FUTURE OF PEDIATRICS TALKS!

A VIRTUAL SUMMER SERIES

Pediatric Health Network

Children's National

A few notes about today's Webinar

- All lines are muted throughout the webinar.
- Please use the Q&A box to ask questions or make comments.
- Today's Webinar recording and slides will be posted to the PHN website following the presentation. You can find past FOP presentations on our website at https://pediatrichealthnetwork.org/future-of-pediatrics/

Speakers

Bita Arabshahi, MD

Priya Vaidyanathan, MD

No conflicts to disclose:

- No financial or business interest, arrangement or affiliation that could be perceived as a real or apparent conflict of interest in the subject (content) of their presentation.
- No unapproved or investigational use of any drugs, commercial products or devices.

Upcoming FOP Talks!

DATE	TOPIC	SPEAKER
July 29	Allergic Reactions: When to Refer?	Amaziah Coleman, MD Claire Boogaard, MD
	Dermatologic Manifestations of COVID-19	Anna Kirkorian, MD
August 12	Obstructive Sleep Apnea: Primary Care Management and When to Refer	Claire Lawlor, MD
	Neuropsychological Evaluations: What are they, when are they needed and how can I get them for my patients?	Kristina Hardy, PhD Laura Kenealy, PhD
August 26	Meeting Teens Where They Are: the Contraception Discussion	Brooke Bokor, MD, MPH Natasha Ramsey, MD
	School's Out: Supporting School Attendance and Distance Learning Engagement	Asad Bandealy, MD Heidi Schumacher, MD

Managing ADHD, Anxiety and Depression: A PHN ECHO

PHN announces the launch of our inaugural Project ECHO® Behavioral Health collaborative on **September 16th, 2020**. The 6 month project will feature:

- A focus on assessment, treatment and management of ADHD, anxiety and depression led by a team of mental/behavioral health specialists who will provide guidance and mentorship to practicing pediatricians.
- Monthly one-hour sessions that start with a 15 minute didactic session followed by a discussion of a case from a participating primary care provider's practice.
- MOC part 4 and CME credit for participants.

Need more information? Register for one of our upcoming information sessions on Thursday, July 23 at 12pm or Monday August 4 at 12:30pm.

Register online at
https://pediatrichealthnetwork.org/project-echo-information-sessions/

Practice Recovery Resources

PHN is offering peer collaboration events focused around practice recovery. Currently, we are planning to offer support for the next **6-12 months** on an as needed basis. This plan may be customized to each practice's needs and may include:

- Clearly defining your practice goals and how you will track success
- Sustaining and/or improving telehealth services
- Identifying possible revenue generating opportunities
- Identifying needs for ongoing Infection control measures
- Scheduling management
- Additional resources as needed

If interested, please email phn@childrensnational.org with specific areas of recovery that are of interest to your practice.

Management of Abnormal Thyroid Labs in the Primary Care Setting

Priya Vaidyanathan, MD
Associate Professor of Pediatrics
Director of Endocrine services
Children's National Hospital

Pediatric Specialists of Virginia

Children's National INOVA

FUTURE OF PEDIATRICS

Background

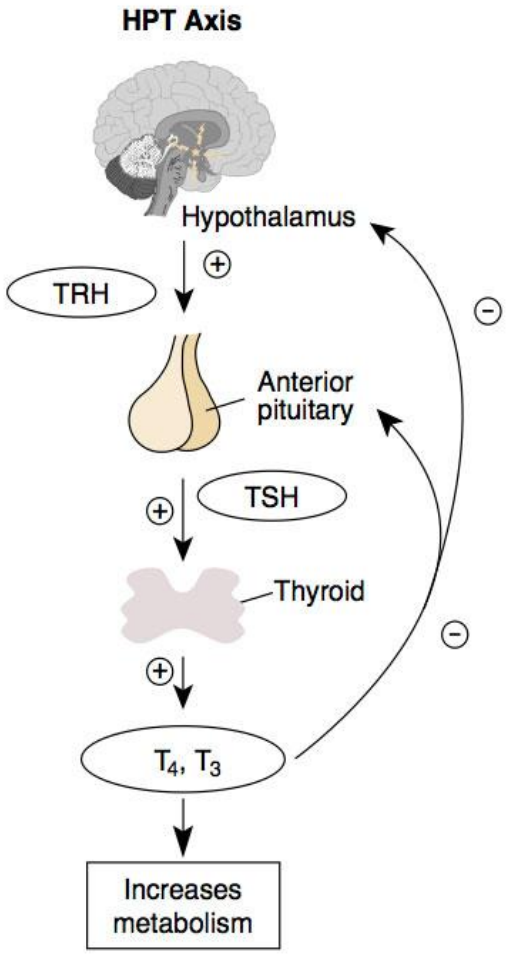
- Thyroid function tests are commonly ordered in primary care offices. Majority of tests are normal.
- Abnormal thyroid tests are a substantial cause of referral to endocrine clinics, majority of those not treated.
- The following approach will increase the yield of testing and empower pediatricians to interpret abnormal labs in order to determine which patients need referral to endocrine clinics.
  - Screening high risk patient groups
  - Testing based on clinical signs and symptoms
  - Ordering appropriate tests
  - Interpreting abnormal tests
  - Refer to endocrinology based on the degree of abnormality.

Learning Objectives

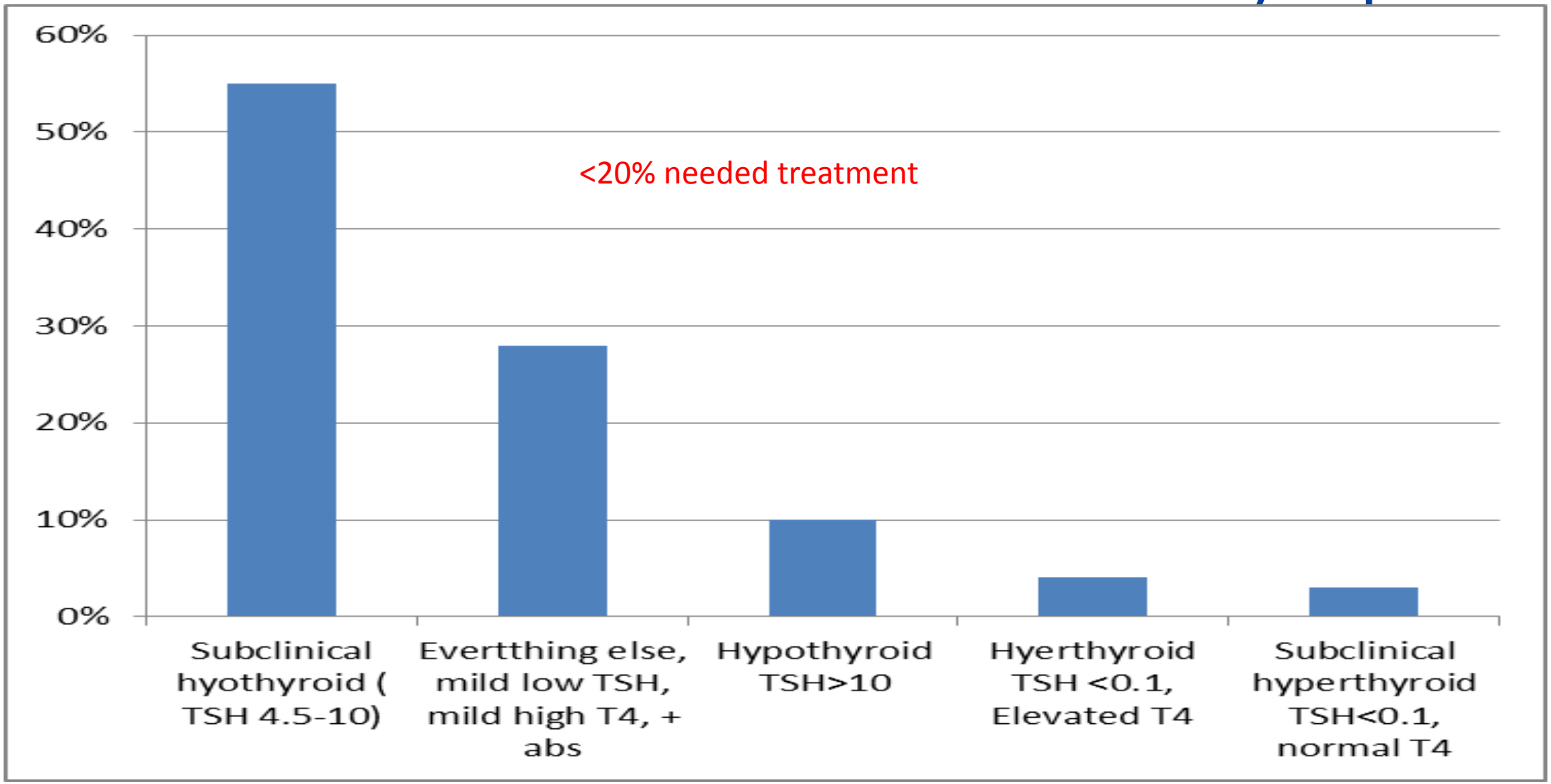
- Describe hypothalamic-pituitary axis
- Describe commonly used terms of thyroid dysfunction
- Review when to order thyroid tests and what to order
- Review interpretation and management of abnormal thyroid tests
- Provide a framework for endocrine referral

The hypothalamic-pituitary-thyroid (HPT) axis and commonly used terms

Condition	TSH (nl: 4.4-4.5)	Free T4
Primary Hypothyroidism	>10	Low
Subclinical Hypothyroidism	4.5-10	Normal
Central Hypothyroidism	Normal or low	Low
Hyperthyroidism	<0.1 (suppressed)	High
Subclinical Hyperthyroidism	<0.1 (suppressed)	Normal



Distribution of thyroid abnormality amongst 1000 consecutive faxes sent to our endocrine division from PCP office over a 2 year period

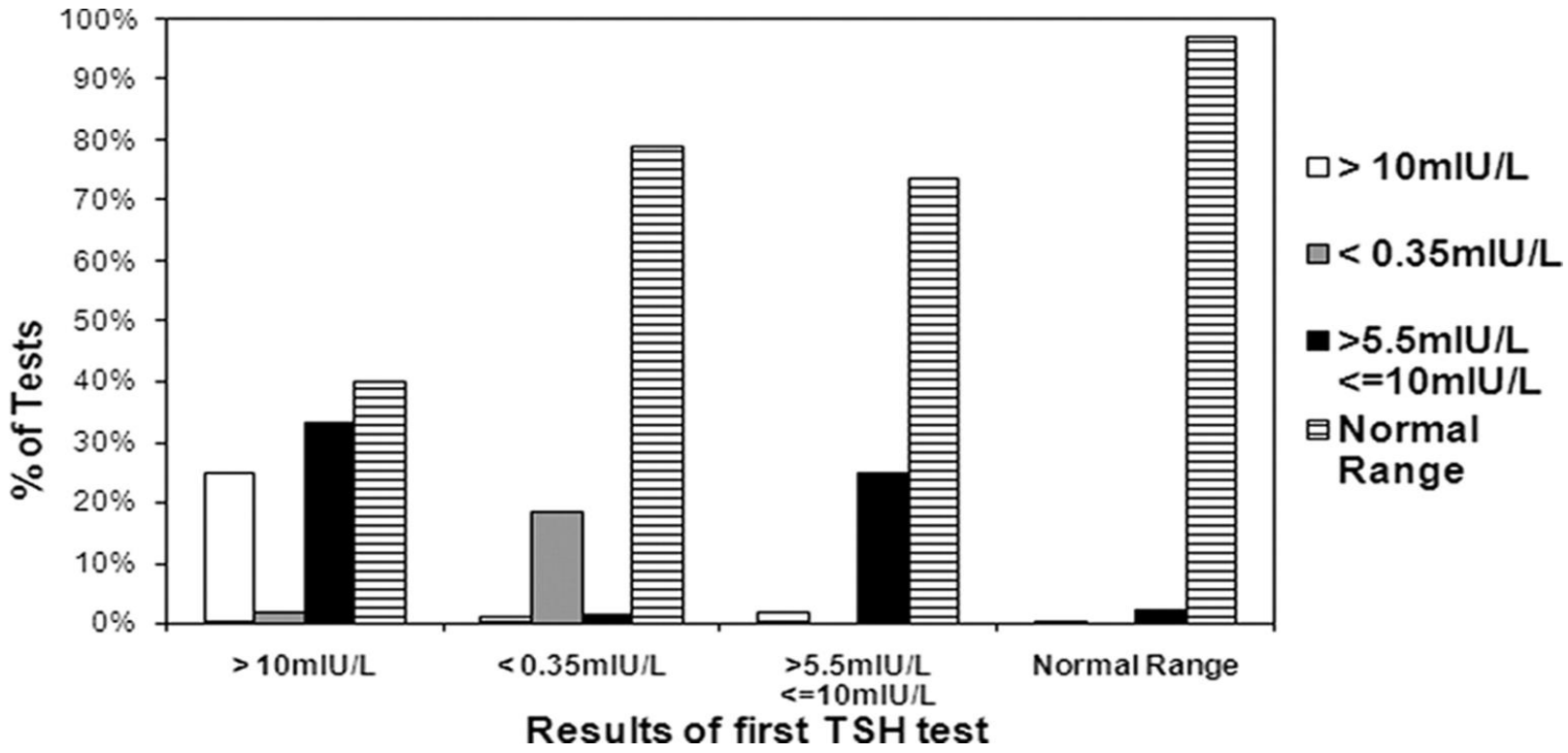


Kaplowitz, PAS 2013

Natural History of Thyroid Function Tests over 5 Yrs in a Large Pediatric Cohort

- 121,052 children from over a million (0.5–16 years) (11.6% of this cohort) had TSH done multiple times from 2002-2007.
- 1st test: **2.9% TSH 5.5-10**
- 2nd test: **73% TSH 5.5-10 normalized**

Distribution of TSH results in the second test according to the category of the first TSH



J Clin Endocrinol Metab, Volume 94, Issue 5, 1 May 2009, Pages 1678–1682, https://doi.org/10.1210/jc.2008-2615

Management of subclinical hypothyroidism (TSH 4.5-10)

- Repeat TSH, Free T_4 and TPO antibody in 6 months.
- No adverse effect on growth, BMI or cognitive function

- A subsets of patients likely to show persistent increase or progress;
  - Enlarged thyroid
  - Positive thyroid antibodies (autoimmunity)
  - Down syndrome, Turner syndrome
  - FH of thyroid disease
  - TSH>7.5

Refer to endocrine clinic if there is thyroid enlargement, positive antibody or persistent TSH elevation

Ewa Małecka-Tendera;, Thyroid Research 2013
Kaplowitz; IJPE 2010

Case Study

14 year old F with BMI 35.5, irregular periods who upon work up has a TSH of 5.8 (nl; 0.5-4.5). free T4 normal at 1.4 (n:< 0.9-1.6). What next?

Lab findings of obese children /non obese controls

Thyroid hormonal status among children with obesity; Robabeh Ghergherehchi; Ther Adv Endocrinol Metab. 2015 Apr

	Children with obesity (190)	Controls (133)	P value
BMI Z score	4.38+/-1.8	-0.33+/-0.97	<0.001
TSH	3.4+/-1.96	2.63+/-1.52	<0.01

- 14% of obese children in this study had SCH

Impact of weight loss and TSH normalization

Thyroid function derangement and childhood obesity: an Italian experience, BMC Endocr Disord. 2010;

	Decrease in BMI>0.5 SD	Decrease in BMI 0.2-0.5 SD	No weight loss
Baseline TSH	5.1+/- 1	5.2+/-0.9	5.27+/-1.3
6 months TSH	3.6+/-1.1	4.6+/-2.6	4.6+/-2.8
P value	0.001	0.3	0.4

When to order thyroid rests? Know the risk factors

- Newborns have a 1:200-4000 risk for congenital hypothyroidism, Order newborn screen and follow recommendations closely

- Down Syndrome: 4-18% risk for thyroid disorder
  - Screen in newborn, 6 months, 12 months and yearly

- Turner Syndrome: every 1-2 yrs, >4 yrs of age
- Autoimmune disorders : Type 1 diabetes, celiac disease
- Family history of thyroid disease is a risk factor, but there is no recommendation for routine screening
- Drugs: Lithium, Amiodarone, Tyrosine Kinase inhibitors, Depakote
- Head and neck radiation

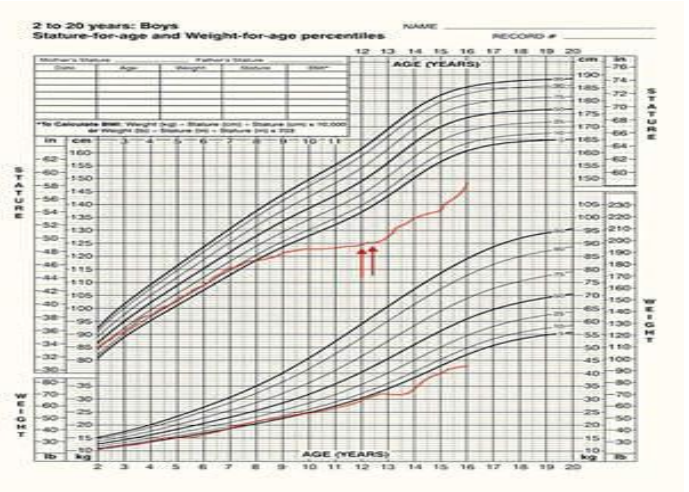
Health supervision for children with Down Syndrome, Pediatrics 201

Health supervision for children with Turner Syndrome, Pediatrics 2003

Know the signs and symptoms of thyroid disease

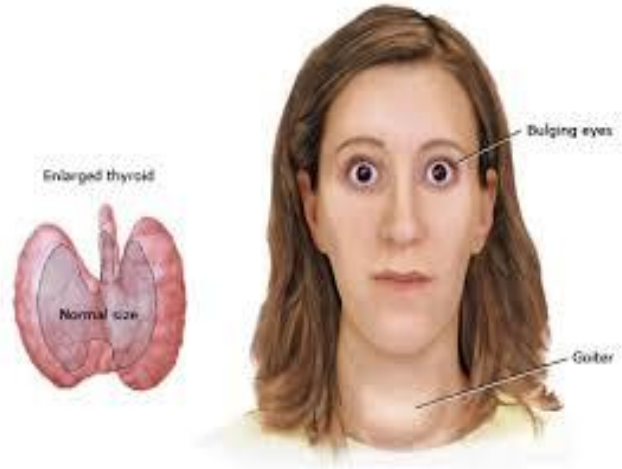
Suspect hypothyroidism

- Height deceleration and good weight gain
- Short stature
- Fatigue, constipation, cold intolerance
- Delayed puberty, irregular periods
- Thyroid enlargement



Suspect hyperthyroidism

- Unexplained weight loss
- Thyroid enlargement
- Exophthalmos
- Tachycardia, hypertension, tremor
- Diarrhea, heat intolerance
- Hyperactive, impaired school performance



What test to order?

TSH

- Good initial screening test
- Limitation: cannot detect central hypothyroidism (rare)

Free T_4

- Good screening test with TSH
- There are 2 assays commercially available
  - Immunoassay- (false low possible)
  - Equilibrium dialysis/Direct gold standard

Thyroid peroxidase antibody (TPO)

- Check only in the presence of goiter or hypothyroidism
- Prevalence of 1-5% in pediatric population
- Only a small minority develop hypothyroidism

Free T_3/total T_3/T_3 uptake, thyroglobulin

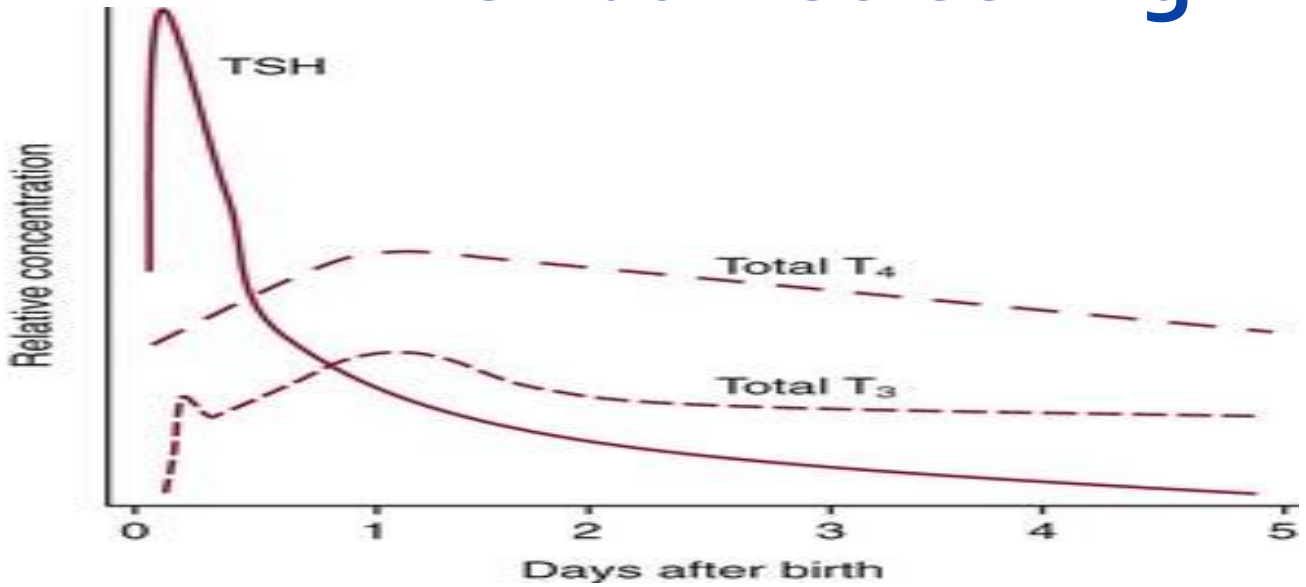
- Do not order as part of screening labs
- Do not order thyroid panels

Case study

You get a call from the newborn screening program that a term baby has a critical newborn screen; T4 = 6 mcg/dl and TSH elevated = 250. What is the next step?

- Page endocrine doctor on call and fax newborn screen report
- Send Confirmatory TSH and Free T4
- Rapid initiation of L-thyroxine 10-15 mcg/kg/day (expedited appointment or we will help you start treatment if on a holiday)
- Good neurodevelopmental outcome if treated by 3 weeks of age

Newborn screening



- Collect 24-48 hours after birth
- DC and VA: Both TSH and T_4 are screened
- MD: T_4 screen. Lower 10% T_4 get TSH tested. Repeat 10-14 days

Case Study

5 day old newborn M with a TSH 4 (normal) and a low T4 of 3 (n; >6.5). What's next?

- Repeat newborn screen
- Send TSH and Free T4 (Equilibrium dialysis)

Free T4 is low, suspect central hypothyroidism and immediately refer to endocrinology

Free T4 normal (XL Thyroid binding globulin deficiency, no harm (TBG is the carrier protein for T4 and T3. Total T4 low but Free T4 will be normal)

Case Study

15 year old F with congenital hypothyroidism on a stable dose of 100 mcg of L-thyroxine for years. On routine follow up TSH came back low at 0.11 and Free T_4 high at 1.9 and dose reduced to 88 mcg/day. Mom called 3 months later worried that the test is still abnormal and that the child was not feeling well. PCP had done labs and her TSH was low again at 0.1 and Free T_4 again high at 1.9 ng/dl. What next?

Biotin Treatment Mimicking Graves' Disease (2016)

- 6 children with mega dose of Biotin for mitochondrial disease had suppressed TSH, elevated Free T_4 and T_3, resolved after stopping Biotin

Case Study

Evaluation of a symmetrically enlarged thyroid gland (goiter)

- Send TSH, Free T_4, TPO antibody and if abnormal refer and if normal follow

Evaluation for suspected thyroid nodule

- US thyroid and TSH
- If there is a thyroid nodule refer to endocrinology (THYNC program, 202-476-2121 and fax report to 202-476-4095)

Review Lab Interpretation

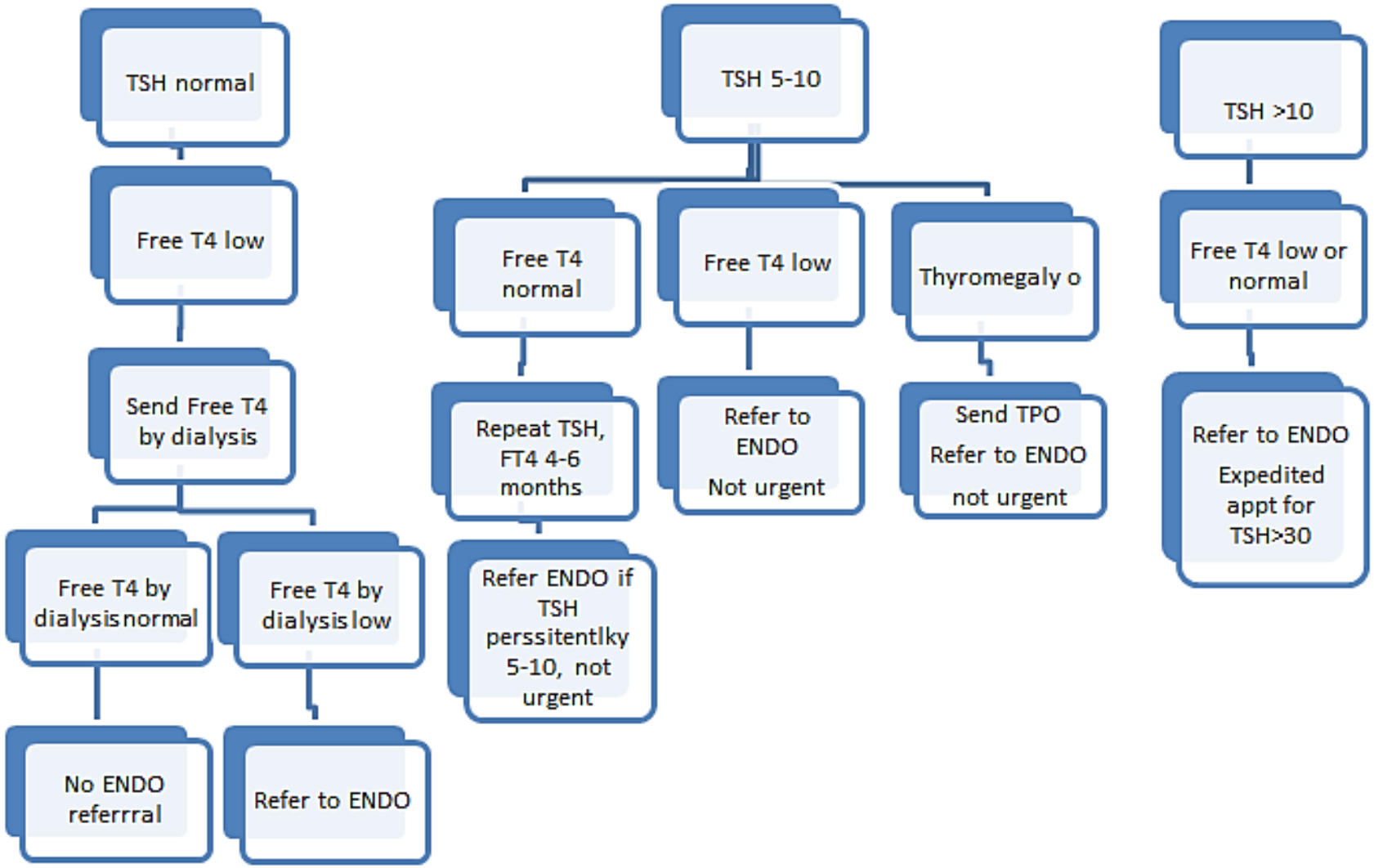
TSH (.5-4.5 mcunit/ml	T4 (4.6-10.4 mcg/dl)	Free T4 (0.9 – 1.6 ng/dl)	Interpretation/follow up
74		0.8	Primary Hypothyroidism (autoimmune) Refer to endocrinology
<0.01		4.2	Hyperthyroidism, refer to Endocrinology
<0.01		1.2	Subclinical Hyperthyroidism, Refer to endocrine
2.5	12.5	1.2	Patient on OC Pills, increases TBG
0.45		1.5	Mild low TSH, Not worrisome
2.1		1.65	Mild high FT4, same holds for mild T3 inc, Not worrisome
2.1		1.2	Euthyroid and Positive thyroid antibodies, TSH in 6 months

Summary

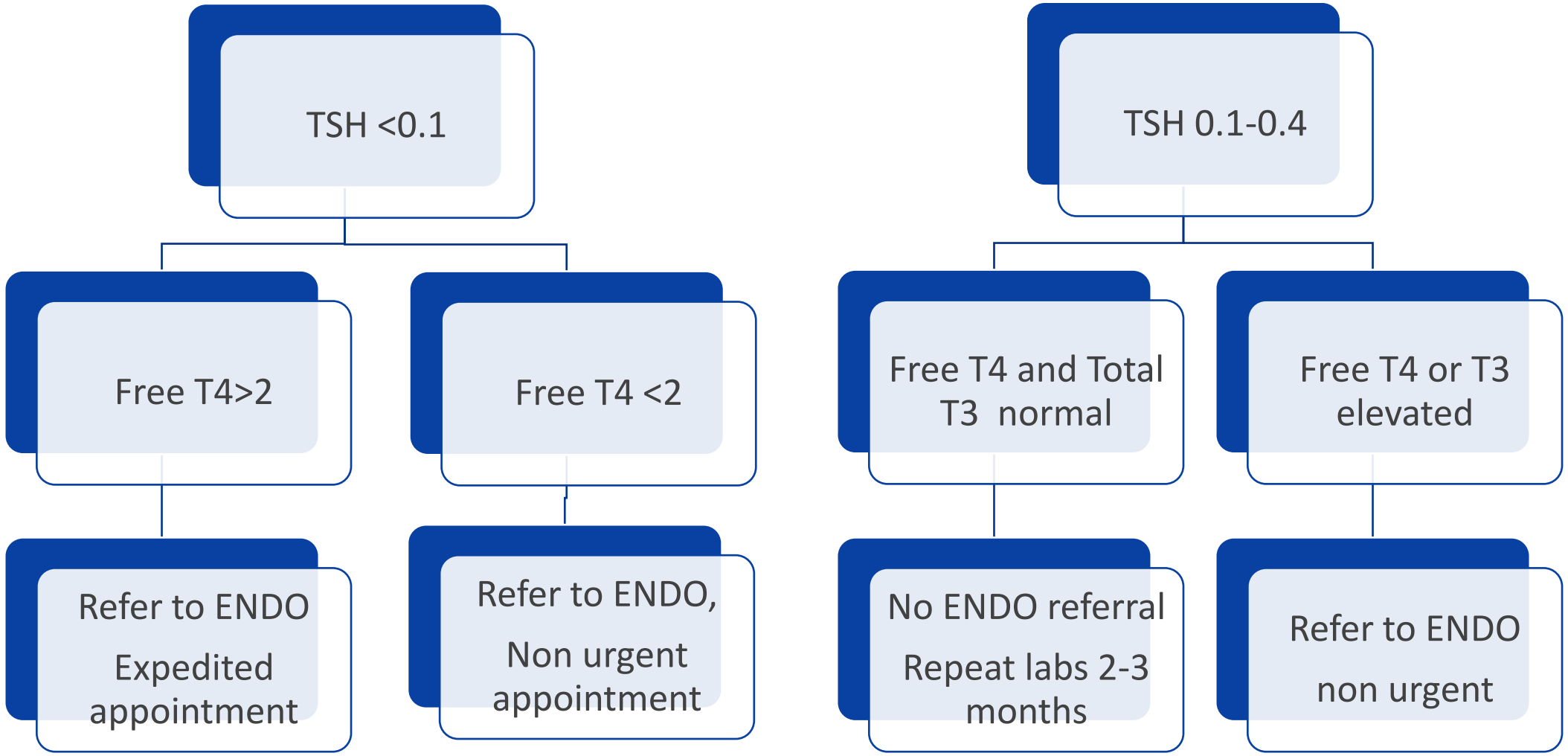
We have developed flow charts for management of thyroid abnormalities

Flow charts and guidelines for endocrine referral will be posted on the website for convenience of the primary care provider.

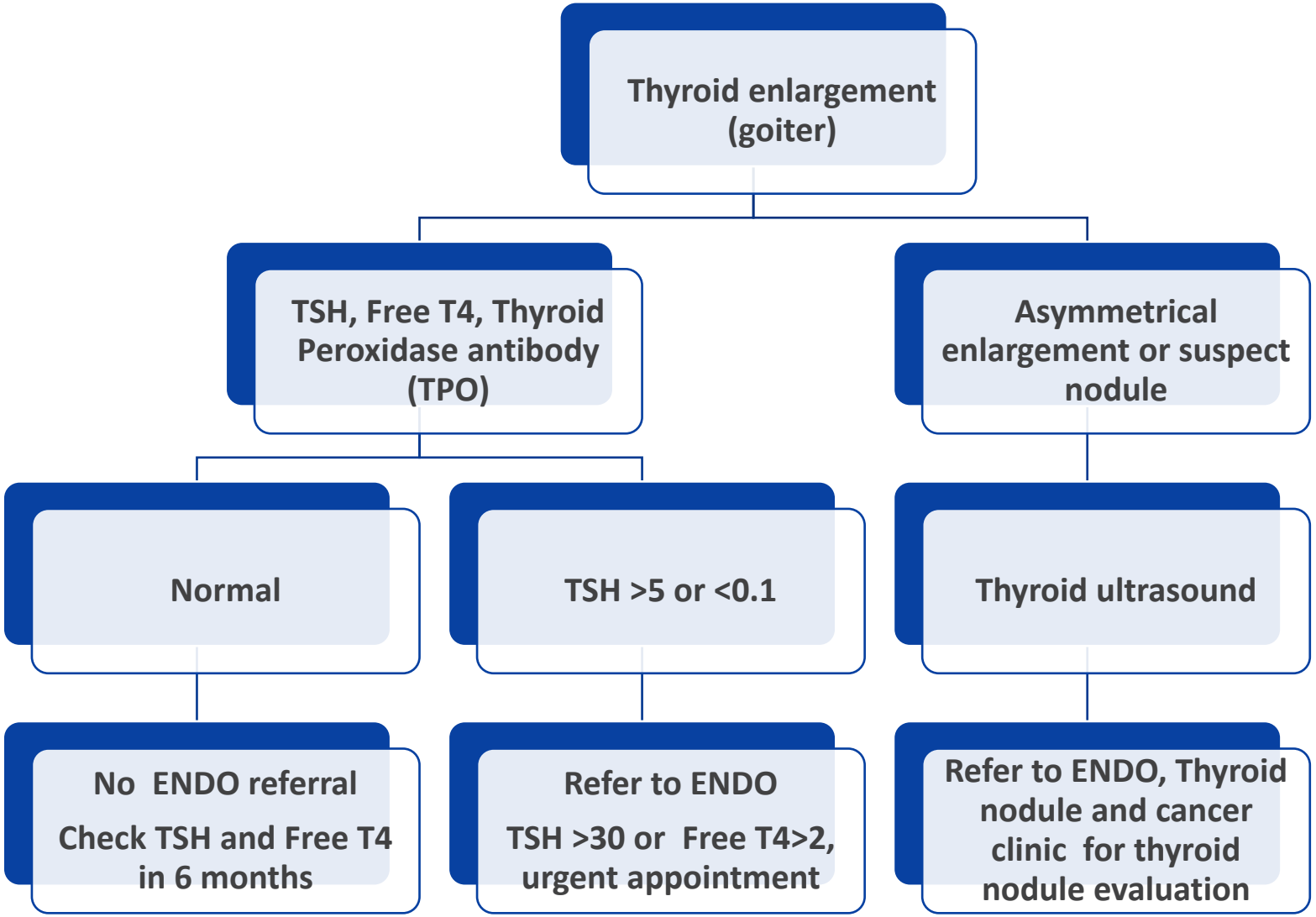
Elevated TSH Flow Chart



Hyperthyroid Flow Chart



Thyroid Enlargement / Thyroid Nodule Flow Chart



Process for ENDO appointment for abnormal thyroid labs

1. FAX lab results to 202-476-4095 with contact information for the family. Our office will contact family to set up the appointment.
2. If expedited appointment is required beyond our triage flow chart, do not hesitate to contact our on call doctor at 202-476-2121
2. Page on call for congenital hypothyroidism, symptomatic hyperthyroidism who need immediate help or any concerns that you feel need immediate attention.
3. For significant isolated Free T_4 elevation with normal TSH, repeat labs. If persistent, refer.

Process for ENDO appointment for abnormal thyroid labs

- T_3 and Free T_3 are not helpful in evaluation of hypothyroidism and are not good screening tests
- If there is thyroid enlargement send TPO (Thyroid peroxidase) antibody along with TSH and Free T_4
- Free T_4 by dialysis is a specific order for Free T_4 analysis by the lab

Process for ENDO appointment for thyroid enlargement or nodule

1. FAX lab /sonogram results to 202-476-4095 with contact information for the family
2. Our office will contact family to set up the appointment
3. If expedited appointment is required beyond our triage flow chart, do not hesitate to contact our on call doctor at 202-476-2121
4. All patients with thyroid nodule evaluation will be given expedited appointment in the Thyroid nodule and cancer clinic. CD of the thyroid ultrasound must be provided at the time of evaluation. For all inquiries regarding the thyroid nodule and cancer program, email endocrineteam@childrensnational.org or call 202-476-2121