENETICS CLINIC: GERMLINE GENETIC TESTING IN PRACTICE AND ITS IMPLICATIONS FOR PRECISION THERAPY AND FAMILY COUNSELING

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10.1136/jim-2019-WMRC.449

**Purpose of study** Prostate cancer has a significant heritable component, notably in genes involved in homologous

recombination DNA repair: *BRCA2*, *BRCA1*, and others. The importance of identifying men who carry these inherited mutations is two-fold: for treatment decision making and for family counseling. The Prostate Cancer Genetics Clinic (PCGC) was established in September 2016 at Seattle Cancer Care Alliance (SCCA) to provide prostate cancer patients with cancer risk assessment, genetic testing, recommendations for treatments and clinical trials. Here, we describe the development of this unique clinic, patient demographics, and results of genetic testing for patients seen during the first 21 months since establishment. The aim of this study is to broadcast our experiences to the broader oncology community with the goal of fostering the development of similar clinics.

**Methods used** A protocol was designed and approved by the institutional review board to retrospectively collect and analyze basic demographic data and clinical information of patients seen at PCGC between September 2016 and June 2019.

**Summary of results** A total of 160 patients were seen between September 2016 and June 2019. 142 patients had germline testing performed, 44/160 (25%) patients had a pathogenic or likely pathogenic variant with 31/160 (19%) in DNA repair genes involving homologous recombination (*BRCA2*, *BRCA1*, *ATM*, and *CHEK2*). All 44 patients were advised to pursue family testing and all 31 patients with variants in homologous recombination genes were counseled on treatment options. At the time of last follow up (data abstraction period was July – August 2019), 3/31 (10%) were started on platinum-based chemotherapy or a PARP inhibitor as a direct consequence to germline testing, and 12/44 (27%) with known germline mutations confirmed at least one family member had undergone cascade genetic testing.

**Conclusions** The novel PCGC at SCCA was established to provide prostate cancer patients with genetic counseling, germline genetic testing, combined with comprehensive discussion about potential treatment options and family implications. It facilitated immediate and future treatment options for men with prostate cancer, provided consultative services and access to critical information for patients and families about clinical trials.

#### 450 CAUSES OF HOSPITALIZATION AMONG CANCER PATIENTS RECEIVING IMMUNE CHECKPOINT INHIBITORS

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10.1136/jim-2019-WMRC.450

**Purpose of study** As increasing number of patients receive immune checkpoint inhibitors (ICI) as cancer therapy, there is growing recognition of the immune related adverse events (IRAE) which may be serious and life-threatening. Here we report our institution's retrospective analysis of patients treated with ICI who were hospitalized due to IRAE.

**Methods used** Patients with advanced cancers and who received ICI therapy at the Los Angeles County Medical Center were identified from a pharmacy database. Patients who were hospitalized within 1 year from their last dose of ICI therapy were included for analysis. Patients admitted for cancer-related complications or scheduled procedures were excluded. Toxicities were graded by CTCAE V5. Suspected immune related adverse events (sIRAE) were defined as hospitalizations where IRAE was: 1) the primary diagnosis, 2) included as a differential diagnosis, 3) biopsy proven, or 4) improved with immunosuppressive therapy.

**Summary of results** Among a total of 192 cancer patients receiving ICI, there were a total of 107 patients and 213 hospitalizations chosen for analysis. Lung cancer was the most common malignancy treated (25.2%). Among these 107 patients, 54.0% were on ICI at time of hospitalization, and 86.5% of hospitalizations occurred within first 6 months after initiating ICI. Among all hospitalizations, 15% required ICU level care while 10.3% required PCU level care.

Among all 213 hospitalizations, 12.2% were due to sIRAE. Among this subset of patients with sIRAE, 19% underwent biopsy, 54% received steroids, and 4% received other immunosuppressive therapy. Melanoma was the most common cancer associated with sIRAE, followed by gastrointestinal, lung, genitourinary and gynecologic cancers. Among patients with sIRAE, 69.2% were on ICI at time of admission, and 11.5% required ICU level care. The most common organ systems involved by sIRAE included: gastrointestinal (including liver), pulmonary, hematologic, endocrine, and rheumatologic.

**Conclusions** IrAE can affect any organ system and are likely under-diagnosed due to unfamiliarity with novel ICI therapy. IRAE can be serious and may lead to hospitalization, and may also result in life-threatening toxicity requiring ICU level care. IrAE should be on the differential for all patients hospitalized during or even after the use of ICI.

#### 451 EMERGENCY-RELEASE BLOOD TRANSFUSIONS AFTER POSTPARTUM HEMORRHAGE AT THE INTERMOUNTAIN HEALTHCARE HOSPITALS

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10.1136/jim-2019-WMRC.451

**Purpose of study** Hemorrhage is the leading cause of child-birth-associated maternal death worldwide and is a prominent

cause of morbidity and mortality in the United States. Most women do not have crossmatched blood immediately available to treat massive postpartum hemorrhage. Therefore, an emergency-release blood transfusion (ERBT) service is critical for all obstetric patients. We conducted a quality improvement project to assess our emergency postpartum transfusion practices, as a basis for progress.

**Methods used** We collected data retrospectively from January 2011 to December 2018 at all Intermountain Healthcare hospitals, on ERBT after postpartum hemorrhages; logging circumstances, number and type of transfusion product, and outcomes.

**Summary of results** The cohort comprised 224,035 live births. Ninety women received ERBT for postpartum hemorrhage (4.02 transfused women/10,000 live births). The four most common conditions listed as casually associated with ERBT were uterine atony (39%), abruption/previa (16%), retained placenta (11%), and uterine rupture (7%). The mean number of component units transfused per woman was 7.8. About 75% of the transfused women (67/90) received  $\geq 3$  units of blood products. The Trauma Service recommend ratio of blood products administered for massive hemorrhage is either 1:1:1 or 2:1:1 (RBC:FFP:platelets), however our ratios varied widely. Only 1/67 women receiving  $\geq 3$  units had a 1:1:1 ratio, and only 6/67 received a 2:1:1 ratio, thus the remaining 90% (60/67) received an inadequate dose of FFP and platelets, compared to that recommended for acute massive hemorrhage. Nineteen% (17/90) of women had a hysterectomy, 34% (31/90) had an ICU admission, and 1 died.

**Conclusions** Emergency transfusions for postpartum hemorrhage occurs in 1/2500 births. Thus, obstetric-specific ERTB policies are imperative for all hospitals with obstetrical services. Transfusion of RBC alone is insufficient to provide hemostasis during massive ongoing hemorrhage. For postpartum hemorrhage, we encourage further study of the resuscitative and hemostatic benefits of a balanced ratio of blood products or transfusing low-titer group O cold-stored whole blood.

#### 452 CHANGES IN BLOOD COUNT PARAMETERS MAY OFFER EARLY INDICATORS OF CLONAL HEMATOPOIESIS OF INDETERMINATE POTENTIAL (CHIP)

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10.1136/jim-2019-WMRC.452

**Purpose of study** CHIP is associated with increased risk for developing hematologic neoplasms and cardiovascular disease. Genetic mutations underlying CHIP include epigenetic modifiers such as *DNMT3A*, *TET2*, and *ASXL* (also known as DTA mutations), which are also found in myelodysplastic syndromes (MDS) and acute myeloid leukemia (AML). DTA mutations are also associated with lower likelihood of relapse when detected in AML patients in remission.

Inflammation may be a unifying factor between clonal hematopoiesis and cardiovascular disease, as hematopoietic stem cells proliferate during systemic inflammation, and atherosclerosis involves chronic inflammation. Because inflammatory marker elevations are strongly associated with red blood cell distribution width (RDW), we explored whether RDW and mean corpuscular volume (MCV), which are both often

elevated in MDS, may predict hematologic neoplasm progression.

**Methods used** Records of 45 patients seen for pre-leukemic conditions who underwent next gen sequencing were analyzed for CHIP-associated gene mutations, particularly DTA mutations. MCV and RDW were also compared between patients with and without DTA and other mutations.

**Summary of results** Those patients who had  $\geq 1$  DTA mutation (31/45; 69%) had more all CHIP mutations (mean: 3.29, SD: 1.35) than those with no DTA mutations (mean: 1.43, SD: 0.65). ASXL1, DNMT3A, SRSF2, TET2 and TP53 were most frequent ( $\geq 22\%$  for each). MCV differed between DTA (mean: 96.1, median: 93.9, range: 62.5-117.8, SD:11.5) and non-DTA patients (mean: 91.4, median: 92, range: 80.8-102.2, SD: 7.5), as did RDW (DTA: mean: 19.8, median 19.2, range: 12.2-36.5, SD: 5.1; non-DTA: mean 16.5, median 16.3, range: 13.2-20.6, SD: 2.1).

**Conclusions** DTA mutations are associated with lower likelihood of AML relapse, but are only found through expensive genetic sequencing. Our early results suggest that differences in MCV and RDW may help predict patients more likely to have DTA mutations. However, the presence of confounding conditions causing microcytosis, including iron deficiency, would mitigate the trend toward elevated MCV in patients with DTA mutations. Thus, routine CBCs may be an inexpensive indicator of patients who would benefit from genetic testing to better characterize disease and stratify risk of developing more aggressive hematologic disorders.

#### 453 PROGRAMMED CELL DEATH PROTEIN (PD-1) BLOCKADE IN ADVANCED AND METASTATIC SQUAMOUS CELL CARCINOMA OF THE SKIN

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10.1136/jim-2019-WMRC.453

**Purpose of study** Cutaneous squamous cell carcinoma (CSCC), the second most common type of skin malignancy, occurs in patients with chronic sun exposure or who are immunocompromised. Though PD-1 blockade is FDA approved for the treatment of advanced and metastatic CSCC, much remains to be elucidated regarding the clinical implications of CSCC and the toxicities that may manifest from treatment.

**Methods used** We report one institution's experience treating CSCC with PD-1 blockade. We conducted a retrospective chart review among patients who received PD-1 blockade for CSCC. Tumor responses were evaluated by RECIST 1.1.

**Summary of results** Among 18 CSCC patients receiving PD-1 blockade, median age was 62 years (range 22-92), and 13 (72.2%) were male. Six patients (33.3%) had tumors on the head and neck, 5 (27.8%) on the lower extremity, 4 (22.2%) in the anorectal region, 2 (12.5%) on the torso, and 1 (6.25%) on the upper extremity. Median tumor mutational burden was 10.5 mutations per Mb (range 5-177). Four (22.2%) patients had positive PD-1 expression, using a 1% cutoff. Seventeen patients were evaluated by RECIST. Three patients (17.6%) had a complete response, 3 (17.6%) had partial response, and 2 (11.7%) had stable disease, yielding an overall response rate of 35.3% and a disease control rate of

47.1%. Nine (52.9%) patients had progression of disease. Of the patients with a clinical response, the median number of cycles of PD-1 blockade received was 4 and the median number of cycles to response was 2. Median time to response was 10.6 weeks, median progression free survival (PFS) was 21.6 weeks, and median duration of response was 30.3 weeks. Nine (50%) of patients had toxicities of any grade, with 3 patients (16.7%) having Grade 3 or higher toxicity. Five patients (17.6%) died during our study period, 4 from disease and 1 from toxicity.

**Conclusions** PD-1 blockade induces responses in approximately 35% of patients with advanced CSCC, a finding consistent with major clinical trials demonstrating its efficacy. While PD-1 blockade was generally well tolerated, some patients did develop serious, life-threatening toxicity.

#### 454 THE USE OF MICRO-RAMAN AND RESPECT PROBE TO CHARACTERIZE A SPECTRUM OF CHILDHOOD CANCERS

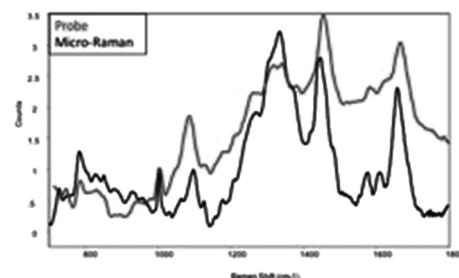
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10.1136/jim-2019-WMRC.454

**Purpose of study** Despite advances in childhood cancer prognosis/treatment, there remains a need to improve treatment/diagnosis while also enhancing our understanding of cancer biology. Raman-enhanced spectroscopy (RESpect) probe is an innovative laser-based handheld tool using Raman spectroscopy that can be applied to biological specimens. A complex micro-Raman system contains a laser source with a microscope that captures scattered light. The use of a fiber optic RESpect probe can enhance this technique and be used in the clinical setting to provide real-time results. This study characterizes non-Hodgkin lymphoma (NHL) tissue using both the micro-Raman system and RESpect probe to demonstrate feasibility of clinically translating this technology which can complement current diagnostic paradigms and treatment assessment.

**Methods used** Frozen pediatric NHL tissues were obtained from the Pediatric Branch of the Cooperative Human Tissue Network and analyzed using the micro-Raman system by 40-point scan at 50x magnification and RESpect probe. The micro-Raman system and probe fingerprints obtained from the spectrum of NHL subtypes (B-cell, T-cell, Burkitt, T-cell Lymphoblastic, Diffuse large B-cell, and Diffuse large T-cell) were compared for probe validity.

**Summary of results** Tissue scan comparisons from the probe and micro-Raman system for the NHL subtypes were comparable with minimal peak differences (figure 1).



Abstract 454 Figure 1

**Conclusions** Comparable fingerprints of NHL subtypes using a micro-Raman system and probe provide support for potential diagnostic use of the RESpect probe in a clinical setting and encourages future use of RESpect in the setting of pediatric cancers.

#### 455 A CASE OF BILATERAL RENAL MASS IN BECKWITH-WIEDEMANN SYNDROME: NEPHROMEGLY VS NEPHROBLASTOMATOSIS

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10.1136/jim-2019-WMRC.455

**Summary** A baby boy who was born at 36 weeks and 5 days, weighing 4160 grams via emergency cesarean section due to decreased fetal cardiac activity and a biophysical profile of 2/10 to a G1P1 mother was found to have bilateral renal masses, cardiac hypertrophy, and polyhydramnios on prenatal ultrasound. Upon delivery, he was found to be limp, unresponsive, and apneic. Positive-pressure ventilation was initially started but required intubation at 1 minute of life. Umbilical vein catheter was also placed around 2.5 minutes of life. A 30 mL normal saline bolus was given with improvement in tone, color, and respiratory effort. Initial blood gas was concerning for HIE. He was noted to have features that were concerning for Beckwith-Wiedemann syndrome (BWS) which included macrosomia, macroglossia, nephromegaly, and hypoglycemia. Abdominal MRI revealed diffuse enlargement of both kidneys with replacement of the parenchyma by numerous homogeneous confluent masses, compatible with nephroblastomatosis. CT of the abdomen with contrast revealed bilateral nephromegaly, but no discrete masses to confirm nephroblastomatosis was seen. Upon further discussion with a COG nephrologist, they believed it was nephromegaly associated with BWS.

**Discussion** Nephromegaly has been shown to be a high risk factor in developing nephroblastomatosis and Wilms tumor in patients with BWS. Nephroblastomatosis is the presence of diffuse nephrogenic rests, which are clusters of embryonic metanephric cells. Its finding is significant, as it is considered to be a precursor of Wilms tumor. It has been found in 100% of kidneys with bilateral Wilms tumor and 40% with unilateral Wilms tumor. Although, over 90% of the patients with BWS will not develop a tumor, the

presence of nephromegaly warrants close monitoring. The only associated risk factor for developing a tumor is in patients with hemihypertrophy. It has been suggested that even with no evidence of nephroblastomatosis on ultrasound, it can be missed if they have microscopic nephrogenic rest which may later develop into Wilms tumor. With the possibility of missing nephroblastomatosis or different interpretations of imaging, close follow-up with interval imaging should be considered in patients with nephromegaly in the setting of BWS.

## Immunology and rheumatology II

### Concurrent session

10:15 AM

Saturday, January 25, 2020

#### 456 RISK OF ELIMINATION DIETS IN ATOPIC DERMATITIS PATIENTS WITH FOOD HYPERSENSITIVITY

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10.1136/jim-2019-WMRC.456

**Purpose of study** While studies have examined the utility of diet therapy in unselected atopic dermatitis (AD) populations, there is a critical gap of knowledge regarding the potential risks of elimination diets in patients with AD and food hypersensitivity. Therefore, we sought to examine the risks of elimination diets in AD patients with food hypersensitivity.

**Methods used** We performed a systematic review of primary literature based on patients with AD and food hypersensitivity. We extracted studies from PubMed, EMBASE, and CENTRAL from inception to July 2019. We assessed the quality of these studies using a risk of bias tool appropriate for each study type. Randomized control trials were assessed with the Cochrane Risk of Bias Tool and observational studies were assessed with the Newcastle-Ottawa scale.

**Summary of results** A total of nine papers with 1227 participants with atopic dermatitis was analyzed. The quality of observational studies ranged from fair to poor and that of

**Abstract 456 Table 1** Cochrane risk of bias

Study (Year)	Random Sequence Generation (Selection Bias)	Allocation Concealment (Selection Bias)	Blinding of Participants and Personnel (Performance Bias)	Blinding of Outcome Assessment (Detection Bias)	Incomplete Outcome Data Addressed (Attrition Bias)	Selective Reporting (Reporting Bias)
Kim et al (2013)	?	?	+	+	+	+
Flinterman et al (2006)	-	?	+	+	+	+
Isolauri et al (1998)	?	?	+	+	?	+
Lever et al (1998)	-	?	+	+	+	+
Sampson and Scanlon (1989)	?	?	+	+	?	+
Sampson and McCaskill (1985)	-	?	+	+	?	+

Abbreviations: minus sign, high risk of bias; plus sign, low risk of bias; question mark, unclear risk of bias.

interventional studies from low to high risk of bias. The domains assessed for bias in the interventional studies appear in table 1. The most concerning risks associated with elimination diets are anaphylaxis and growth restriction.

**Conclusions** There are clear risks associated with elimination diets; however, the range of severity and prevalence of these risks have not been clearly established. Patients with AD should be properly diagnosed with food allergens before adopting elimination diets. Additionally, AD patients should be counseled on the risks associated with elimination diets regardless of their food hypersensitivity status. Ultimately, whether or not the risks associated with elimination diets outweigh the benefits in AD patients with food hypersensitivity cannot be generalized and must be determined on an individual basis.

#### 457 OMEPRAZOLE INDUCED SUBACUTE CUTANEOUS LUPUS ERYTHEMATOSUS

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10.1136/jim-2019-WMRC.457

**Purpose of study** Drug induced subacute cutaneous lupus (SCLE) is an uncommon condition and a form of Drug-induced lupus erythematosus and it is well described in the literature. Many drugs can trigger the condition including proton pump inhibitors. There are several physical finding clues to the diagnosis. We are describing a severe form of SCLE associated with high dose omeprazole.

**Methods used** Retrospective Study

**Summary of results** Here we present a case of a 34-year-old Hispanic female with a persistent refractory acid reflux disease, erosive esophagitis and gastritis. She underwent fundoplication 5 months prior and about 2 weeks later she developed dysphagia, odynophagia, circum-lip lesions, arthralgia and myalgia. In about 3 weeks prior she developed skin lesions starting on her back and spread throughout her body. The lesions were pruritic and started to ulcerate with sub-ungual hematomas. Her painful oral lesions worsened and white material suppur imposed. Antibiotics and antifungal did not relieve and she came and was admitted. Her medication history was significant for high dose omeprazole of 40 mg twice day through out as the only medication she was taking. Her physical exam showed severe buccal mucositis superimposed with candida and ulceration on her lips similar to steven johnson syndrome. She had diffuse erythematous base vesicular and pustular lesions in various stages. She also had sub-ungual hematomas to 4th digit of the left hand and hallux of left foot with periungual telangiectasia. Her laboratory studies showed Histone Ab 1.6 U (1.6-2.5) and rest of her work up for rheumatological and infectious disease came back negative including SS-A and SS-B. Diagnosis of drug induced SCLE were made and she was started on steroid with resolution of her symptoms to be followed up in clinics on taper dose of steroid. Her omeprazole were discontinued.

**Conclusion** Drug induced subacute cutaneous lupus should be considered in the appropriate clinical setting the main remedy is to avoid insulting agent and use of corticosteroids

#### 458 NEONATAL NET-INHIBITORY FACTOR INHIBITS MACROPHAGE EXTRACELLULAR TRAP FORMATION

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10.1136/jim-2019-WMRC.458

**Purpose of study** Extracellular traps (ETs) are web-like structures composed of chromatin and anti-microbial peptides extruded from immune cells to trap and kill microbes. Neutrophil extracellular traps (NETs) participate in antimicrobial defense; however, dysregulated NET formation leads to inflammatory tissue damage in many disease states including sepsis. Neonatal NET-Inhibitory Factor (nNIF) is a novel peptide found in fetal circulation that inhibits NET formation. Macrophages also form extracellular traps (METs), and while less well described, METs are pathogenically implicated in numerous disease states and may contribute to inflammatory tissue damage. Whether nNIF inhibits extracellular traps from cells other than neutrophils remains unknown. We hypothesize that nNIF inhibits MET formation.

**Methods used** We isolated murine alveolar macrophages via bronchial alveolar lavage. Isolated macrophages were stimulated with lipopolysaccharide (LPS; 100 ng/mL) to induce MET formation ± nNIF pre-incubation (10 nM) for 1 hour *in vitro*. MET formation was qualitatively assessed using live cell imaging with cell permeable (SYTO green) and cell impermeable (SYTOX orange) DNA stains. We also performed this experiment in surrogate macrophages differentiated from an immortalized human monocyte cell line - THP-1 cells (PMA (20 nM for 2 days).

**Summary of results** LPS induced *in vitro* MET formation in both murine alveolar macrophages and surrogate human macrophages as assessed qualitatively and quantitatively. Furthermore, preincubation with nNIF reduced *in vitro* MET formation in both cell types.

**Conclusions** We conclude that nNIF inhibits MET formation *in vitro* by murine and surrogate human macrophages. We speculate that inhibition of MET formation by nNIF may lead to a reduction in inflammatory tissue damage in a variety of disease states, including sepsis.

#### 459 CD20 EXPRESSION IS ELEVATED ON A T HELPER CELL SUBPOPULATION IN NEWLY DIAGNOSED MULTIPLE SCLEROSIS PATIENTS

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10.1136/jim-2019-WMRC.459

**Purpose of study** Anti-CD20 monoclonal antibody therapy (rituximab, ocrelizumab) has demonstrated significant efficacy in treating relapsing remitting multiple sclerosis. Although it is postulated that these therapies' mechanism of action is to deplete peripheral B cells—the primary antigen presenting cells to effector T cells in the MS disease process—we sought to understand if CD4+/CD40+ T helper (Th40) cells, which are elevated in autoimmune states including T1D and MS may also be targeted by the drug.

**Methods used** Frozen peripheral blood mononuclear cell (PBMC) samples from 10 newly diagnosed MS patients were cultured *in vitro* with one of either IL-2, IL-3, or Interferon- $\gamma$ , and then stimulated by either biotinylated CD3

or biotinylated CD3 and CD28. We stained these samples with anti-CD3, -CD4, -CD40, and -CD20 antibodies, then conducted flow cytometry at baseline and 24 hours post-stimulation.

**Summary of results** CD20 expression on Th40 cells was significantly elevated compared to the broader population of coexpressive CD40+/CD3+ T Cells both at baseline and 24 hours (*Mean diff.*=22.9%, 95% CI: 20.4% to 25.3%,  $p<0.0001$ ; *Mean diff.*=17.5%, 95% CI: 15.8 to 19.2%,  $p<0.01$ , respectively). ANOVA demonstrated CD20 expression was also significantly elevated on all CD4+ cells compared to CD3+ cells  $F(1, 408)=126.3$ ,  $p<0.01$  at baseline and 24 hours (*Mean diff.* =6.2%, 95% CI: 5.1% to 7.2%; *Mean diff.* =6.9%, 95% CI: 6.0% to 7.7%, respectively). CD20 expression decreased on CD4+ cells between baseline and 24 hours (*Mean diff.* =-2.2%, 95% CI: -3.3% to -1.1%,  $p<0.01$ ) and on CD3+ cells between baseline and 24 hours (*Mean diff.* =-2.9%, 95% CI: -3.7% to -2.1%).

**Conclusions** This research demonstrates that CD20 is preferentially expressed on cells that coexpress CD4 and CD40 (Th40 cells) in MS patients. Because Th40 cells are present at elevated proportions in patients newly diagnosed with multiple sclerosis and are implicated in autoimmune disease progression, these findings may indicate an alternative mechanism of action for anti-CD20 monoclonal antibody therapy. Next steps will include analyzing CD20+ Th40 cell counts in patients before and after commencing anti-CD20 antibody therapy for multiple sclerosis.

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#### INTRAVITREAL POLYACRYLONITRILE IMPLANT IN MACULAR DEGENERATION MOUSE MODEL TRAPS COMPLEMENT PROTEIN AND DELAYS RETINAL DEGENERATION

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10.1136/jim-2019-WMRC.460

**Purpose of study** Age related macular degeneration (AMD) is the leading cause of blindness in the developed world. However, despite extensive research to modify and halt disease progression, treatments for the dry form of AMD. AMD is beginning to be understood as a chronic neuroinflammatory condition, where an upregulated immune response mediated by complement factors (CF) causes retinal damage. It is possible that removing CF will slow or halt chronic inflammation. In order to test this polyacrylonitrile (PAN) fibers, which demonstrate a high binding affinity for multiple CF proteins, were intraocularly injected to sequester CF in the retina.

**Methods used** PAN fibers were intraocularly placed in heterozygous complement factor H deficient mice which develop a retinal phenotype similar to non-exudative macular degeneration in humans. Disease progression was assessed through anatomical and electrophysiologic changes using optical coherence tomography (OCT) and electroretinograms (ERG). The implant was left in place for 2 years and repeat ERGs and OCTs were performed each week. Following interval testing, mice and age matched controls were sacrificed and disease progression, vitreous complement levels and implant saturation were assessed via immunohistology, metabolomics, and antibody saturation.

**Summary of results** Compared to PAN implant CFH, age-matched controls displayed significantly reduced rod response amplitudes. Analysis of tissue sections showed an accumulation of complement C3 in the retina of age-matched controls, with retinal thinning, and photoreceptor atrophy.

**Conclusions** Here we present a novel intravitreal PAN implant capable of slowing disease progression in an AMD animal model. This research is critical in determining a method of halting AMD, ultimately preventing blindness in individuals who suffer from the disease. In addition to AMD, the PAN implant may potentially be used to treat other retinal degenerations mediated by inflammation and CF, including retinal dystrophies and diabetic retinopathy. The results of this study will be critical in guiding pre-clinical studies of the PAN implant and ultimately the first human clinical trial of the PAN implant.

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#### PARADOXICAL INFLAMMATORY RESPONSE SYNDROME IN AN IMMUNOCOMPETENT PEDIATRIC PATIENT WITH CRYPTOCOCCAL GATII MENINGITIS

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10.1136/jim-2019-WMRC.461

**Case report** While cryptococcal meningitis is already an infection with significant rates of morbidity and mortality, its sequelae may include a post-infectious inflammatory response syndrome (PIRS) in patients who have already achieved microbiological control. PIRS can cause substantial immune-mediated damage to the central nervous system resulting in long-term neurological disability or even death. We present the case of a previously healthy adolescent male with *Cryptococcus gattii* meningitis who experienced neurological deterioration after obtaining microbiological control of his disease on antifungal therapy. He was suspected to have PIRS and treated with steroids with clinical improvement and eventual return to baseline neurological status. He also received serial therapeutic lumbar punctures to help relieve symptoms of increased intracranial pressure with the use of CSF glucose and cytokines as markers of neurological recovery. Immunological workup did not demonstrate any underlying immunodeficiencies. Steroids were successfully employed in our pediatric patient with CM who developed PIRS and should be considered in children suffering from CM that develop worsening neurological symptoms after initiation of appropriate antifungal therapy. In addition, serial monitoring of CSF glucose and inflammatory markers may be helpful in guiding the management of PIRS—especially given recent research on particular CSF biomarkers corresponding to CNS inflammation in CM. While CM most commonly affects immunocompromised individuals and patients who develop CM should undergo immunological workup, we did not unearth any immunological conditions in our otherwise healthy adolescent. It is important for clinicians to be cognizant of PIRS as a possible complication of CM treatment in children. While there is an absence of pediatric data on the use of steroids in managing PIRS, we used them successfully in our pediatric patient. Additionally, CSF studies including glucose and newer biomarkers may play a role in guiding the treatment of PIRS.

### 462 DISSEMINATED COCCIDIOIDOMYCOSIS PRESENTING AS POLYARTICULAR SEPTIC ARTHRITIS: A CASE REPORT

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10.1136/jim-2019-WMRC.462

**Purpose of study** Coccidioidomycosis is a fungal infection that is endemic to California, Arizona, and other areas of the southwestern United States. It is caused by inhalation of spores of *Coccidioides immitis*. 60% of infected patients are asymptomatic; the remaining 40% have primarily pulmonary disease characterized by fever, cough, and pleuritic chest pain. In rare cases, less than 1% of infected patients, dissemination of the infection can occur. Dissemination usually affects those with impaired cellular immunity and pregnant women, and can involve bones, joints, meninges, and/or skin [1].

We present a very rare case of disseminated polyarticular coccidioidomycosis that presented with three isolated joints in an otherwise healthy 29-year-old male.

**Methods used** Retrospective case report.

**Summary of results** We present the case of a 29-year-old male who presented to the emergency department (ED) complaining of pain and swelling in multiple joints for three months. In the ED, an arthrocentesis of two of the joints involved were significant for total nucleated cells of 520,000/cm<sup>2</sup> and 90,000/cm<sup>2</sup> with 61% and 93% Neutrophils respectively. Grams stain and bacterial cultures were negative. Fungal culture however grew fungi resembling *Coccidioidomycosis Immitis*. Serum anti-*Coccidioides* IgM and IgG titers were greater than 1:512. Whole body bone scan showed bony involvement of the affected joints. Based on the history obtained and lab results collected, patient was diagnosed with a rare case of disseminated polyarticular Coccidioidomycosis and osteomyelitis. Subsequently he was treated with long term Amphotericin B, after which, he showed clinical improvement.

**Conclusions** This case demonstrates an atypical presentation of disseminated Coccidioidomycosis. It illustrates the challenges in approaching a presentation of multiple possible etiologies while highlighting the necessity of considering Coccidioidomycosis in the differential diagnosis of a patient presenting with polyarthritis in endemic areas. Furthermore, it shows that arthrocentesis with an extremely elevated WBC count and neutrophil predominance, as opposed to the expected lymphocytic predominance, should raise suspicion of Coccidioidomycosis in these endemic areas.

## Neonatology general VI

### Concurrent session

10:15 AM

Saturday, January 25, 2020

### 463 CONGENITAL DIAPHRAGMATIC HERNIA: IMPROVEMENT IN SURVIVAL WITHOUT ECMO FOLLOWING PRACTICE CHANGE

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10.1136/jim-2019-WMRC.463

**Purpose of study** Over the past two decades, mortality and ECMO rates for congenital diaphragmatic hernia (CDH) remains at 30%. In an effort to reduce ECMO and improve survival, we made the following changes to our CDH care guidelines: delayed transfer from birth hospital, reliance on pre-ductal oxygen saturation (pre-SpO<sub>2</sub>) to wean oxygen, lower initial mean airway pressure, deferred echocardiograms, and stricter criteria for inhaled nitric oxide (iNO) and inotrope uses. We compared pre and post revision rates of ECMO, survival and survival without ECMO in left-sided CDH neonates.

**Methods used** We conducted a retrospective review of left-sided CDH neonates managed at our NICU's (University of Utah and Primary Childrens Hospital) during the pre (2003-2015, n=186) and post (2016-2018, n=47) revision epochs. We conducted regression analysis to control for defect size, intra-thoracic liver, and severe anomalies.

**Summary of results** There were no changes in survival or ECMO use across the 2003-2015 epoch. Following guideline changes, we identified a significant decrease in ECMO (32% to 11%, pre v post; p=0.003) and an increase in survival without ECMO (53% to 79%, p=0.0001). Overall survival increased from 72% to 83% (p=0.11).

**Abstract 463 Table 1** Comparison of left sided DH cohort pre-revision period (2003–2015) vs post-revision period (2016–2018)

	Pre-revision, n=166 (n, % or median, quartiles)	Post-revision, n=42 (n, % or median, quartiles)	p-value
Gestational age (wks)	38 (37-39)	38 (37-39)	0.954
Birth weight (g)	3084 (2698-3346)	3090 (2795-3411)	0.467
Age at transfer (hrs)	5 (3-9)	18 (8-40)	<0.001
1st Echo >24 hours	8 (12)	23 (59)	<0.001
Age at repair (hrs)	107 (67-216)	87 (56-130)	0.059
Defect C or D*	71 (38)	19 (40)	0.46
Liver up	67 (36)	18 (38)	0.20
Support at best OI <24 hrs	7.2 (4.4-25)	6 (3.7-12.9)	0.049
OI	95 (60-100)	45 (34-70)	<0.001
FiO <sub>2</sub>	13.0 (11.5-15.0)	11.0 (10.0-12.4)	<0.001
Paw	101 (54-187)	76 (56-93)	0.017
Post-paO <sub>2</sub>	100 (99-100)	100 (98-100)	0.227
Pre-SpO <sub>2</sub>	4 (1-7)	4 (2-6)	0.706
Age (hrs)			
iNO	146 (79)	21 (45)	<0.001
Dopamine	144 (77)	30 (64)	0.056
Milrinone	85 (46)	25 (53)	0.36
Flofan	67 (36)	6 (13)	0.002
Hydrocortisone	134 (72)	30 (64)	0.27
Paralytic	51 (27)	4 (9)	0.006

**Conclusions** CDH guideline changes focused on minimizing stimulation, pre-ductal oxygenation, and less aggressive ventilator/inotrope support were associated with decreased ECMO use and improved survival without ECMO.



#### 464 TELEMEDICINE CONSULTATIONS MAY IMPROVE STABILITY OF NEONATES PRIOR TO TRANSPORT

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10.1136/jim-2019-WMRC.464

**Purpose of study** Telemedicine can improve quality of care for neonates born in rural community hospitals. However, no studies to date have examined the effect of telemedicine on neonatal stabilization prior to and during the transfer process. The purpose of this study was to explore the association between neonatal telemedicine consultations and infant stability during transfer, compared to traditional telephone consultations.

**Methods used** We collected data from all telemedicine and telephone consultations for newborns that took place at six community hospitals in northern California between 2014 and 2018. To measure infant stability, we used a modified Transport Risk Index of Physiologic Stability version II (TRIPS-II) from the California Perinatal Transport System (CPeTS), a validated instrument designed to measure illness severity in newborns. Scores were collected at three different times for infants who were transferred: at time of consultation, time of arrival of the transport team, and time of arrival at the regional neonatal intensive care unit (NICU). We performed difference-in-difference analyses to examine changes in TRIPS-II scores between different time points for infants receiving either telemedicine or telephone consultations.

**Summary of results** A total of 209 infants were transferred to a higher level of care after receiving either type of consultation. 162 infants (77.5%) received a telephone consult and 47 (22.5%) received a telemedicine consultation. At the time of consultation, infants who received telemedicine had higher mean TRIPS-II scores than those who received a telephone consultation (10.9 vs 5.5,  $p=0.01$ ). Infants who received telemedicine consultations experienced a mean decrease in TRIPS-II scores of 3.31 points between time of consultation and time of transport team arrival, compared to a decrease of 0.2 points for infants who received a telephone consultation only ( $p=0.007$ ). There was no difference in TRIPS-II scores upon arrival to the NICU.

**Conclusions** Our findings suggest that telemedicine may help to stabilize neonates at local hospitals prior to the arrival of transport. This may have important implications for the use of telemedicine for neonates requiring transfer.

#### 465 STABILITY OF DARBEPOETIN IN NEONATAL INTRAVENOUS FLUIDS

<sup>1</sup>U Nwokidu-Aderibigbe\*, <sup>2</sup>L Jantzie, <sup>1</sup>J Maxwell, <sup>1</sup>S Beauman, <sup>3</sup>RK Ohls. <sup>1</sup>University of New Mexico, Albuquerque, NM; <sup>2</sup>Johns Hopkins University, Baltimore, MD; <sup>3</sup>University of Utah, Salt Lake, UT

10.1136/jim-2019-WMRC.465

**Purpose of study** We previously reported stability of erythropoietin in commonly used neonatal intravenous (IV) fluids. Since that time, Darbeopetin (Darbe) has been introduced as a long acting erythropoiesis stimulating agent. We determined the stability of Darbe over time in common neonatal IV fluids and determined the effect of the excipient stabilizing agent Polysorbate 80 (PS80) on Darbe recovered.

**Methods used** The following solutions were studied:

0.9% normal saline (NS), dextrose 10% in water (D10), dextrose 10% in water + 4.5% amino acids (DA), and standard total parenteral nutrition (TPN). PS80 was added to each solution to a final concentration of 0.05% (w/v). Darbe was diluted with each solution (with and without PS80 added) to a goal concentration of 50 pg/mL. Each solution was drawn into a 10 mL syringe and pushed through 60-inch neonatal microbore tubing. Samples were collected at baseline (prior to push), 5 minutes, 1 hour and 24 hours (for TPN only), and frozen immediately at -80°C. Darbe concentrations were subsequently measured in duplicate via the Quantikine ELISA Human Erythropoietin Immunoassay.

**Summary of results** Darbe concentrations were  $32.7 \pm 1.4\%$  of expected when diluted with NS, D10 or DA solutions without PS80. When PS80 was added to maintain the original excipient concentration, baseline concentrations were  $96.2 \pm 1.8\%$  of their expected ( $p < 0.01$  versus non-PS80 solutions). Concentrations remained similar to baseline at the 5 and 60-minutes in PS80-containing fluids, but decreased without PS80 at 60 minutes (DA: 77%; D10: 42%; NS: 16%;  $p < 0.05$  vs baseline). Despite being lower than expected, similar baseline Darbe concentrations in TPN were achieved with ( $54 \pm 0.5\%$ ) or without PS80 ( $55.5 \pm 1.3\%$ ). Concentrations in TPN remained similar over the 24 hours tested (86% of baseline).

**Conclusions** A significant decrease in the expected concentration of Darbe occurred in fluids without PS80. Darbe was most stable in TPN over time, despite a lower than expected baseline concentration. We speculate that adding to TPN solution once weekly might be a novel and sufficient way to administer Darbe to neonates intravenously.

#### 466 IN-ROOM TECHNOLOGY EXPEDITES TREATMENT OF NEONATAL SEIZURES IN THE INTENSIVE CARE NURSERY

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10.1136/jim-2019-WMRC.466

**Purpose of study** Seizure burden in the neonatal period is independently associated with poor neurodevelopmental outcomes. Given the potential for seizure induced brain injury in the neonate, seizures should be treated promptly. We aimed to decrease the time to medical treatment of neonatal seizures from 25 minutes (pre-intervention) to less than 15 minutes.

**Methods used** The study is set in a 58-bed level IV Intensive Care Nursery (ICN) at an academic children's hospital. Previously, a Seizure Rescue Task Force including a team of physicians, nurses, pharmacists and technicians was created as a hospital-wide initiative to expedite seizure treatment in hospitalized pediatric patients. The seizure rescue process was implemented in Dec 2016 and included a seizure rescue button added to the in-room staff terminal to alert a pharmacist for bedside expedited administration of anti-seizure medication. Hospital-wide impact was significant but the ICN had poor adoption. We created a key driver diagram to identify unique barriers to the process in the ICN. In Jan 2019 we rolled out an education initiative about the importance of rapid treatment of neonatal seizures and use of the seizure rescue process. We reviewed the medical records of all patients in the ICN with seizures requiring treatment and measured the time from decision to treat seizures to medication administration. Shewhart charts were used for analysis.

**Summary of results** There were 41 seizure events among 16 patients pre-intervention (Jan 2016 to Nov 2016) and 134 events among 65 patients since the seizure rescue process was introduced (Dec 2016 to Jul 2019). Average time to seizure treatment decreased from 26 minutes when the process was not used to 12 minutes when used. Overall time to seizure treatment decreased from 25 to 13 minutes after the education initiative in Jan 2019, correlating with increased use of the seizure rescue process from 27% to 70%.

**Conclusions** Implementation of an innovative in-room technology was associated with a 50% reduction in time to treatment of neonatal seizures without the need to activate code resources. Education about the importance of rapid treatment of neonatal seizures increased the sense of urgency around these events resulting in more frequent use of the seizure rescue process and faster time to anti-seizure medication in the ICN.

#### 467 NEONATAL INTER-FACILITY TRANSPORT STABILIZATION TIMES

S Patel\*, DA Hill, J Rael, DC Alverson. *University of New Mexico, Albuquerque, NM*

10.1136/jim-2019-WMRC.467

**Purpose of study** Neonates may require transfer to another hospital after birth for a variety of reasons. Stabilization time (ST) is the time the transport team spends at the referring hospital. Telemedicine is an emerging technology that allows referral centers to aid in management of patients while awaiting transfer. The effect of telemedicine on ST is unknown. However, there is limited baseline data on neonatal ST for comparison. This study aims to establish baseline neonatal ST and examine how illness severity affects ST.

**Methods used** Retrospective chart review of transports from July 2014 to June 2017 of neonates <72 hours of age transported from a Level I/II nursery to a Level III/IV. Infants previously discharged home were not included. ST was defined as the difference between the time the transport team arrived at and departed from the referring hospital. Illness severity was measured by the Transport Risk Index of Physiologic Stability, Version II (TRIPS-II). Additional data on gestational age (GA), birth weight (BW), five-minute APGAR, and transport provider were collected to allow for statistical correction of illness severity. Statistical analysis was done using linear regression and analysis of variance (ANOVA).

**Summary of results** Of 668 transport charts reviewed, 472 were included in the data analysis. Mean ST was 65 ± 34 minutes (range 20-241). TRIPS-II scores ranged from 0 to 49. When TRIPS-II scores were grouped by illness severity, 385 patients fell in Group 1 (0-10), 55 in Group 2 (11-30), and 32 in Group 3 (>30). Linear regression models show statistically significant increases in ST by 1.02 minutes for every increase in TRIPS-II score by 1 point. Statistical significance was maintained when adjusting for confounders. Using grouped TRIPS-II scores, when compared to patients in Group 1, the patients in Group 2 required an extra 38 minutes of ST, and the patients in Group 3 required an extra 60 minutes of ST.

**Conclusions** These results indicate that ST is significantly affected by illness severity, regardless of GA, BW, APGAR or transporting provider. These are the first baseline data to establish ST. Future studies showing the impact of how telemedicine affects ST will now be possible.

#### 468 FACTORS AFFECTING INFANTS OF UNEXPECTED BIRTHS PRESENTING TO THE EMERGENCY DEPARTMENT

<sup>1</sup>S Liu\*, <sup>1</sup>LE Yaeger, <sup>1</sup>E Sander, <sup>2</sup>P Shastry, <sup>3</sup>N Flores-Fenlon, <sup>1</sup>M Martes Gomez, <sup>4</sup>B Nolan, <sup>1</sup>R Ramanathan, <sup>1</sup>FB Wertheimer, <sup>1</sup>M Biniwale. <sup>1</sup>LAC+USC Medical Center, Los Angeles, CA; <sup>2</sup>UCLA Medical Center, Los Angeles, CA; <sup>3</sup>Children's Hospital Orange County, Orange, CA; <sup>4</sup>UCI Medical Center, Irvine, CA

10.1136/jim-2019-WMRC.468

**Purpose of study** Perinatal mortality is high in unexpected deliveries. The objective was to analyze unplanned out of hospital deliveries and threatened deliveries presenting to LAC+USC Medical Center Emergency Department (ED) and identify maternal and infant characteristics.

**Methods used** This is a retrospective chart review of pregnant women that were admitted to the Labor and Delivery Unit from the ED between June 2015 and November 2018 at LAC+USC Medical Center. Women who delivered infants or presented with threatened deliveries to the ED were included. Those with an intrauterine fetal demise were excluded. The IRB approved this study. Maternal and neonatal electronic records were reviewed.

**Summary of results** A total of 71 live births met inclusion criteria. The median maternal age was 28 years (IQR25-32.5yrs), and median gravida 3 and parity 1. Infants born before hospital arrival constituted 50% of the population. Only two women presented after trauma or motor vehicle accident, while the remaining were in labor. Illicit substance use was confirmed in 42% of mothers and 15% had a psychiatric diagnosis. Limited prenatal care was seen in 55% of women. None of these factors were statistically significant for delivery before ED arrival. Maternal drug use at any point during pregnancy was significantly higher in infants delivering before ED arrival (p=0.03). Substance use was noted to be higher in women receiving limited prenatal care (p=0.003). Median infant gestational age was 38 weeks (IQR35-39wks) with mean birth weight of 2782g (SD742g). Advanced resuscitation, including positive pressure ventilation, intubation or chest compressions was required in 32% of infants and 45% required NICU admission. Mortality rate was 9.8%.

**Conclusions** Our results highlight the significant mortality associated with unexpected deliveries presenting to the ED with increased morbidities in the infants requiring resuscitation and higher NICU admission rates. Substance use and limited prenatal care appear to be significant factors.

#### 469 FACTORS CONTRIBUTING TO MORTALITY IN UNEXPECTED BIRTH PRESENTING TO THE EMERGENCY DEPARTMENT

<sup>1</sup>LE Yaeger\*, <sup>1</sup>S Liu, <sup>1</sup>E Sander, <sup>2</sup>P Shastry, <sup>3</sup>N Flores-Fenlon, <sup>4</sup>B Nolan, <sup>1</sup>M Martes Gomez, <sup>1</sup>FB Wertheimer, <sup>1</sup>R Ramanathan, <sup>1</sup>M Biniwale. <sup>1</sup>LAC+USC Medical Center, Los Angeles, CA; <sup>2</sup>UCLA Medical Center, Los Angeles, CA; <sup>3</sup>Children's Hospital of Orange County, Orange, CA; <sup>4</sup>UCI Medical Center, Orange, CA

10.1136/jim-2019-WMRC.469

**Purpose of study** Perinatal mortality is higher in unexpected deliveries. The objective of this study was to analyze unplanned out of hospital deliveries and threatened deliveries presenting to LAC+USC Medical Center Emergency Department (ED). Our goal was to further characterize both maternal and neonatal factors of the infants who died following these events.

**Methods used** This is a retrospective chart review of all pregnant women that were admitted to the Labor and Delivery Unit from the ED between June 2015 and November 2018. Patients who delivered infants or presented with threatened deliveries were included in the study. Women who had an intrauterine fetal demise were excluded. Maternal and neonatal factors were compared between the infants who survived and those that died. This study was approved by our institution's IRB.

**Summary of results** A total of 71 live births occurred during the study period meeting all inclusion criteria and 7 (9.8%) of these infants died. The median maternal age was significantly younger (18 years vs. 28 years,  $p=0.003$ ). All infants required resuscitation at birth. The median gestational age was 31 weeks and the mean birth weight was 2289g. The infants that died had a significantly lower gestational age (31 weeks vs. 38 weeks  $p=0.03$ ). There were a total of 21 preterm infants in the study group and 5 of them did not survive. Of the infants that died, 48% had a gestational age of less than 29 weeks. Three of the preterm infants died due to failure to respond to resuscitation measures and two had congenital anomalies. There was an increased likelihood of hypoxic ischemic encephalopathy (HIE) in term infants who expired compared to the term study infants that survived ( $p=0.004$ ).

**Conclusions** Unplanned out-of-hospital deliveries requiring resuscitation in the ED may contribute to an increased risk of mortality in preterm infants. Term infants delivered out of hospital have increased incidence of HIE with poor prognosis.

## Neonatology pulmonary III

### Concurrent session

10:15 AM

Saturday, January 25, 2020

#### 470 IMPROVING SHORT TERM OUTCOMES IN VLBW INFANTS VIA LESS INVASIVE SURFACTANT ADMINISTRATION

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10.1136/jim-2019-WMRC.470

**Purpose of study** Less invasive surfactant administration (LISA) has been shown to minimize the need for intubation and improve respiratory outcomes in preterm neonates by limiting exposure to positive pressure ventilation (PPV). However, the feasibility of this technique in spontaneously breathing VLBW infants and comparison with methods requiring intubation (such as INSURE) is lacking. We seek to determine whether the administration of surfactant via LISA is superior to intubation and surfactant administration by comparing short-term outcomes, and to study the applicability and feasibility of this technique.

**Methods used** VLBW infants meeting inclusion criteria (£34 weeks gestation, no anomaly that would impact respiration, spontaneously breathing on CPAP with evidence of RDS) received surfactant via LISA starting 04/2017. They were compared to a historical cohort receiving surfactant via endotracheal intubation. Average FiO<sub>2</sub> requirements and level of respiratory support 12 hours post-surfactant, need for reintubation and/or additional surfactant doses, and incidence of pneumothorax within 72 hours of surfactant delivery were studied.

**Summary of results** Of the 117 infants in the study, 50 were in the control group (average GA 26 6/7 weeks, BW 893g) and 67 were in the LISA group (average GA 27 6/7, BW 907g). Those receiving LISA had lower FiO<sub>2</sub> needs (0.29, 0.27, and 0.26 at 1, 2, and 12 hours post-surfactant) compared to the control group (0.35, 0.34, and 0.27, respectively). Infants receiving surfactant via LISA were less likely to require intubation 72 hours after dosing (27% vs 68% in control group).

**Conclusions** LISA is easily implemented, reduces average oxygen needs, and decreases the need for PPV and mechanical ventilation in VLBW infants. Given clear short-term benefits, LISA may be the preferred method for surfactant delivery in spontaneously breathing preterm infants.

#### 471 ASSOCIATION BETWEEN BLOOD CARBOXYHEMOGLOBIN LEVEL AND BRONCHOPULMONARY DYSPLASIA IN EXTREMELY LOW BIRTH WEIGHT INFANTS

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10.1136/jim-2019-WMRC.471

**Purpose of study** Carboxyhemoglobin (CO-Hb) can be endogenously formed in the presence of oxidative stress and may be elevated in inflammatory lung disease. There is lack of evidence of its relationship with development of bronchopulmonary dysplasia (BPD). The goal of this study was to evaluate the association between blood CO-Hb levels in extremely low birth weight (ELBW) infants and BPD.

**Methods used** Retrospective study of ELBW infants born at LAC-USC Medical Center between June 2015 and June 2019, that survived to 36 weeks corrected gestational age (cGA). CO-Hb values were collected daily from day of life (DOL) 1 to DOL 14. BPD definition followed NICHD criteria. Wilcoxon Rank sum test was used to determine the association between blood CO-Hb levels and BPD.

**Summary of results** ELBW infants with BPD had a median GA in weeks of [24 (1) vs 27 (3.5);  $P=0.002$ ] in non-BPD infants, and median BW of (644.5 (185) vs. 910 (250) grams,  $p=0.02$ ) respectively. Blood CO-Hb level was not significantly different between infants with and without BPD (table 1).

**Abstract 471 Table 1** CO-Hb at different DOL and BPD

	BPD n=18	Non-BPD n=4	p
CO-Hb at DOL 1 to 5	2.47 (0.18)	2.85 (0.62)	0.1
CO-Hb at DOL 6 to 10	2.33 (0.46)	2.57 (0.46)	0.2
CO-Hb at DOL 11 to 14	2.2 (0.31)	2.43 (0.30)	0.4

Data reported as: Median (IQR)

**Conclusions** Lower gestational age and birth weight are associated with BPD but not CO-Hb levels at any time within the first 14 days of life. This needs to be further studied in a larger sample size.

**472 PREDICTORS OF BRONCHOPULMONARY DYSPLASIA IN VERY LOW BIRTH WEIGHT INFANTS BY GRADIENT BOOSTING, AN ENSEMBLE MACHINE LEARNING ALGORITHM**

A Vaid\*, L Padilla, V Rehan. *Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center, Torrance, CA*

10.1136/jim-2019-WMRC.472

**Purpose of study** Bronchopulmonary dysplasia (BPD) continues to be a significant contributor to morbidity and mortality in premature infants. Despite improvements in neonatal care, the ability to reliably predict BPD development remains limited, especially early in clinical course. Machine learning can be used to build predictive models that outperform traditional statistical approaches. Here we use Gradient Boosting (GB), a powerful ensemble machine learning algorithm, to determine more reliable predictors of BPD.

**Methods used** This is a single center [Harbor-UCLA Medical Center Neonatal Intensive Care Unit (NICU)] study. Sixty-nine variables available in the California Perinatal Quality Care Collaborative database were extracted on all very low birth weight (<1500g) admissions to Harbor-UCLA NICU from 2005-2018. Variables missing data for more than 25% subjects were excluded. Infants with a major congenital anomaly (n=48) were also excluded. A total of 445 infants were included for analysis. A GB model was developed using the pandas, scikit-learn and XGBoost libraries in the Python programming language. 10-fold cross-validation was employed to train and test the model, and the results of the top 5 most accurate folds were averaged. The average *information gain*, which is a metric of the importance of a variable towards model's prediction, was quantified for each variable.

**Summary of results** Average accuracy of the model across the top 5 folds was 87%. Five variables with the maximal *gain value*, with corresponding odds ratios derived from a logistic regression are presented in **table 1**.

**Abstract 472 Table 1** Gain values and odds ratios

Variable	Gain	Odds Ratio (95% CI)
Head circumference at birth	2.37	0.62 (0.41 – 0.94)
Post delivery room CPAP	2.81	1.38 (1.01 – 1.89)
Days intubated ventilated	3.86	5.05 (3.01 – 8.47)
Discharge weight	4.04	1.27 (0.96 – 1.66)
Supplemental oxygen on day 28	14.26	15.29 (6.65 - 35.14)

**Conclusions** Our model found top predictors of BPD in very low birth weight infants, as well as the relative importance of these predictors. Though some of these are well-established predictors of BPD, others such as head circumference at birth and discharge weight are novel findings.

**473 A SINGLE-CENTER, RETROSPECTIVE COHORT STUDY INVESTIGATING PCO2 AS A PREDICTOR OF ADVERSE EVENTS IN THE FIRST YEARS OF LIFE IN INFANTS WITH BRONCHOPULMONARY DYSPLASIA**

D Vandeleur\*, N Ly, EE Rogers. *UCSF, San Francisco, CA*

10.1136/jim-2019-WMRC.473

**Purpose of study** To investigate the use of capillary carbon dioxide (cPCO2) tension as a predictor of adverse events (AE) in the first years of life in infants with bronchopulmonary dysplasia (BPD). Infants with BDP are at increased risk of AE after discharge from the neonatal intensive care unit. Few studies have investigated the risk factors for these adverse events, but one small retrospective study described an association between elevated PCO2 at time of discharge and AE. If PCO2 can be used a predictor for infants at increased risk of AE, then these infants could be identified closer follow up with the goal of preventing poor outcomes.

**Methods used** Single-center, retrospective cohort study of infants with BPD discharged from the UCSF NICU between 2012-2015. Primary predictor variable is cPCO2 prior to discharge. Secondary predictor variables include: demographics, oxygen requirement at discharge and comorbidities. Outcome variable is adverse events (death, readmission, re-intubation, or tracheostomy) in the first three years of life. Exclusion criteria: death in NICU, no cPCO2 measurement, or no UCSF followup. Analysis via STATA/SE 15.1.

**Summary of results** 677 patients met inclusion criteria. Demographics: 46% female, 54% male; 38% Hispanic, 38% Caucasian, 15% Asian, 7% African American, 1% Pacific Islander, 1% other. Comorbidities: 30% with pulmonary hypertension in the NICU, 20% with other pulmonary comorbidity, 20% with cardiac comorbidities, 4% with both cardiac and pulmonary comorbidities. Mean PCO2 prior to discharge was 55.6 mmHg. Outcomes after discharge: 25% of patients died, 54% had 1+ ED visit or readmission (average of 4 times) and more than 50% of visit were respiratory related, 10% were intubated, 1.5% underwent tracheostomy.

**Conclusions** The descriptive data demonstrates that adverse outcomes are common after discharge in this cohort of infants with BPD. We will next perform inferential statistical analysis to investigate if there is an association between PCO2 or other secondary predictors and these AE with the hope of being able to inform clinical practice for BPD patients discharged from the NICU.

**474 DOES LOCATION OF CONGENITAL DIAPHRAGMATIC HERNIA REPAIR AFFECT OUTCOMES?**

K Gulliver\*, B Yoder. *University of Utah, Salt Lake City, UT*

10.1136/jim-2019-WMRC.474

**Purpose of study** Neonates with congenital diaphragmatic hernia (CDH) are often clinically unstable. Transportation of critically ill neonates can be associated with adverse events. We aimed to determine if CDH repair in the newborn intensive care unit (NICU) versus operating room (OR) was associated with increased mortality.

**Methods used** We reviewed data and hospital courses of CDH neonates who had operative repair at Primary Children's

Abstract 474 Table 1

		Repair in OR	Repair in NICU	
Demographics:	Gestation (weeks)*	38.2±1.8	37.6±2.2	P=0.028
	Liver up <sup>®</sup>	28/118 (24%)	59/112 (53%)	P<0.001
	Age at repair (hours) <sup>#</sup>	58 [32-94]	107 [76-190]	P<0.001
	Repair with muscle flap/ patch <sup>®</sup>	15/118 (13%)	54/112 (48%)	P<0.001
Pre-Operative:	No HFV or ECMO <sup>®</sup>	62/118 (53%)	9/112 (8%)	P<0.001
	Vasoactive medications <sup>®</sup>	54/116 (47%)	78/95 (82%)	P<0.001
	Oxygenation Index (OI) <sup>#</sup>	4 [2.7-5.5]	5.7 [4.3-8.7]	P<0.001
Hospital Course:	Change in Pre/Post-op OI <sup>#</sup>	-0.4 [-1.2 - 1.0]	-0.4 [-1.5 - 0.9]	NS
	Required ECMO <sup>®</sup>	2/118 (2%)	33/112 (29%)	P<0.001
	Survived <sup>®</sup>	114/118 (97%)	97/112 (87%)	P=0.007
	Operation to discharge/death (days) <sup>#</sup>	22 [15-34]	45 [23-74]	P<0.001
	Operation to death (days) <sup>#</sup>	50 [35-89]	68 [21-120]	NS

\* Mean±SD; @ n/N (%); # Median (IQR 25-75%); HFV, high frequency ventilation

Hospital between 1/1998-6/2019. We excluded neonates repaired on ECMO.

**Summary of results** We identified 230 CDH infants repaired off ECMO. CDH neonates repaired in the NICU (n=112) were younger at birth (P<0.03), had more frequent liver herniation (P<0.001) and less often had a primary repair (P<0.001) compared to those repaired in the OR (n=118). Age at repair was later, more often on high frequency ventilation and vasoactive medications, and had higher pre-operative oxygenation index (OI) than those repaired in the OR (all P<0.001). There was no difference in the change in OI from pre- to post-operation between the two groups. Survival was higher (97% vs 87%, P=0.007) and need for ECMO lower (2% vs 29%, P<0.001) for infants repaired in the OR. For those that died, there was no significant difference in time from operation to death between groups (table 1). By logistic regression, gestational age and defect size were significantly associated with death, while location of repair, need for ECMO and OI at 24 hours of life were not.

**Conclusions** In our center, critically ill CDH neonates are more likely to undergo operative repair in the NICU versus the OR. Cardiopulmonary function, as measured by change in pre- and post-op OI, did not differ based on repair location. Repair location was not independently associated with mortality.

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#### ACIDEMIA AT BIRTH IN THE PREMATURE NEONATE AND ASSOCIATED OUTCOMES

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10.1136/jim-2019-WMRC.475

**Purpose of study** Prior research has shown an association between abnormal outcomes in the full term neonate due to the presence of metabolic acidemia at birth; however, few have looked into this association in premature neonates with very low birth weight (VLBW). This study aimed to describe potential association between acidemia in the premature neonate just before or at the time of delivery, with short and long term outcomes.

**Methods used** To look at the association between intrapartum acidemia and postnatal outcomes, cord blood gases as well as admission blood gases of VLBW infants were gathered between 2009 and 2019. IRB authorization was obtained from our institution prior to the start of the study. Data points were queried from NICU database as well as electronic medical records. Acidemia was defined as a pH less than 7.1 or a base excess greater than -10 mmol/L. Short and long term neonatal outcomes were analyzed against the indicator of intrapartum acidemia using SPSS statistical software Version 24.

**Summary of results** Out of 341 VLBW infants admitted to the NICU during the study period 50 infants had acidemia. Delivery room intubation and acidemia had a statistically significant relationship (p=0.005) as 65.9% of acidotic babies needed intubation compared to 42.4% of non-acidotic babies. Acidotic babies were also more likely to need chest compressions (32% vs 14% p=0.008). Severe intraventricular hemorrhage (IVH) was noted to be significantly higher (p<0.001) as 19% of acidotic babies had severe IVH compared to 3.2% of VLBW infants without acidemia. Survival rates for infants born with acidemia were significantly lower (75% vs 93%, p<0.001).

**Conclusions** VLBW infants born with intrapartum acidemia require more extensive resuscitation at the time of delivery. These infants are at higher risk of severe IVH and have increased mortality. These implications can help guide physician risk assessment of VLBW infants.

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#### FACTORS AFFECTING NEED FOR RESUSCITATION IN INFANTS OF UNPLANNED OUT OF HOSPITAL BIRTH AND THREATENED DELIVERY TO THE EMERGENCY ROOM

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10.1136/jim-2019-WMRC.476

**Purpose of study** Perinatal mortality is high in unplanned out of hospital births. The objective of this study was to analyze unplanned out of hospital deliveries and threatened deliveries presenting to the LAC+USC Medical Center Emergency Department (ED). The aim of this study was to better characterize what factors contributed to infants who needed resuscitation at birth.

**Methods used** This is a retrospective chart review of infants delivered to women that were admitted to the Labor and Delivery Unit from the ED between June 2015-November 2018 at LAC+USC Medical Center. Only patients who delivered infants outside of the hospital or presented with threatened deliveries to the ED were included. Women with an intrauterine fetal demise were excluded. This study was approved by our institution's IRB. Data was collected for all maternal and neonatal factors through electronic medical records and an ED database.

**Summary of results** A total of 71 live births met inclusion criteria. Of these infants, 23 (32%) of them required resuscitation following delivery. Median maternal age, positive maternal urine toxicology, and weight were not significantly different between groups. Concerning those that received resuscitation, they were more likely to have no prenatal care documented ( $p=0.002$ ). The most common types of resuscitation needed included oxygen administration (74%), positive pressure ventilation (65%), and intubation (43%). Preterm infants were significantly more likely to need resuscitation compared to term infants ( $p=0.002$ ). Resuscitated infants were much more likely to be admitted to the NICU than non-resuscitated infants (83% vs. 25%,  $p<0.001$ ). This was still significant when correcting for term gestation (80% vs. 21%,  $p<0.001$ ). In addition, resuscitated infants had a lower first temperature documented ( $p=0.008$ ) and a lower initial blood glucose levels ( $p=0.02$ ).

**Conclusions** Infants of unplanned out of hospital birth and threatened delivery have a higher need for resuscitation, especially if they are preterm. Lack of prenatal care increases the need for resuscitation. Increased incidence of low blood glucose as well as temperature occurs in infants needing resuscitation.

## Neuroscience III

### Concurrent session

10:15 AM

Saturday, January 25, 2020

#### 477 ATYPICAL PRESENTATION OF DEVIC'S DISEASE WITH NO SPINAL CORD FINDINGS

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10.1136/jim-2019-WMRC.477

**Introduction** Neuromyelitis Optica (NMO) also known as Devic's disease is a rare, autoimmune disorder of the central nervous system that mainly affects the optic nerves and spinal cord. It has a prevalence of 1-2 per 100,000 individuals; if not identified and treated in a timely manner detrimental outcomes can occur. This case is presented to highlight a unique clinical presentation of a rare disease.

**Clinical case** The patient is a 9-year-old African American female who presented with an ataxic gait and altered mental status. She was initially diagnosed with acute disseminated encephalomyelitis (ADEM) in 2016 at age 6 when she presented with acute onset ophthalmoplegia. At the time, brain magnetic resonance imaging (MRI) revealed enhancement of the medial thalami extending into the midbrain. Her symptoms remitted after treatment with IV steroids and IVIG. In the ensuing she developed a myriad of intermittent symptoms including seizures, urinary incontinence, intractable vomiting, and gait instability. A trial of high dose IV steroid therapy failed to elicit a favorable therapeutic response. Repeat MRI of the brain in July 2019 showed a

small high signal intensity focus with cystic characteristics in the left midbrain near the superior colliculus. A broad range of differential diagnoses from multiphasic ADEM to multiple sclerosis were entertained. While she did not exhibit any clinical or radiologic signs referable to the optic nerve or spinal cord, elevated anti-aquaporin 4 (AQP4) antibodies were found in her serum consistent with neuromyelitis optica (NMO).

**Discussion** Neuromyelitis optica (NMO) is a severe inflammatory demyelinating disease that preferentially targets the optic nerve and spinal cord with a mean age of presentation at 38 years of age. This patient presents at an uncommon age of onset at 9 years. She also had a history of ADEM. In addition to her unique presentation of a hypothalamus cystic lesion, she had no area postrema involvement, optic neuritis or long segment transverse myelitis. This case emphasizes the need to maintain a broad differential to include neuromyelitis optica in children who have nonspecific demyelinating lesions in the brain. Early identification of the disease is critical as acute episodes can have irreversible long-term effects if left untreated.

#### 478 MANAGEMENT OF MIGRAINE HEADACHES THROUGH WEB-BASED TECHNOLOGY

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10.1136/jim-2019-WMRC.478

**Purpose of study** Web-based behavioral self-management is emerging as a complementary tool in management of variety of health conditions. However, there is lack of evidence focused on demonstrating the efficacy of web-based intervention for prevention and treatment of migraine headaches. The objective of this study is to compile the evidence in regards to the effectiveness of mobile or web-based interventions for management of migraine headaches.

**Methods used** A comprehensive literature review was utilized through multiple search engines, such as PubMed, Google Scholar, and Cochrane using keywords, 'migraine', 'internet', 'mobile', and 'web-based.' Only studies of adult patients that involved a headache diary, a web-based self-management intervention as well as a questionnaire to measure the outcome in subjects and a control group were included in our analysis.

**Summary of results** Of 17 studies found, 5 satisfied our inclusion criteria. Majority of the studies showed a decrease in headache frequency and/or improved self-efficacy after using a web-based behavioral intervention. Most patients continued their routine pharmacologic treatment while on the web-based intervention. Intervention methods focused on self-management skills but were variable in terms of duration and methodology among the studies. When the online therapy was used as a second behavioral intervention (Kleiboer study), the effect was less pronounced, possibly due to overlapping intervention or because of the small sample size.

**Conclusions** Our review suggests that web-based intervention models can be helpful as a complementary means in self-management of migraine headaches. Larger prospective

**Abstract 478 Table 1** Web-based technologies for management of migraine headaches

First Author; Year Published	Mobile Technology Intervention	Participant Count, Age Range	Outcome Measured	Outcome of Intervention Group vs. Control Group	P-value
Hedborg; 2011	Experimental: Internet-based multimodal behavior treatment (MBT) program, included hand massage in one group Control: Muscular relaxation program	Experimental with Hand Massage and MBT: n=27, age range: 44.4-54.3 Experimental with only MBT: n=28, age range: 40.1-49.5 Control: n=28, age range: 45.4-52.5	50% or more improvement in attack frequency from baseline period (2 months) to post-intervention (6 months)	Experimental with Hand Massage and MBT: 40% Experimental with only MBT: 42% Control: 15%	p=0.039
Devineni; 2005	Experimental: Internet-delivered behavioral regimen Control: Waitlisted for intervention	Experimental: n=39, mean age (SD) =43.6 (12.0) Control: n=47, mean age (SD) =41.0 (11.8)	50% or greater reduction in Headache Index scores (6 weeks in experimental group, 4 weeks in control group)	Experimental: 38.5% Control: 6.4%	p<0.05
Bromberg; 2012	Experimental: Online training over 4 weeks, follow-up after another 4 weeks Control: Routine migraine care $F_{3,179}=10.99, p<0.0001$ $t=-5.36, p<0.001$	Experimental: n=93, age range: 18-65 Control: n=92, age range: 18-65	Improvement in Headache and Feeling of Self-Efficacy from baseline period (2 weeks) to post-intervention (4 weeks)	Improved Headache Self-Efficacy measured by 'treatment-BY-time' from baseline to post-intervention	
Sorbi; 2014	Experimental: Online behavioral training (oBT) Control: Waitlisted for intervention	Experimental: n =195, age range: 31-55 Control: n=173, age range: 33-55	Percentage decrease in attack frequency from baseline to post-training (11.6 months in oBT, 11.1 months in control)	Experimental: 23% decrease Control: 19% decrease	p>0.05
Kleiboer; 2009	Experimental (ODA+): ODA (online digital assistance) with Behavioral Therapy (BT) Control (ODA-): Behavioral Therapy, no ODA	ODA+: n=31, age range: 25-59 ODA-: n=31, age range: 26-58	Mean (SD) patient ratings (scale 1-4) of attack frequency from baseline period (4 weeks) to post-BT period (3 weeks)	ODA+ group at baseline: 3.0, (1.8) ODA+ post BT: 2.4, (1.5) ODA- group at baseline: 2.6, (1.6) ODA- post BT: 2.6, (1.4)	p=0.67

studies are needed to determine the optimal way of incorporating the most effective web-based technology in clinical practice.

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#### A RARE CASE OF SYRINGOBLUBIA IN A PATIENT WITH COCCIDIOIDOMYCOSIS MENINGITIS

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10.1136/jim-2019-WMRC.479

**Case report** Meningitis is the most extreme and lethal presentation of coccidioidomycosis and is a challenging manifestation to treat. We describe an unusual case of a young Hispanic male whose treatment for coccidioidomycosis meningitis is further complicated by CNS anatomical abnormalities.

**Methods used** Retrospective case report.

**Summary of results** We report the case of a 20-year-old Hispanic male who was diagnosed with coccidioidomycosis meningitis two years prior. He underwent a ventriculoperitoneal shunt procedure and endoscopic third ventriculostomy shortly after his diagnosis. After failing fluconazole treatment, isavuconazole was initiated one year later. Six months prior he experienced left upper extremity weakness and left chest, arm and face paresthesia. Evaluation by MRIs of the brain and cervical spine revealed Chiari 1 malformation with a cystic cavitary lesion in the upper cervical spine extending into the brain stem with syringomyelia and syringobulbia. The patient underwent a posterior fossa craniotomy with C1 laminectomy and reported improvement of numbness and paresthesia with some residual facial numbness. The patient experienced

several months without any unusual symptoms except for morning headaches which improved with over the counter medication. He recently developed shunt failure with acute diplopia and headache with progression of the syringomyelia and syringobulbia and increase in size of the dilated fourth ventricle. He underwent shunt revision with resolution of his symptoms.

**Conclusions** The concomitance of coccidioidomycosis meningitis with Chiari 1 malformation, syringobulbia and syringomyelia is rare and limited literature is published. The contraindication of performing lumbar puncture to monitor treatment will make the management of this condition very challenging.

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#### CHRONIC MENINGITIS WITH FEATURES OF VOGT-KOYANAGI-HARADA DISEASE

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10.1136/jim-2019-WMRC.480

**Purpose of study** Vogt-Koyanagi-Harada syndrome is a rare systemic granulomatous autoimmune disease with an incidence of approximately 1.5 to 6 per 1 million patients in the United States. It is a rare multi-system inflammatory disease that targets melanocyte-rich tissues, such as the eye, inner ear, meninges, skin and hair and has been characterized by panuveitis, often with neurologic and cutaneous manifestations. It is more likely to present among Asians, Middle Easterners, Hispanics, and Native Americans. Onset of symptoms is between age of 20-50 years.

**Methods used** Retrospective case report.

Here we present the case of a 41-year-old female who presented with a 8-week history of progressively worsening headache with accompanying nausea, vomiting and diplopia. She was being by ophthalmologist for several years and was diagnosed with bilateral staphyloma and myopic degeneration. Her examination showed decreased visual acuity of 20/400, bilateral cranial six nerve palsy, diffuse vitiligo patches on hand face and body and poliosis of head hair. Her lumbar punctured (LP) showed elevated intracranial pressure (ICP) of 360 mm H<sub>2</sub>O with WBC of 440, %79 lymphocytes, glucose of 56 and protein of 122. Her ICP was reduced with serial LPs. Comprehensive serum and cerebrospinal fluid studies only was positive for QuantiFERON-TB Gold. She had periodic attacks of decreased visual acuity during her pregnancies. She was empirically started on four-drug standard anti tuberculosis regime and was discharged to follow up in the clinic.

**Conclusion** Finding the etiology of chronic meningitis is very difficult and in many cases remains unknown and empirical treatment for tuberculosis and use of steroid are not uncommon. Any extra meningeal symptoms and signs might guide to make a definitive diagnosis.

#### 481 FRONTAL CORTEX LESION IN HUMAN IMMUNODEFICIENCY VIRUS HOST

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10.1136/jim-2019-WMRC.481

**Purpose of study** In human immunodeficiency virus (HIV) hosts with CD4 cell count >500, a hyper-intense frontal cortex lesion is more likely associated with benign and malignant brain tumors than opportunistic infections, similar to findings in immunocompetent hosts.

**Methods used** Single patient case report.

**Summary of results** 57-year-old African American male with schizoaffective disorder, late latent syphilis, chronic Hepatitis C, and HIV presented with altered mental status (AMS) and headaches. The patient was diagnosed with HIV approximately 26 years prior while incarcerated. He reported that he was on and off of anti-retroviral therapy (ART) while in and out of jail and currently off ART for 7 months. CT brain with contrast was remarkable for a 1.5cm enhanced lesion with surrounding cerebral edema in the left frontal parietal lobe and subsequent MRI with contrast showed a hyperintense frontal lobe lesion. As CD4 count was unknown at this time, Bactrim was started at 5mg/kg TMP and 25mg/kg SMX for treatment of presumed central nervous system (CNS) toxoplasmosis. Azithromycin was started for *Mycobacterium avium* prophylaxis. Additionally, the patient was treated with Penicillin G for possible neurosyphilis. CSF analysis showed WBC 4 with 96% lymphocytes, glucose 51, and protein 32. Additional studies revealed CD4 count 565 and HIV viral load 205. Comprehensive screening in HIV-positive host, including cocci serology, toxoplasma IgG, Histoplasma urine antigen, CSF cryptococcal antigen, and CSF DNA-PCR for toxoplasmosis were found to be negative and led us to broaden the differential diagnoses to included pathologies beyond opportunistic infectious etiologies. Antibiotic therapy for treatment of presumed CNS toxoplasmosis will be continued for 2 weeks followed by repeat MRI with gadolinium. Neurosurgery will be consulted for possible biopsy if no improvement in the lesion is observed.

**Conclusions** The management of an HIV host with unknown CD4 count presenting with AMS and headaches who is found to have a CNS lesion requires immediate treatment for opportunistic infections such as toxoplasmosis. In HIV hosts with CD4 count >500, negative serum IgM/IgG for toxoplasmosis, and negative CSF DNA-PCR for toxoplasmosis, further evaluation with repeat MRI brain status post 2-3 weeks of treatment and possible brain biopsy is necessary.

#### 482 INSPIRATORY STRIDOR AS AN INITIAL PRESENTATION OF ACUTE DISSEMINATED ENCEPHALOMYELITIS

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10.1136/jim-2019-WMRC.482

**Case report** Acute disseminated encephalomyelitis (ADEM) is a rare condition, reporting 3-4 cases per year in the USA. This case is novel because of its unique clinical presentation and rapid evolution in a pediatric patient.

The patient is a 9-year-old healthy AA female who was noted to have difficulty breathing, intermittent wheezing and inspiratory stridor 3 days prior to admission. She had two prior ER visits with normal CBC, CMP and rapid strep; a neck XR showed subglottic narrowing. Initially she was treated for croup with steroids, racemic epinephrine and albuterol and discharged home with nebulizers both times. On the day of admission, mother described the same abnormal breathing pattern as well as new onset tongue swelling and complaints of neck pain. Patient was noted to be anxious with unusual behaviors such as kicking and hair pulling. Following admission, she continued to have inspiratory stridor but was also noted to have hand flapping, moaning and a rapid change in mental status. A brain CT scan showed hypo attenuation in the left frontal subcortical white matter. Shortly after, the patient developed new onset tonic-clonic seizures and a subsequent MRI reported multiple non-enhancing white matter lesions in both frontal lobes consistent with ADEM. CSF analysis was normal. Patient was then transferred to the pediatric ICU for management.

ADEM is a demyelinating process, and overall a rare illness. Investigations suggest that the cause includes molecular mimicry of myelin autoantigens that share features with infectious organisms. 72-77% of cases have an identifiable preceding illness. The neurologic symptoms of ADEM commonly appear 4 to 13 days after an infection. This case represents a rare pediatric illness, but also is unique because of the atypical clinical presentation and rapid evolution. Physicians must maintain a wide differential for abnormal breathing patterns when patients do not respond to typical therapies, especially in the presence of anxiety-like behaviors in an otherwise previously healthy child.

#### 483 A CASE OF PRIMARY PROGRESSIVE MULTIPLE SCLEROSIS MISDIAGNOSED AS CONVERSION DISORDER

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10.1136/jim-2019-WMRC.483

**Case report** Psychiatric patients have their neurological conditions often overlooked secondary to underlying psychiatric disorders and are not reported well in current literature.



**Methods** Retrospective case report.

**Results** The patient is a 45-year-old Caucasian female with a history of schizoaffective disorder. The patient had a history of admissions to outside hospitals for complaints of weakness that resolved without treatment and she was diagnosed with conversion disorder. During her hospitalization, the patient reported generalized weakness, numbness, and multiple episodes of urinary and bowel incontinence. No collateral information could be ascertained to validate her symptoms. The physical examination was notable for decreased strength in her bilateral lower extremities. However, multiple hospital staff witnessed the patient moving without difficulty, making conversion disorder our diagnosis. CT brain and cervical spine revealed C5-C7 degenerative joint disease and spondylosis without any significant concern for severe neurologic impairment. A subsequent MRI of the cervical spine ruled out any concern for cervical myelopathy but MRI brain revealed periventricular lesions concerning for Multiple Sclerosis. A lumbar puncture was performed. CSF was negative for infection. The CSF was positive for oligoclonal bands and IgG. The patient was diagnosed with Relapsing Remitting Multiple Sclerosis and started on Methylprednisolone IV 1000mg for five days. After completing Methylprednisolone, the patient made no significant improvement which prompted the initiation of plasmapheresis. The patient showed consistent improvement in her physical capacity with each session of plasmapheresis. She went from not having the ability to move from laying to sitting, to finally being able to move from laying to standing without assistance.

**Conclusions** Identifying Multiple Sclerosis in patients with psychiatric illnesses can be challenging, therefore as physicians it is imperative to remain diligent in identifying these features in the most complex of patients in order to detect and treat them early and properly.

## Not presented – published only

## 484 TACKLING STIGMA AGAINST DEPRESSION AMONGST MEDICAL STUDENTS

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10.1136/jim-2019-WMRC.484

**Purpose of study** Depression amongst medical students is prevalent due to many stressors faced during medical education. However, many do not seek treatment due to stigma from peers, self-stigma, and other barriers. A systemic review and meta-analysis by LS Rotenstein, et al (2016) suggests that 1 in 4 medical students reports being depressed. Per Schwenk et al (2010) medical students show an increase in suicidal ideation in their 3rd and 4th years, yet only 22% of depressed medical students report using mental health services. It is essential that medical students address the factors and barriers contributing to the prevalence of depression amongst medical students. This study explores methods to tackle the stigma of depression amongst medical students via interventions that aim to encourage discussion.

**Methods used** Peer led interventions including lectures and self-disclosure are the primary modes of intervention. Incoming medical students at UNR Med Class 2022 underwent an intervention during orientation week and during the last block

of their first year. Class 2021 was used as the placebo cohort. The goal was to present the facts about depression, sources of stigma, self-awareness of mental well-being, and resources. Change in stigma was measured via a pre and post survey.

**Summary of results** Data is currently being analyzed for the intervention and placebo cohort. Pre-liminary results suggests an increase in the number of students diagnosed with depression in both classes. Individual questions showed a wide variability in responses. For example, the intervention group was more likely to share depressive symptoms with friends and consider medical students with depression equally as intelligent. However, they also thought they would be viewed as 'unable to handle my responsibilities.' Individual analysis of questions and their implications for the intervention and change in stigma is still underway. Additionally, the top 3 reasons for not seeking treatment included lack of time, stigma of being diagnosed with a mental illness, and fear of documentation on academic record.

**Conclusions** Due to the small sample size no stastically significant conclusion can be drawn from the data collected thus far. However, it is apparent that there was an increase in depression rates and common barriers to seeking treatment need to be addressed among medical students.

## 485 METABOLITES IMPORTANT IN THE DIFFERENTIATION OF HUMAN INDUCED PLURIPOTENT STEM CELLS TO LUNG PROGENITOR CELLS

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10.1136/jim-2019-WMRC.485

**Purpose of study** Respiratory distress syndrome (RDS) affects preterm infants due to stunted lung development at birth. Induced pluripotent stem cells (iPSCs) have been successfully differentiated into lung organoids to study lung development and disease in vitro. Metabolomic technologies have allowed the examination and identification of metabolic pathways and processes occurring during development and has been successful at identifying significant biomarkers important in differentiation.

**Methods used** We used two wild type stem cell lines and exposed them to cocktails of growth factors and small molecules in order to undergo step wise differentiation into lung progenitor cells. The cells were sorted for CXCR4 at definitive endoderm, CD271 and CD56 at anterior foregut endoderm and CPM at the lung progenitor step. The cell products were analyzed with AFBM using a Biocrates p180 kit for hexoses, amino acids, phosphatidylcholines, lysophosphatidylcholines, sphingolipids, acylcarnitines, and biogenic amines. The data was analyzed using DIABLO followed by leaps subset regression.

**Summary of results** DIABLO partial least squares discriminant analysis (PLS-DA) cross-compared all samples simultaneously using each differentiation state as a categorical variable. DIABLO identified signature metabolites changing between two or more differentiation states. To further refine results, top-ranked combinations of metabolites changing across pairs of differentiation stages were identified using Bayesian information criterion (BIC) scoring in subsets regression. iPSC to AFE or LPC showed unique amino acid changes (Trp, Pro) which did not appear in the iPSC to DE transition. Top-scoring unique

signatures for the differentiation from iPSC to selected stage included: DE (lysoPC.a.C16.1, PC.aa.C42.1, PC.aa.C44.3, C16.2), AFE (PC.aa.C24.0, PC.aa.C30.0, SM.C16.0, C12), and LPC (lysoPC.a.C26.1, PC.aa.C30.0, SM.C18.0, C3.1).

**Conclusions** These metabolites may be used in vitro to increase the efficiency of the differentiation process into lung progenitor cells and improve our understanding of early embryonic lung development. Further examination of the impact of these metabolites is warranted.

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#### IS THERE A RELATIONSHIP BETWEEN DIABETES STIGMA AND DEPRESSION?

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10.1136/jim-2019-WMRC.486

**Purpose of study** The relationship between diabetes and depression has been examined in several studies, with findings that suggest individuals with diabetes have higher likelihood of depression. It is important to explore this connection further, as poorer outcomes are associated with this comorbidity. One potential factor that could be involved in this relationship is diabetes stigma. Other types of health-related stigma, such as HIV-stigma, lung cancer stigma, and epilepsy stigma, have been shown to be associated with increased depression and worse health outcomes. The hypothesis is that higher diabetes stigma scores would be associated with more depressive symptoms.

**Methods used** This was tested in a cross-sectional survey study. Participants completed the Comprehensive Diabetes Stigma Scale (CDSS-15) to measure the experience of diabetes stigma, and the Center for Epidemiologic Studies Depression Scale-10 (CES-D-10) to measure depressive symptoms.

**Summary of results** A moderate positive correlation was found between diabetes stigma and depressive symptoms ( $r=0.41$ ). The stigma score was significantly different between racial groups, and the depression score was significantly different between gender groups. The correlation between stigma and depressive symptoms was higher in the female group than the male group.

**Conclusions** Diabetes stigma could have a role in the experience of depression in patients living with Type 2 diabetes and may be a modifiable target to ultimately improve health outcomes.

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#### EXERCISE TREADMILL TESTING AND THE RATE OF FALSE POSITIVE ETTs IN WOMEN

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10.1136/jim-2019-WMRC.487

**Purpose of study** Previous studies suggest that females have a higher incidence of FP exercise ECG tests than males, thus reducing the value of this test in women. According to *Sketch et al.*, there is significant difference in the results obtained from males and females, such that a positive ETT is of limited reliability in predicting the presence of CAD in women. However, *Levisman* and *Amsterdam* of UCD, demonstrated that the high rate of FP ETTs in women was related to the

inclusion of primarily premenopausal women in whom the prevalence of CAD is low. The purpose of this study, therefore, is to investigate these divergent propositions through a retrospective review of exercise treadmill laboratory records, specifically evaluating the influence of sex and age on frequency of FP results.

**Methods used Study Cohort:** female and male patients with ages ranging from 30 y.o. to 62 y.o and older, at the UC Davis Medical Center who had a positive ETT and then underwent further confirmatory cardiac testing such as exercise stress echocardiography (ESE), stress nuclear testing or coronary angiography. Also, it will include patients referred primarily for chest pain and exclude those with documented CAD, coronary angiography, myocardial infarction or revascularization.

**Experimental Design:** participants will be divided into 2 groups based on gender and 4 groups based on age: group I: 30-40 y.o., group II: 41-51 y.o., group III: 52-62 y.o., and group IV: >62 y.o. To help identify FP ETTs the study will include parameters such as ETT-induced chest pain; age-predicted maximal HR achieved; cardiac workload; peak METs; number of ECG leads with ischemic ST depression; mm ECG ST depression; and post-ETT time to resolution of ischemic ST depression.

**Summary of results** I am currently collecting data and evaluating the relation of FP ETTs to the age-based subgroups and anticipate that, consistent with my hypothesis, the rate of FP ETTs will be inversely related to the age of the cohort participants.

**Conclusions** I am currently reviewing and analyzing study data, however some limitations we are anticipating include those inherent in the retrospective methodology as well as the collection of patient data from a single center laboratory. However, the results of this study should add to the body of knowledge on the topic of false positive ETT in women and men with potential to enhance patient management.

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#### MEDICAL MISSIONS INCREASE CULTURE COMPETENCE IN MEDICAL STUDENTS

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10.1136/jim-2019-WMRC.488

**Purpose of study** Culture competence is the ability to communicate across cultural differences, and is increasingly important for medical professionals. The current study aimed to assess the change of culture competence before and after a medical mission abroad.

**Methods used** 58 osteopathic medical students went on medical missions to Thailand, Morocco, Vietnam, or Peru between June 10 and August 7, 2019. Each participant was emailed a pre-survey 2 days pre their trip, and a post-survey 2 days post their trip to complete online using the survey platform Qualtrics. The surveys consisted of the Health Beliefs Attitude Survey questions, based on a 6-point Likert scale, where 6 stands for 'strongly agree' on statements of culture competence. These scores were added up for each participant, with the possible range of 15 to 90. These numbers were compared between participants pre and post survey. Wilcoxon rank sum tests were conducted to assess whether there was a

statistically significant change in the culture competence score before and after the medical mission trip.  $P$ -value $<0.05$  was considered to be statistically significant.

**Summary of results** 8 participants completed both pre and post survey and were included in the final analysis. More than half (62.5%,  $n=5$ ) were between 26 and 30 years old, 50% ( $n=4$ ) were females, 50% ( $n=4$ ) were Caucasian, and 50% ( $n=4$ ) attended a previous mission abroad. The median pre-score was 73.5 (Q1=67, Q3=80.5), and the median of the post score was 78.5 (Q1=74.5, Q3=82.5). There is a marginally statistically significant change in the median between pre and post survey ( $p=0.0938$ ). Among participants who attended a medical mission before this study, the culture competency score increased from 78.5 to 80.5 ( $\Delta=2$ ,  $p$ -value=0.3750). Among participants who did not attend a medical mission before, the culture competency score increased from 69 to 75.5 ( $\Delta=6.5$ ,  $p$ -value=0.5000).

**Conclusions** Due to small sample size, the change in the median of culture competency score did not reach statistical significance. However, the trend of increased culture competence demonstrated the effectiveness of a medical mission abroad, especially for those who did not attend a medical mission abroad in the past. Future research based on a larger sample size should be conducted to confirm the current findings.

#### 489 APPENDICITIS (NOT!): CECAL DIVERTICULITIS IN AN ADOLESCENT MALE

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10.1136/jim-2019-WMRC.489

**Introduction** While diverticular disease is typically thought to be a disease of the elderly, recent epidemiological studies demonstrate increasing incidence among patients younger than 50 years old.<sup>1</sup> Even so, diverticular disease is still exceedingly rare within the pediatric population.

**Case report** We present the case of a 15 year old previously healthy male who presented with four days of worsening sharp right-sided mid-abdominal pain associated with nausea, constipation, and poor appetite. His labs were notable for an elevated C-reactive protein and mildly elevated ESR but otherwise normal CBC and CMP. Pediatric Surgery was consulted due to concern for appendicitis. He underwent an abdominal CT which demonstrated a single cecal diverticulum containing high attenuation material with thickening of the cecal wall and associated fat stranding. While the appendix seemed somewhat enlarged, it was partially gas-filled. His clinical picture and imaging were consistent with cecal diverticulitis. He was started on ceftriaxone and metronidazole. Diet was slowly advanced as tolerated. His pain improved over the course of his 4-day admission. Aside from one temperature to 38 degrees F, he remained afebrile throughout hospitalization. He was discharged home with amoxicillin/clavulanic acid in order to complete a 7-day antibiotic course.

**Conclusion** Diverticulitis should be considered as a potential diagnosis when pediatric patients present with acute onset of severe abdominal pain, especially in presentations that are concerning for but may not fully fit an appendicitis illness script.

#### REFERENCE

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#### 490 A CASE OF GLIOMATOSIS CEREBRI

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10.1136/jim-2019-WMRC.490

**Introduction** Glioblastoma cerebri is an extremely rare and aggressive brain tumor with resistance to therapy. Incidence reported to be less than 100 cases each year in the USA.

**Discussion** 49 yo male with a history of IV meth abuse, ETOH abuse, and seizure disorder on Keppra 750mg twice daily presented with increasing frequency of seizures. He reported having five episodes daily involving upper extremity clenching with loss of consciousness and urinary incontinence. Seizures were typically followed by 4-5 minute post ictal period. He also reported daily visual hallucinations for the past 3 weeks. Medical records from 1 month prior indicated an unremarkable CT and MRI brain, no epileptiform activity on EEG monitoring and negative CSF analysis for infections.

Labs including toxicology were unremarkable on presentation. Overnight EEG monitoring indicated no epileptic activity. MRI brain was notable for multiple areas of subtle white and gray matter T2/Flair abnormalities in the bilateral frontotemporal lobes, with one discrete small 7 mm enhancing ring lesions in the left temporal area, highly suspicious of gliomatosis cerebri type 2.

Neurosurgery was consulted for brain biopsy and pathology of the right temporal lobe was positive for diffuse astrocytoma (WHO grade II/IV). Patient was started on Depakote for seizures as well as chemotherapy and radiation for four months. Post radiation, MRI brain was repeated and showed worsening bilateral frontotemporal hyperintensities, and an enlarging left temporal lesion with three new left frontal lesions. Oncology referred the patient to neurosurgery for consideration of resection, however were unfortunately notified that patient had already deceased.

**Conclusion** Gliomatosis cerebri involves multiple contiguous lobes of the brain. Main symptoms are dementia, seizures, and hemiparesis. Diagnosis is made with MRI and histopathologic confirmation of an astrocytic process. Prognosis is poor despite aggressive treatment with 26-52% surviving less than 1 year. Surgical resection is generally not an option due to multilobar involvement, radiation and chemotherapy has no proven efficacy. Major obstacles toward establishing standardized treatments include rarity of the disease, lack of understanding of the tumor biology, variation across histopathologic grading and patient outcomes, and lack of response to therapies.

#### 491 A CASE OF HGB S/O ARAB'S DISEASE IN A HISPANIC MALE, CASE REPORT AND LITERATURE REVIEW

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10.1136/jim-2019-WMRC.491

**Case Report** Hemoglobin S/O Arab's disease is seen primarily in those of Middle Eastern descent. To the best of our knowledge, there is no reported or published case of this disease in the Hispanic population.

A 26 year old male diagnosed at 2 months of age with Hemoglobin S/O<sub>Arab</sub> presented to the emergency department with severe abdominal and right leg pain. Several days prior to hospitalization, he had intractable nausea and non-bilious, non-bloody vomiting. His abdominal pain worsened and spread to his bilateral hips and proximal thighs, prompting him to seek medical attention. He had stopped his daily hydroxyurea and folic acid approximately 3 months prior. On physical exam, he was in acute distress with scleral icterus and epigastric tenderness reproducible on palpation. A chest x-ray illustrated no acute cardiopulmonary disease. Laboratory results were significant for leukocytosis, normocytic anemia, reticulocyte count of 9.89%, absolute reticulocyte count of 5.9, total bilirubin of 7.1 (conjugated 1.4), and an LDH of 962. Peripheral blood smear showed hypochromasia, polychromasia, sickle cells, and target cells. The patient's pain was controlled with hydrocodone 5mg/acetaminophen 325mg and 2 mg intravenous morphine for breakthrough pain control. He was restarted on folic acid 1 mg daily and hydroxyurea 500mg twice daily. Pain was adequately controlled and there was no evidence of underlying infection. Patient was discharged with the same regimen and followed closely in outpatient clinic.

Hemoglobin S/O<sub>Arab</sub> is a rare hemoglobinopathy caused by two variant beta globin chains with glutamate replaced by valine and lysine. The presence of these two substitutions results in a presentation comparable to sickle cell disease. Hb S/O<sub>Arab</sub> vaso-occlusive crises can be managed similarly to those of Hb S. However in our case, the resolution occurred within 48 hours, which is significantly sooner than those with typical hemoglobin S disease.

We present the first documented and reported case of Hb S/O<sub>Arab</sub> in a Hispanic male. The gene frequency of Hb S/O<sub>Arab</sub> is unknown, though, per Zimmerman et.al., of the estimated 1500-2000 sickle cell infants born each year, it is possible that several of them are Hb S/O<sub>Arab</sub> cases.

#### 492 PROGRESSIVE BILATERAL QUADRICEPS WEAKNESS IN A HEALTHY YOUNG MAN: AN UNUSUAL PRESENTATION OF DIFFUSE-LARGE B-CELL LYMPHOMA

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10.1136/jim-2019-WMRC.492

**Case report** The clinical presentation of DLBCL is highly variable and often difficult to decipher. A 32-year-old man with a history of a benign brain tumor and well-controlled seizures presented with about 8 months of progressive bilateral lower extremity weakness, associated with waxing and waning groin and knee pain. He noticed he was having difficulty running due to bilateral quadriceps weakness. About 2 months after the onset of weakness, he developed a sharp pain in his left medial thigh that eventually radiated to his right medial thigh. Then over the next 4 months, the lower extremity weakness progressed, and he needed crutches to ambulate. At presentation, there was a new onset right medial knee pain and edema without any preceding trauma or falls. He denied fevers, diaphoresis, weight change, pain elsewhere, or recent illnesses. He initially had a negative neurologic workup including MRI of the T and L spine, evaluation of vitamin deficiencies and thyroid function testing. He underwent rheumatologic

workup, which was negative for dermatomyositis, polymyositis, vasculitis, RA, SLE or seronegative spondyloarthropathy. Given the new right knee pain, an MRI of the right knee was completed and revealed bony infiltration of the distal femur and proximal tibia concerning for lymphoma. He then developed worsening left groin and hip pain, which prompted an MRI of the pelvis that revealed multiple bony infiltrates and a 12 cm mass in the left pelvis. His weakness was determined to be secondary to mass effect leading to compression of the iliopsoas muscle and sacral plexus. A CT guided biopsy of the pelvic mass revealed histology consistent with DLBCL. He was diagnosed with stage IV disease after PET scan showed involvement of lymph nodes in his neck, chest, abdomen, and pelvis, as well as osseous lesions in his axial and appendicular skeleton. He was transferred to the heme/onc service for initiation of R-EPOCH chemotherapy. This case demonstrates the diagnostic challenge of a patient presenting with a malignancy masquerading as a neurological and musculoskeletal pathology. It also illustrates the importance of maintaining high clinical suspicion for dangerous pathology in a healthy appearing young man presenting with insidious symptomatology.

#### 493 RECURRENT ASPIRATION PNEUMONIA IN A PATIENT WITH NK/T CELL LYMPHOMA, NASAL TYPE

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10.1136/jim-2019-WMRC.493

**Purpose of study** NK/T cell lymphoma, nasal type is a rare aggressive type of Non-Hodgkin's Lymphoma that causes destruction of midline structures like the palate and sinuses. There is a strong association between EBV and men, more frequently at a 2:1 ratio. We present a case of NK/T cell lymphoma in a male with recurrent aspiration pneumonia due to complication of his disease.

**Methods used** Retrospective Study.

**Summary of results** A 50 year old Hispanic male presented to the emergency department complaining of dyspnea and increased facial swelling. One month prior to presentation, the patient had a biopsy of the right submandibular lymph nodes due to swelling, which resulted in the diagnosis of NK/T cell lymphoma, nasal type. On presentation, physical exam was significant for a mass eroding through the hard palate extending to the soft palate. Upon admission to the hospital, the patient was started on IV corticosteroids and chemotherapy, GEMOX. He was discharged after receiving his first cycle of chemotherapy with follow up with Oncology planned for the rest of treatment. Patient was subsequently readmitted after receiving chemotherapy cycle 2 for neutropenic fever and aspiration pneumonia, with three days of dyspnea and white sputum production, increased from baseline. Patient was started on IV antibiotics, which decreased lactic acid and procalcitonin levels, however he continued to have persistent fever. It was presumed to be due to recurrent aspiration through the hard palate defect. A video fluoroscopy study showed a fistulous tract within the hard palate with regurgitation into the nasopharynx. Due to this finding, a PEG tube was placed for feeding instead of oral consumption. This resulted in resolution of pneumonia and patient improving.

**Conclusions** Thorough investigation should always be done for any patient who presents with neutropenic fever after chemotherapy. Most clinicians often jump to infectious causes such as opportunistic pathogens, however structural defects may be the cause of underlying illness. Due to his palatal defect caused by erosion from the lymphoma, this patient required surgical intervention as well as antibiotics to treat his complications.

#### 494 VIBRIO VULNIFICUS: WHEN OYSTERS AREN'T APHRODISIACS

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10.1136/jim-2019-WMRC.494

**Case report** *Vibrio vulnificus* is a gram negative bacteria can potentially cause serious infections and septicemia. With approximately 200 reported infections each year, it is an easily overlooked diagnosis. Delays between onset of symptoms and initiation of treatment have been associated with higher mortality rates which makes early identification crucial.

A 43-year-old male presented to the emergency department at St. Francis Medical Center, Lynwood, CA with a 4-day history of weakness, nausea, and bilateral lower extremity pain. The patient denied any medical history but admitted alcohol abuse. Vitals consisted of blood pressure of 100/72 mmHg, heart rate of 118 bpm, respirations of 32/rpm, and a temperature of 100.4F. Physical exam showed scleral icterus, yellowing of the tongue, and bilateral lower extremities edema with erythematous macular blanching. Laboratory results included sodium of 120 meq/L, potassium of 5.6 meq/L, WBC count of  $1.2 \times 10^9/L$ , platelets of  $80 \times 10^9/L$ , BUN of 55 mg/dL, creatinine of 6.2 mg/dL, glucose of 92 mg/dL, alkaline phosphatase of 210 U/L, albumin of 3 g/dL, and total bilirubin of 1.4mg/dL. Imaging revealed hepatosplenomegaly and fatty liver. Diagnosis of sepsis was made; hypotension persisted despite vasopressors. Blood culture revealed *Vibrio vulnificus*. Doxycycline and ceftazidime was administered. Upon questioning, patient admitted to eating raw oysters in Mexico recently. He deteriorated over 39 days, enduring septic shock, respiratory and kidney failure, hepatic encephalopathy, and necrotizing fasciitis. He expired following a myocardial infarction despite resuscitative measures.

Although the incidence of *V. vulnificus* is low, the scenario of septicemia and bullous skin lesions should raise suspicion in patients with underlying liver disease. Susceptibility is due to higher iron levels, providing thriving environment for *V. vulnificus*. Questioning of raw seafood consumption should be considered in septic patients with cellulitis. This case illustrates the importance of obtaining a complete history and identifying the organism early. Recognition and aggressive use of supportive measures are critical in minimizing the fatal consequences of *V. vulnificus*.

#### 495 COLLOID MILIUM: A NOVEL CASE FOLLOWING THERMAL BURN WITH DIFFERENTIAL DIAGNOSIS

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10.1136/jim-2019-WMRC.495

**Introduction** Colloid milium is a rare condition of colloid deposition which most commonly affects fair skinned individuals with history of long-term sun exposure. There are no reports of colloid milium following thermal burn in the literature. Differential diagnosis of colloid milium may include conditions such as sebaceous hyperplasia, nodular amyloidosis, and basal cell carcinoma.

**Case Presentation** A 63 year-old man presented to the dermatology clinic with a papular lesion on the bridge of his nose. The papules appeared over 20 years earlier following a severe thermal burn and have been gradually improving for the last 10 years. However, his symptoms of burning sensations flare every year when he is exposed to heat and sun. He has applied high SPF sunscreen without relief. He has no known allergies. Shave biopsy was performed, and hematoxylin and eosin staining revealed homogenous, acellular material consistent with colloid extending through the dermis and exhibiting characteristic fissure artifacts.

**Abstract 495 Table 1** Selected differential diagnosis of colloid milium

Condition	Characteristics
Colloid Milium	Deposition of colloid in dermis; small flesh colored or translucent papules most commonly on sun exposed areas of head and neck
Nodular amyloidosis	Cutaneous manifestation of sarcoidosis; waxy papules
Sebaceous Hyperplasia	Benign hair follicle tumor; small yellow papules seen in older adults typically on forehead or cheeks
Basal Cell Carcinoma	Neoplasm of basal cells of epidermis; slow growing flesh-colored, pink, or pigmented plaque or nodule that may spontaneously bleed or ulcerate



**Abstract 495 Figure 1** Colloid milium on nose

**Implications** Here we present a novel case of colloid milium following a thermal burn. We outline the clinical and histopathologic differences among colloid milium and other conditions commonly included on a differential diagnosis.

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**DESCRIPTIVE ANALYSIS OF NEWBORNS EVALUATED IN THE EMERGENCY DEPARTMENT**A Huang\*, E Gastelum, J McCue, E Schmitt. *UCSF Fresno, Fresno, CA*

10.1136/jim-2019-WMRC.496

**Purpose of study** Newborns being evaluated in the emergency room has dramatically increased over the past several years. Neonatal susceptibility to infections, parental anxiety, insufficient caretaker knowledge, or benign symptoms are just a few reasons for the increase in the number of emergency department (ED) visits. However, several studies show that majority of newborns' ED visits were considered non-urgent. To prevent non-urgent ED visits, it is vital that outpatient physicians provide excellent anticipatory guidance to parents of newborns. The objective of this retrospective study is to determine factors associated with newborn ED visits at Community Regional Medical Center (CRMC) and improve content, delivery, and emphasis when providing anticipatory guidance.

**Methods used** We collected data of over 500 newborn seen in the ED of CRMC in Fresno, California between January 2014 and December 2018. Participants were families of term newborns ages 1-28 days, with no history of prematurity, prolonged NICU stay, or complex medical history. As a part of this retrospective study, SPSS analysis will be conducted on the following data: demographics of the newborn (gestational age, age of visit to ED) and maternal data (maternal age, number of live births, length of stay postpartum, home postal code at time of ED visit, ethnicity, race). The data will also juxtapose the parent's chief complaint in conjunction with the physician's final diagnosis to determine the urgency of the visit.

**Summary of results** The data will identify the demographics of mothers and newborns seen in the ED, particularly mothers that are primiparous, teenagers, living in low

socioeconomic areas, or those discharged early from postpartum. When categorizing parents' main concern based on organ system and chief complaint, this breakdown will affect how we introduce a tool for providers to improve outpatient patient education.

**Conclusions** By profiling the type of newborns' visits to the ED, physicians can better understand parental concerns during the newborn period and how to provide anticipatory guidance in the outpatient setting. Furthermore, the knowledge gained from this study will help physicians improve newborn parent education in the postpartum setting to reduce the number of non-acute ED visits.

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**INITIAL EMPIRICAL ANTIBIOTIC EXPOSURE IN PREMATURE INFANTS AND THE RISK FOR NECROTIZING ENTEROCOLITIS (NEC)**

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10.1136/jim-2019-WMRC.497

**Purpose of study** Empiric antibiotics are commonly used on premature infants during the early postnatal period. Alteration of bacterial flora in the neonate's gut may be a risk factor for the development of NEC. The purpose of this study was to investigate whether initial empirical antibiotic treatment in premature infants is associated with an increased risk of NEC.

**Methods used** A literature review was conducted using PubMed, Google Scholar, and reference checks. Keywords used included, 'necrotizing enterocolitis,' 'antibiotic exposure,' and 'prematurity.' Only studies that included a control group and accounted for potential confounding variables associated with NEC were included in our analysis.

**Abstract 497 Table 1** Association of IEAT and development of NEC

First Author & Year	Mean Gestational Age (weeks)	Definition of Cases & N	Definition of Controls & N	Outcome
Raba, 2019	NEC: 25.2 Control: 25.9	Infants exposed to IEAT w/NEC: 22	Matched controls exposed to IEAT w/out NEC: 32	PIEAT was associated with a 3.6-fold increase in the risk of a baby developing NEC (Odds Ratio: 3.6; 95% CI 1.13–11.47) Meropenem and gentamicin with highest association with NEC
Esmailizand, 2017	NEC: 25.9 Control: 25.9	Infants exposed to IEAT w/NEC: 224	Matched controls exposed to IEAT w/out NEC: 447	PIEAT was associated with increased risk of NEC compared with IEAT (adjusted OR: 2.02; 95% CI 1.55, 3.13) Odds ratios of NEC with duration of IEAT: No IEAT: 1.39   3-4 days: 1.52   5-6 days: 2.68   7-8 days: 2.56   >8 days: 3.71
Alexander, 2011	NEC: 28.2 Control: 28.1	Infants exposed to IEAT w/NEC: 124	Matched controls exposed to IEAT w/out NEC: 248	Antibiotic exposure was a risk factor for NEC, p=0.015 Odds ratios of NEC with duration of IEAT: 1-2 days: ≈1.25   3-4 days: ≈1.4   5-6 days: ≈1.7   7-8 days: ≈2   9-10 days: ≈2.4   >10 days: ≈3.9
Cotten, 2009	PIEAT: 25.6 Control: 26.3	Infants exposed to PIEAT w/NEC: 255	Infants exposed to PIEAT w/out NEC: 1892	PIEAT in 255 (58%) of those with NEC vs 1892 (53%) of those without NEC, p=0.04 Duration of IEAT associated with an increased risk of NEC, p<0.001
Abdel Ghany, 2012	PIEAT: 30.97 Control: 32.6	Infants exposed to PIEAT w/NEC: 34	Infants exposed to PIEAT w/out NEC: 173	The duration of IEAT and risk of NEC, OR: 1.31, p=0.018 PIEAT in 34 (100%) of those with NEC vs 139 (80%), p=0.005
Torres, 2018	PIEAT: 27.8 Control: 28.2	Infants exposed to PIEAT: 144	Infants exposed to IEAT: 69	20 (13.9%) got NEC, all belonged to the PIEAT group, p=0.03
Kuppala, 2011	PIEAT: 27.4 Control: 29.3	Infants exposed to PIEAT: 130	Infants exposed to a) no IEAT: 60 b) IEAT: 175	8 (4.6%) of those in IEAT vs 9 (6.9%) of those in PIEAT got NEC, p=0.11

**Summary of results** 7 studies satisfied our inclusion criteria (table 1 below). The definition of the control group and the confounding variables, such as antibiotic type, feeding type and use of other medications were not uniform among the studies. In most of the studies, patients with positive blood culture and sepsis were excluded. Majority of the studies suggest that prolonged initial empirical antibiotic treatment (PIEAT) of more than 5 days in the immediate postnatal period is a risk factor for the development of NEC.

**Conclusions** Our review suggests that there is an association between the PIEAT and the risk of NEC in very premature infants. The limitation of the studies included inability to control for all of the possible variables that could play a role in development of NEC. Larger prospective studies that allow for subgroup analysis based on different confounding variables are needed to confirm the association of PIEAT and NEC.

#### 498 A CASE OF CONGENITAL CENTRAL HYPOVENTILATION SYNDROME COMPLICATED BY INTRACRANIAL HEMORRHAGE

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10.1136/jim-2019-WMRC.498

**Background** Congenital Central Hypoventilation Syndrome (CCHS) is a rare cause of apnea in the neonate. We present a unique case of CCHS to demonstrate that a high index of suspicion for CCHS is necessary to avoid a delay in diagnosis.

**Case** A full term baby boy was born to a healthy 25-year-old G1P1 via caesarean section with vacuum-assist due to failed induction. Patient required positive pressure ventilation at birth due to poor respiratory effort. At 3 hours of life, patient had a cyanotic episode and was admitted to the NICU. He required intubation due to apnea. Due to history of traumatic delivery, head CT was done and demonstrated bilateral subdural hemorrhages and a non-displaced skull fracture. MRI showed posterior subdural bleed. Neurology and neurosurgery were consulted to help explain the frequent apneic episodes. Patient was extubated and maintained on nasal non-invasive ventilation but continued to have frequent apnea. He failed a trial of caffeine and required reintubation due to respiratory acidosis. Subsequently, a sleep study was done revealing multiple episodes of central apneas and hypopneas. Genetic testing for CCHS was ordered and was positive for a mutation in the PHOX2B gene. Patient underwent tracheostomy and was discharged on a home ventilator.

**Discussion** CCHS is a rare disorder of respiratory and autonomic dysregulation estimated to affect 1:200,000 people. It is classically characterized by hypercapnia and hypoxemia during sleep. Most patients require tracheostomy and lifelong ventilatory support. Apnea in the neonate has a broad differential including cardiac, pulmonary, infectious and neurogenic causes. CCHS is often overlooked because of overlap with more common disease processes and low incidence of the disease. Our patient had a neurological explanation for apnea (head trauma with intracranial hemorrhage) and thus CCHS was not initially considered as a diagnosis. Only when our patient was unable to be extubated due to persistent respiratory acidosis was genetic

testing done. Due to the availability of genetic testing for CCHS, we recommend considering CCHS as a diagnosis in all term neonates with central apnea despite presence of confounding findings.

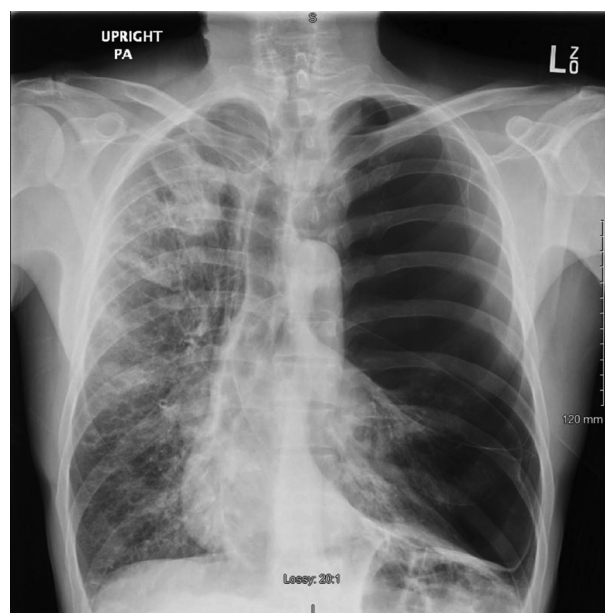
#### 499 TENSION BULLAE WITH PERIPHERAL PNEUMOTHORAX

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10.1136/jim-2019-WMRC.499

**Case report** The differentiation of tension bullae, chronic tension pneumothorax, and atypical pneumothorax is difficult to diagnose from a history and physical examination alone.

A 49-year old male smoker presented to the emergency department with chest pain for the past four days, described as sharp, constant, non-radiating, located over both sides of the upper chest. He was in moderate distress with an oxygen saturation of 84% on room air. The physical examination was significant for hyperresonance and decreased breath sounds on the left. Chest radiography revealed the entire left lung occupied by thin-walled bullae, left-to-right mediastinal shift, heterogeneous opacification of the right upper lobe, and a one centimeter nodule in the right mid-zone (figure 1). It is important in this scenario to obtain further imaging promptly, as performing a needle thoracotomy may cause unintentional placement that could lead to an iatrogenic pneumothorax, hemothorax, shock, or even death. It is unclear in the current literature whether to perform immediate needle thoracotomy followed by a chest tube, perform a video-assisted thoracoscopy, or proceed to emergent bullectomy.



Abstract 499 Figure 1

It remains clear that if the patient is unstable, in acute distress, a needle thoracotomy is the current standard of care. However, without further imaging, it may be difficult to diagnose the underlying etiology of the patient's pathology. Every patient needs to be evaluated and an informed calculated risk of performing an emergent thoracotomy versus proceeding to a computed tomography.

## 500 PATIENT PREFERENCES IN COLORECTAL SURGERY: WEIGHING SURGICAL SITE INFECTIONS AND ANTIBIOTICS SIDE EFFECTS

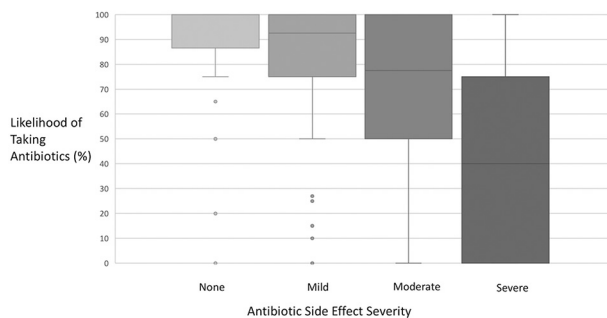
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10.1136/jim-2019-WMRC.500

**Purpose of study** The likelihood of a Surgical Site Infection (SSI) after colorectal surgery is reduced when using a mechanical bowel preparation with oral antibiotics (MBP +ABX). ABX may cause side effects such as vomiting; thus, this study aimed to understand the willingness of patients to take ABX despite the possibility of side effects to reduce the risk of SSI.

**Methods used** This was a single-center study of adults undergoing colorectal surgery, colonoscopy, or treatment in a surgical clinic. A standard gamble instrument was designed to measure patient willingness to accept ABX side effects to reduce the risk of SSI from 14% to 7%. Data were analyzed using the Kruskal-Wallis and Wilcoxon signed-rank tests due to non-parametric distribution.

**Summary of results** We enrolled 68 patients (36 women) undergoing colonoscopy (n=43), colorectal surgery (n=14), and evaluation in clinic (n=11). Willingness to take ABX decreased with increasing severity side effects,  $p < 0.001$  (figure 1). The highest level of severity of side effects patients were willing to accept was moderate (55.9%), followed by severe (23.5%), mild (14.7%), none (1.5%). Five patients that volunteered that they had personal experience with SSI chose to always complete antibiotics regardless of side effects.



**Abstract 500 Figure 1** Patient willingness to take ABX assuming varying severity of side effects. Answers varied significantly using Kruskal-Wallis test,  $p < 0.001$ .

**Conclusions** Increasing side effect severity is associated with decreased patient willingness to take ABX even with reduced risk of SSI. This effect may be modified in patients who previously experienced SSI. Further studies are needed to inform preoperative discussions about the quality of life associated with both ABX and SSI prior to colorectal surgery.

## 501 OPTIMIZING SKIN ANTISEPSIS FOR NEONATAL SURGERY

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10.1136/jim-2019-WMRC.501

**Purpose of study** Preoperative skin antiseptics is routinely performed to reduce the risk of surgical site infections (SSIs). Povidone-iodine has been the antiseptic of choice for decades; however, a growing body of evidence in adults suggests that alcohol-based chlorhexidine solutions provide superior protection against SSIs. Equivalent data in the neonatal surgical population is lacking, but literature on skin antiseptics for invasive non-surgical procedures in neonatal intensive care units (NICUs) and for prevention of newborn nosocomial infections in developing countries suggests that chlorhexidine antiseptics is safe and non-inferior to povidone-iodine in reducing hospital acquired infections.

The aim of this project is to therefore assess the safety (avoidance of skin injury) and effectiveness (avoidance of SSIs) of preoperative skin antiseptics with chlorhexidine-alcohol in neonates undergoing abdominal and thoracic surgery at British Columbia Children's Hospital (BCCH).

**Methods used** Our target population will include general surgery patients in the NICU at British Columbia Women's Hospital (BCWH) older than 34 weeks post conceptual age. Patients with known allergies to chlorhexidine gluconate (CHG) or isopropyl alcohol (IPA), open wounds, or mucosal surfaces in the prep area will be excluded. Patients will be prepped with one of two CHG-IPA formulations (2% CHG - 70% IPA or 0.5% CHG - 70% IPA) and skin integrity assessments will be performed pre- and post-application. Using BCCH data from the American College of Surgeons National Surgical Quality Improvement Pediatric Program, an analysis will be performed comparing pre- and post-implementation data to assess incidence of adverse skin reactions and SSIs.

**Summary of results** Implementation of the proposed CHG-IPA formulations is ongoing. Preliminary results will be reported at the time of the conference.

**Conclusions** This project will: 1) engage stakeholders from BCCH and BCWH in neonatal surgical quality improvement work, and 2) inform the development and implementation of a neonatal surgical skin preparation protocol that can be applied across surgical subspecialties to standardize practice and improve clinical outcomes (specifically reduce SSIs).

## 502 A RARE CASE OF PNEUMATOSIS CYSTOIDES COLI PRODUCING ILEOCOLIC INTUSSUSCEPTION

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10.1136/jim-2019-WMRC.502

**Introduction** Ileocolic intussusception is primarily a disorder of early childhood, with 10% of cases occurring in children over 5 years of age. In this older age group, it is associated with a pathologic lead point, such as lymphoid hyperplasia or a tumor. Pneumatosis cystoides intestinalis (PCI), a rare condition in which gaseous cysts line the intestinal wall, can seldom cause intussusception. Here, we present a unique case of intussusception secondary to PCI in a 7-year-old.

**Case** An otherwise healthy 7-year-old Navajo boy with a recent episode of self-limited constipation and abdominal pain presented to the ED with a six-hour history of colicky, periumbilical pain and diarrhea. On presentation, the patient was in acute distress secondary to pain. Contrast CT showed an



intussusception beginning proximal to the terminal ileum, extending at least 7.3 cm distally. Coronal images showed terminal ileum, cecum, and ascending colon invaginating into the distal ascending and transverse colon. Free fluid was seen at the origin of the intussusception, and general surgery was consulted for immediate reduction by exploratory laparoscopy. During surgery, the intussusception was reduced by lifting the transverse colon and allowing gravity to pull the ileum out of the ascending colon. A firm mass in the cecal wall was identified as a possible lead point. The laparoscopy was converted to an open ileocecectomy due to concern of malignant pathology. Gross pathologic examination of the cecum showed areas of dilatation with multiple air-filled cystic cavities with smooth internal linings and no mural nodularities. Histologic examination of the tissue sections was appropriately reactive. PCI was determined to be the cause of intussusception.

**Discussion** The association between PCI and intussusception is extremely rare, with only six documented cases in the pediatric population to our knowledge. Of these, our patient represents the second pediatric patient without an underlying secondary pathology. Despite its rarity, PCI should be considered when evaluating patients for intussusception— prompt recognition can aid in a more conservative management of the disease.

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#### MENTORS AND MENTEES IN ACADEMIC MEDICINE AGREE THAT GENDER MATCHING IS NOT REQUIRED FOR SUCCESSFUL MENTORSHIP

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10.1136/jim-2019-WMRC.503

**Purpose of study** Women have been underrepresented in orthopedic surgery for many years despite increasing proportions of graduating female medical students and percentage of women in other surgical specialties in the recent years. Studies, however, reveal this disparity is due more to women's decision not to pursue careers in orthopedic surgery rather than their inability to match into training programs. A mentor was defined as someone who provides guidance, advice and support in professional and personal development. Our study examined importance of same-sex mentorship at all stages of medical training, from medical students to practicing physicians.

**Methods used** Between May-October of 2019, UC Davis medical students, residents and faculty completed an online Qualtrics survey asking about their background, mentorship experience, and important factors when choosing a medical specialty.

**Summary of results** Preliminary results show responses from 324 medical students, 309 residents, and 157 faculty members. Initial data revealed that respondents generally agreed that having a mentor who takes the time to get to know their mentee matters more than having a mentor who matches their mentee's gender. Students expressed their desire for mentors be aware of the challenges that gender might play while in pursuit of their goals. These findings support the notion that mentors can be successful even when they are not the same gender as their mentee. Most respondents believed that mentors are important, with residents valuing mentorship more now compared to earlier in their training. Several students

reported that they wished they had mentors in earlier years of medical school, suggesting that medical schools should adopt programs to pair students with mentors as early as possible. Faculty members requested more protected time to spend with their mentees to build relationships and accomplish goals together.

**Conclusions** There is a clear demand for mentoring programs to direct focus on improving the quality of mentorship by diversifying pool of mentors and connecting mentees to the appropriate mentors they can identify with, as well as, providing protected time for mentors to cultivate the most effective relationships and success in their careers.

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#### ISOLATED THORACOSCHISIS WITH RIB AGENESIS AND LIVER HERNIATION

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10.1136/jim-2019-WMRC.504

**Case report** Thoracoschisis is a very rare congenital birth defect defined by the herniation of intra-abdominal organs through a defect in the thoracic wall. Though often associated with other birth defects as a part of the 'limb-body wall complex' deformities, thoracoschisis has very rarely been reported as an isolated finding.

Here we present the case of a 30 day old term male infant with an isolated left thoracoschisis managed successfully by primary closure. The patient has been monitored postnatally in the Neonatal Intensive Care Unit (NICU) of Maputo Central Hospital because of the presence of a herniated mass through a left chest wall defect below the left nipple.



**Abstract 504 Figure 1** Showing the 3 x 3 cm herniation of the left lobe of the liver overlying the left chest wall

Computer Tomography (CT) scans suggested the presence of a left diaphragmatic hernia, left rib agenesis and herniation of an unidentifiable intra-abdominal organ through the anterior left chest wall. On day of life (DOL) 30, when global health outreach pediatric surgeons arrived to the hospital, the decision was made to operate on the child. The mass was found to be of liver origin, the exposed tissue was excised and primary closure of the chest wall was accomplished. The patient's postoperative course involved a wound infection that resolved favorably with treatment, allowing for discharged home on post-operative day (POD) 17 in a stable condition.

### 505 IMPACT OF FUNCTIONAL TOTAL LARYNGECTOMY ON QUALITY OF LIFE

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10.1136/jim-2019-WMRC.505

**Purpose of study** It is estimated that 5-11% of total laryngectomies performed in the United States are done for organ dysfunction, termed functional total laryngectomy (FTL). Despite this, little has been written about the effect this has on quality of life (QOL). In this study, we aim to evaluate the impact on quality of life of this major elective surgery with life-altering effects.

**Methods used** A cross-sectional analysis of FTL patients was performed using the MD Anderson Dysphagia Index (MDADI), University of Washington Quality of Life Index (UW-QOL), and the 12-Item Short Form Healthy Survey (SF-12) version 2. Patients were asked to fill out the survey based on their preoperative and postoperative symptoms. Finally, they were asked if it was worth it.

**Summary of results** A total of 8 out of 15 patients met inclusion criteria, were able to be contacted, and were willing to participate in the study. There was no significant difference between global preoperative and postoperative QOL scores as measured by any of the three questionnaires used. When broken down by individual questions, there was a significant decrease in appearance scores ( $p=0.03$ ) and a significant increase in swallow scores after FTL as measured by the UW-QOL ( $p=0.008$ ). Six of the eight patients stated that they would elect to under FTL again.

**Conclusions** Functional total laryngectomy appears to have a neutral effect on QOL with some areas improving and others

worsening. This is important information to discuss when counseling patients with end-stage dysphagia.

### 506 SURGICAL INTERVENTIONS FOR MITRAL VALVE BACTERIAL ENDOCARDITIS IN PEDIATRIC PATIENTS: A SYSTEMATIC REVIEW

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10.1136/jim-2019-WMRC.506

**Purpose of study** Bacterial endocarditis is an infection of the heart's endothelial lining, causing the formation of bacterial vegetations most commonly around the lining of the mitral valve. In 52% of cases, surgical intervention is required. Mitral valve (MV) repair and replacement are the most common corrective procedures, however, there is scarce literature comparing the outcomes of both procedures in a pediatric cohort.

**Methods used** A systematic literature review using PubMed, Ovid EMBASE, Cochrane Database of Systematic Reviews, Scopus, and Web of Science identified 20 case reports for data extraction. Papers were selected through the systematic use of search terms and were manually assessed for relevance and inclusion of pertinent data. Data parameters included postoperative complications and outcomes. Review and meta-analysis were conducted according to PRISMA guidelines.

**Summary of results** The mean age of the patients was 6.4 years. 10 patients underwent MV repair and 10 underwent MV replacement. 1 patient had 2 repairs of the MV that resulted in the failure of each procedure. This ultimately led to the replacement of the previously repaired valve. Although MV repair had more overall complications, MV replacement resulted in more severe complications such as heart block (10%) and valve thrombosis (40%). In the MV repair group, MV regurgitation and MV stenosis were present post-operatively in 40% and 20% of patients, respectively.

**Conclusions** We recommend that MV repair should be the treatment of choice since complications are less grave, as they are mainly comprised of residual regurgitation or novel stenosis. The major adverse outcomes seen in patients after valve replacement are associated with more severe sequelae and future implications for patients. Improving outcomes for MV repair in this patient cohort should be the focus of possible future studies.