

Pediatric Endocrinology Primer for Primary Care Practitioners

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What is the PROBLEM?

Pediatric obesity pandemic of the past few decades

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graph TD; A[Pediatric obesity pandemic of the past few decades] --> B[Increase in the incidence and prevalence of type 2 diabetes mellitus (T2D) in childhood]; B --> C[Disproportionate disease burden in children of minority ethnic groups and low socioeconomic status];
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Increase in the incidence and prevalence of type 2 diabetes mellitus (T2D) in childhood

Disproportionate disease burden in children of minority ethnic groups and low socioeconomic status

What is the PROBLEM?

Projections of type 1 and type 2 diabetes burden in the U.S. population aged <20 years through 2060: The SEARCH for Diabetes in Youth Study

Objective

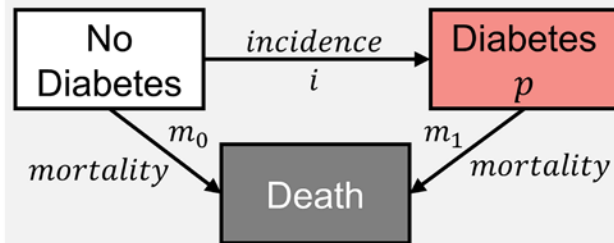
To project the prevalence and number of youth aged <20 years with diabetes through 2060

Input data

Prevalence in 2017 and incidence between 2002 and 2017 by

- Diabetes type
- Age
- Sex
- Race and ethnicity

Illness-Death Model



Two projection scenarios:

1. Constant incidence:
Incidence remains constant between 2017 and 2060
2. Increasing incidence:
Incidence continues to increase as observed between 2002 and 2017

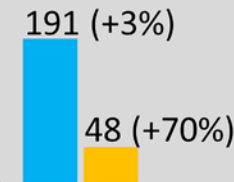
Number of cases in 1,000s

Year 2017

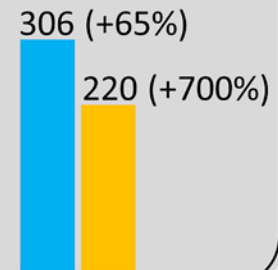


Year 2060

Constant incidence



Increasing incidence



What is the PROBLEM?

- Nearly 1 in 5 adolescents (18%) aged 12-18 years, and 1 in 4 young adults (24%) aged 19-34 years, are living with prediabetes, according to a new [CDC study \(2005-2016\)](#).
- The prevalence of a confirmed diagnosis of PCOS 0.56%, and increased to 1.14% when undiagnosed cases with documented symptoms qualifying for PCOS according to NIH criteria were included.

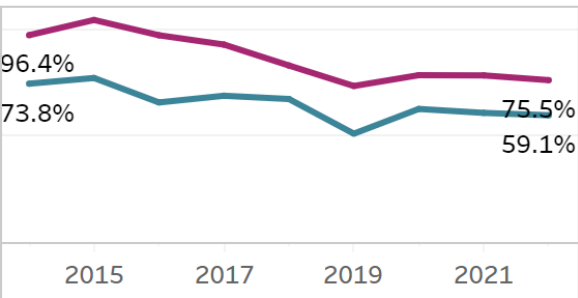
What is the PROBLEM?

Pediatric Endocrinology Rates

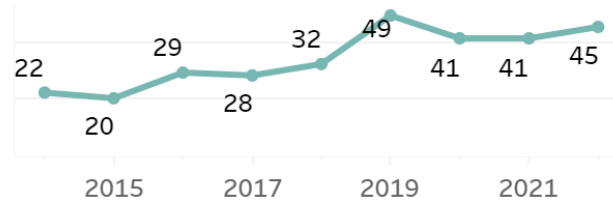
Average NRMP Matched Percent: 64.7%

Average Final Fill Rate (ABP): 86.0%

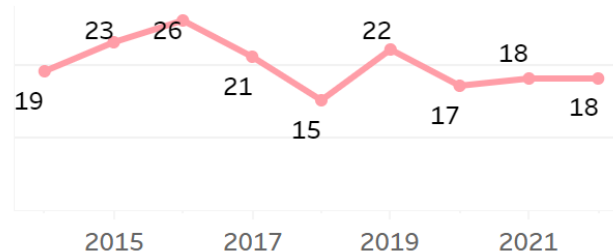
Yearly NRMP Match Percent and Final Fill Rate (ABP) for Pediatric Endocrinology



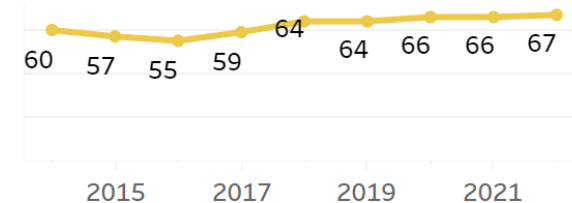
Number of Unfilled Positions per NRMP in Pediatric Endocrinology



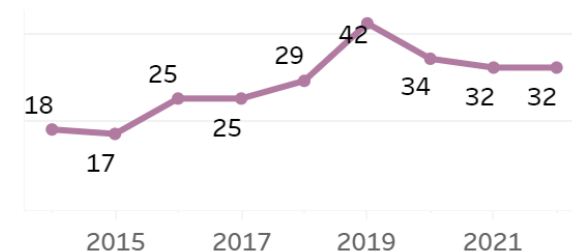
Number of Trainees (ABP) Above NRMP Matched Number in Pediatric Endocrinology



Number of Programs per NRMP in Pediatric Endocrinology



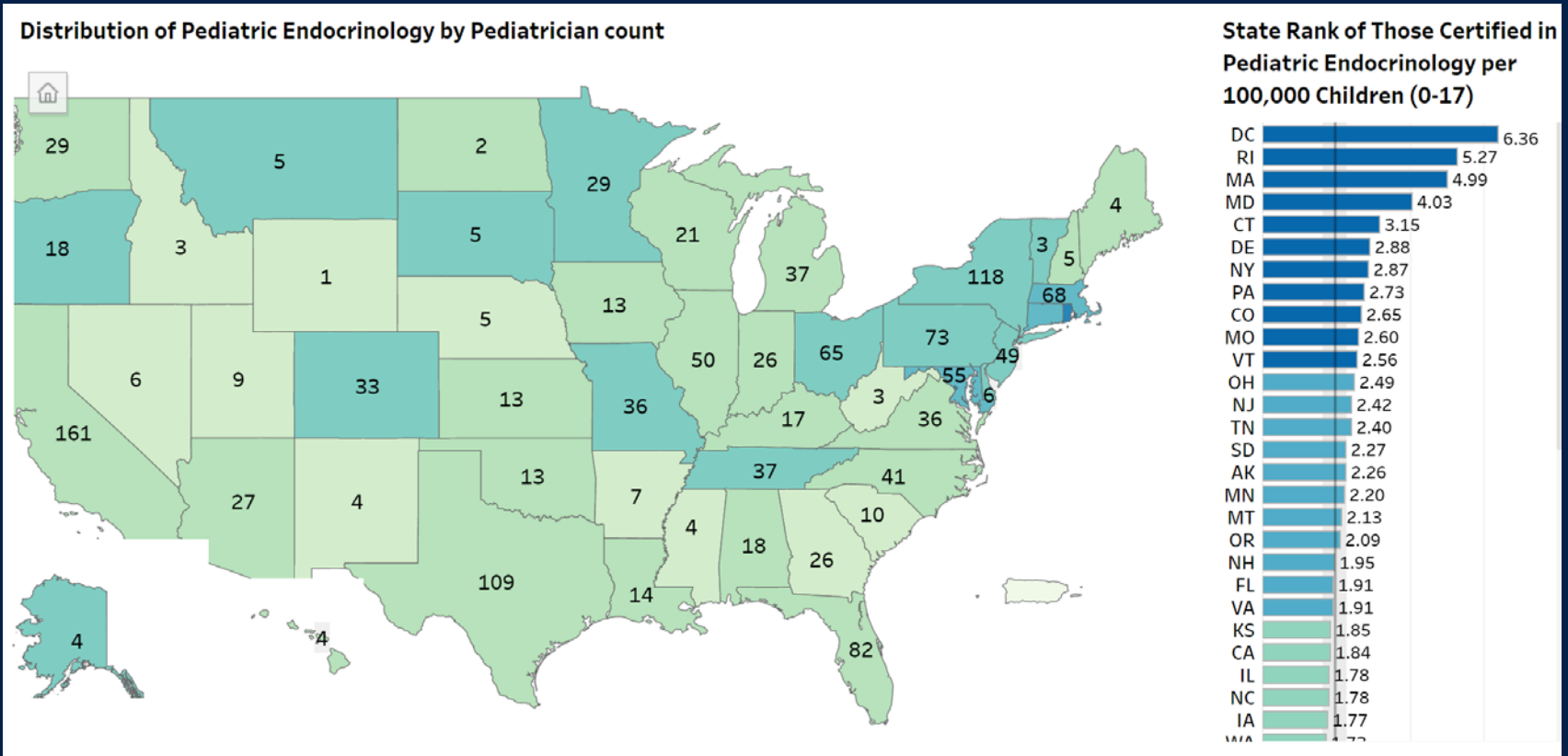
Number of Unfilled Programs (NRMP) in Pediatric Endocrinology



What is the PROBLEM?



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What is the PROBLEM?

- The Central Valley has 1.17 specialists for 100000 children (however some people cover more than one county- a lot of satellite clinics from VCH or Bay Area).
- 1,022,792 children (under 18) [Kern, Tulare, Kings, Fresno, Madera, Mariposa, Merced, Stanislaus, Tuolumne] – 12 pediatric endocrinologists.
- How long do you think it takes for a NON-urgent referral to get through to an endocrinologist (NMP or VCH)?

Proposed SOLUTION

- Help PCPs join the workforce:
 - Initiate workup.
 - Refer only when truly needed.
 - Be comfortable managing common conditions like obesity, prediabetes, PCOS, etc.
 - Have a **quick, easy, Dr. Kinman approved** guide to help do all of the above.

Proposed SOLUTION

- Endocrinology Primer for Primary Care Practitioners:
 - Easy to access on google drive
 - Fast guide on differentials, workup and when to place referral
 - Easy read with fast tips when in a hurry
 - Cases to read when time allows
 - Quick link to resources and AAP guidelines
 - All reviewed by Dr. Kinman.

Topics already included

- Pubertal disorders:
 - Normal pubertal development
 - Precocious puberty
 - Delayed puberty
- Thyroid disorders:
 - Neonates born to mothers with Graves disease
 - Hypothyroidism
 - Hyperthyroidism
 - Euthyroid sick syndrome

Topics already included

- Menstrual disorders:
 - PCOS
- Diabetes and prediabetes
- Adrenal disorders
 - Premature adrenarche
 - Congenital adrenal hyperplasia
- Growth disorders:
 - Tall stature
 - Short stature

PCOS

Definition

- Irregular menses and/or oligomenorrhea PLUS biochemical or clinical evidence of hyperandrogenism.
- Obesity and insulin resistance are common, but NOT required for diagnosis.
- CANNOT be diagnosed in the first 2 years postmenarche due to menstrual irregularities being normal during that period.

Diagnosis

- Exclude other causes first with :
 - *Dehydroepiandrosterone sulfate (DHEAS);
 - *LH; FSH (ratio usually elevated > 2.5-3:1 in PCOS);
 - *free and total TESTOSTERONE;
 - *17-hydroxyprogesterone;
 - *Prolactin;
 - *+/- Thyroid function
- Assess for associated abnormalities (diabetes and hyperlipidemia)
 - *CMP, Hb A1C
 - *Lipid profile
- DO NOT order radiologic procedures (like pelvic ultrasound) - those are not necessary and adolescent ovaries have cysts, NORMAL adolescent ovaries can look like adult PCOS ovaries.

Management

- Hirsutism and/or alopecia- Combined oral contraceptive pills (early intervention = better cosmetic outcomes)
- Obesity- Lifestyle changes for weight loss
- Insulin resistance- Metformin (warn adolescents- it improves fertility!)
- Cosmetic measures for hair removal

When to Refer

- Above management is not enough and patient needs antiandrogen treatment (spironolactone, cyproterone acetate, finasteride, flutamide)

PCOS

Did you know that 5-10% of females of reproductive age can have PCOS?
This is independent of race, ethnicity, or country of origin.

Case presentation:

A 16 year old female comes to you with complaints of oligomenorrhea, with some periods as frequent as every 3 weeks, yet then with no menses for 3 months.

- She had her first period at age 11; they have never been regular
- To her and her mother's knowledge, there was no premature adrenarche (premature pubic hair development, axillary hair development, and/or premature body odor severe enough to require deodorant occurring before 8 years of age in a female)
- She reports hair on her chin, as well as hair going up to her umbilicus which she plucks or shaves
- She denies any severe acne, but has gained about 30 pounds in the last 2 years despite not increasing in height
- She is more concerned about the hirsutism, while her mother is concerned about both the oligomenorrhea and the hirsutism

What are you thinking?

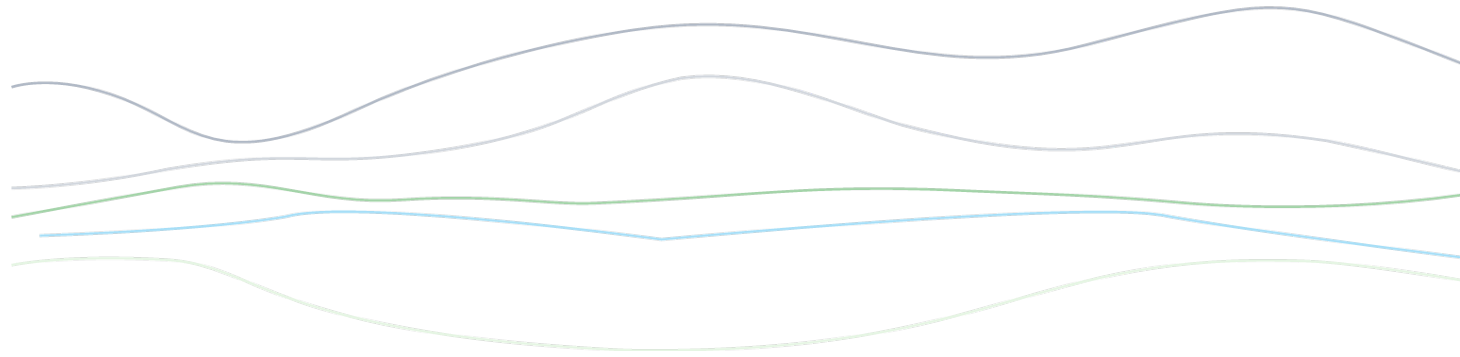
Obviously, PCOS (or polycystic ovarian syndrome) has to be on your differential because this is very common. She had her first period at 11 years of age; they should be regular by two years later (e.g. not be persistently less than 21 days or > 45 days apart). But you also need to be aware of other causes of hyperandrogenism as you wouldn't want to miss a late-onset (also known as non-classic) congenital adrenal hyperplasia (CAH), an adrenal tumor, or an ovarian tumor (such as Leydig cell tumors). In addition, there are other causes of oligomenorrhea or secondary amenorrhea.

Milestones

- All topics are currently awaiting Dr. Kinman's review.
- Plan is to send the QR code to all attendings and residents before graduation.
- More high-yield topics.
- Working on the format to be user friendly.
- The project is not finished: Thank you Hiba El-Rahi for joining the project, more people are welcome to join!

Resources

- <https://www.abp.org/dashboards/yearly-growth-pediatric-fellows-subspecialty-demographics-and-program-characteristics>
- Koren, Dorit, and Lynne L. Levitsky. "Type 2 diabetes mellitus in childhood and adolescence." *Pediatrics In Review* 42.4 (2021): 167-179.
- Andes, L. J., Cheng, Y. J., Rolka, D. B., Gregg, E. W., & Imperatore, G. (2020). Prevalence of prediabetes among adolescents and young adults in the United States, 2005-2016. *JAMA pediatrics*, 174(2), e194498-e194498.
- Christensen, S. B., Black, M. H., Smith, N., Martinez, M. M., Jacobsen, S. J., Porter, A. H., & Koebnick, C. (2013). Prevalence of polycystic ovary syndrome in adolescents. *Fertility and sterility*, 100(2), 470-477.
- <https://www.abp.org/dashboards/pediatric-subspecialty-us-state-and-county-maps>
- Tönnies, T., Brinks, R., Isom, S., Dabelea, D., Divers, J., Mayer-Davis, E. J., ... & Imperatore, G. (2023). Projections of type 1 and type 2 diabetes burden in the US population aged < 20 years through 2060: the SEARCH for Diabetes in Youth study. *Diabetes Care*, 46(2), 313-320.



THANK YOU!

Special thanks to Dr. Renee Kinman