

# Updates in the Evaluation and Treatment of Children and Adolescents with Obesity



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FAMILY PHYSICIANS

FEBRUARY 16-18

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Annual Update 2024

February 16, 2024 Hilo, Hawaii



# Conflicts of Interest

I have no conflicts of interest to disclose.



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# Learning Objectives



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# Learning Objectives



1. Discuss the epidemiology and impact of obesity in children and adolescents
2. Explain the diagnosis of, measurement of, risk factors for, and comorbidities associated with obesity in children and adolescents
3. Implement guideline based treatment modalities for children and adolescents



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# Presentation Overview



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# Presentation Overview

- Epidemiology and Impact
- Diagnosis and Management
- Risk Factors
- Evaluation of the Overweight/Obese Pediatric Patient
- Comorbidities
- Treatment



CLINICAL PRACTICE GUIDELINE Guidance for the Clinician in Rendering Pediatric Care

American Academy  
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

## Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity

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# Epidemiology and Impact



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# Epidemiology and Impact



- **Definitions**
  - Overweight - 85-95th percentile for age/sex
  - Obesity -  $\geq$ 95th percentile for age/sex
  - Severe Obesity -  $\geq$ 120th percentile for age/sex







# Epidemiology and Impact



- The “Not Great” Data
  - Obesity rate has ~ **TRIPLED** since 1963, **5 -> 19%**, in 2017
  - Predictive Epi model based on this 2017 data. . .
    - **57% of CURRENT 2-19 year olds will be obese by the time they are 35 years old**
  - The pandemic period was associated with a **DOUBLING** of the rate of BMI increase vs. the pre -pandemic period



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# Epidemiology and Impact



- Risk Factors
  - Lower level parental education (OR 1.78, CI 1.2-2.62)
  - Lower family income level
  - Less access to healthier food options
  - Less access to safe and affordable physical activities
  - Higher incidence of adverse childhood experiences (ACE)
    - 2+ ACEs = OR 1.21, CI 1.0-1.44
  - Non-Hispanic white < other ethnic groups / minorities
  - Children and Youth with Special Health Care Needs
    - Pooled OR 1.80





# Epidemiology and Impact



- The Impact
  - Elevated BMI levels in childhood/adolescence are predictive of a high adult BMI
  - Increased short and long term adverse health outcomes
    - Hypertension, Hyperlipidemia, Insulin Resistance, Type 2 Diabetes Mellitus, NonAlcoholic Fatty Liver Disease
  - A model predicts that a cohort of 10 year olds with lifelong obesity will cost **9.4 - 14 billion for healthcare**



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# Diagnosis and Measurement



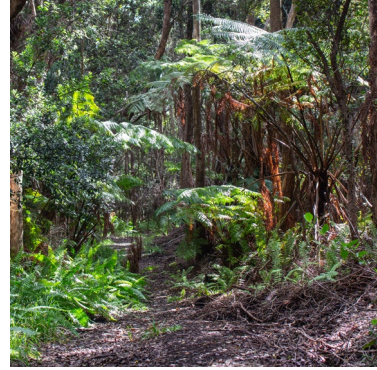
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# Diagnosis and Measurement

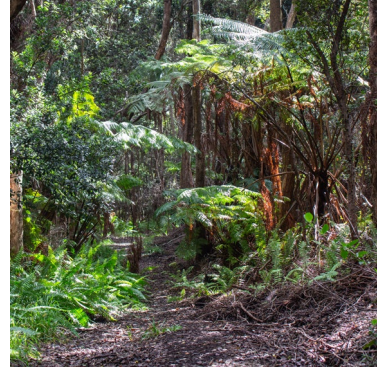


**KAS 1. Providers should measure height and wt, calculate BMI, and assess BMI percentile using age - and sex-specific CDC growth charts or growth charts for children with severe obesity at least annually for all children 2 to 18 y of age to screen for overweight (BMI  $\geq$  85th percentile to  $<$ 95th percentile), obesity (BMI  $\geq$  95th percentile), and severe obesity (BMI  $\geq$  120% of the 95th percentile for age and sex).**





# Diagnosis and Management



- BMI has numerous limitations - **it's still recommended**
- CDC Growth Charts are based on data from 1990s - 1960s during “healthier growth patterns”
  - *They do NOT equate to current population distribution of BMI*
- CDC and AAP recommend **WHO weight -for-length** , age-, and sex-specific charts in children until age 2





# Tips for Communicating Weight Status to Parents/Children



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# Tips for Communicating Weight Status to Parents/Children

1. Ask permission
2. Avoid labeling
  - a. Child with obesity versus obese child
3. Use neutral terms
  - a. Unhealthy weight, gaining too much weight **VERSUS**
  - b. Obese, morbidly obese, chubby







# Risk Factors



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# Risk Factors

- Policy Factors
  - Marketing of unhealthy foods
  - Under resourced communities
  - Socioeconomic status
  - Children in Families that have immigrated
  - Food insecurity



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# Risk Factors



- Neighborhood and Community Environment Influences
  - School environment
  - Lack of fresh food access
  - Presence of fast food restaurants
  - Access to safe physical activity
  - Environmental health



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# Risk Factors

- Family and Home Environment Factors
  - Parenting feeding styles
  - Family home environment organization
  - Sugar sweetened beverages
  - Portion sizes
  - Snacking behavior
  - Dining out and family meals
  - Screen time



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# Risk Factors

- Family and Home Environment Factors
  - Sedentary behavior
  - Sleep duration
  - Environmental smoke exposure
  - Psychological factors
  - Adverse childhood experiences



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# Risk Factors

- Individual Level Influences or Contributors
  - Genetic factors
  - Epigenetic factors
    - Prenatal, parental, postnatal
    - Gestational diabetes
    - Maternal weight gain
    - Maternal smoking
    - Birth weight
    - Breastfeeding

Genetic Syndrome

Monogenetic disorders

MC4R deficiency

Leptin deficiency

Leptin receptor deficiency

POMC deficiency

Proprotein subtilisin or kexin type 1 deficiency

SRC1 deficiency

Syndromic forms of obesity

Prader-Willi syndrome

Alstrom syndrome

Bardet-Biedl syndrome

Smith-Magenis syndrome

SH2B1 deficiency

Sim1 deficiency

16p11.2 microdeletion syndrome

Brain derived neurotrophic factor deficiency

Albright's hereditary osteodystrophy

Cohen syndrome

Beckwith-Wiedemann syndrome



# Risk Factors



- Individual Level Influences or Contributors
  - Early use of antibiotics
  - Endocrine disorders
  - Special health care needs impacting nutrition/activity
    - Developmental & physical disabilities
    - Autism Spectrum Disorder
    - Untreated ADHD, weight promoting appetite traits
    - Medication ASE





# Evaluation of the Overweight/Obese Pediatric Patient



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## Evaluation of the Overweight/Obese Pediatric Patient

**KAS 2. Providers should evaluate children 2 to 18y of age with overweight and obesity for obesity related comorbidities by using a comprehensive patient history, mental and behavioral health screening, SDoH evaluation, physical examination, and diagnostic studies.**



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**TABLE 4** Special Considerations in the Review of Systems for the Patient With Overweight or Obesity

System	Symptom	Possible Obesity-Related Causes
General	Poor or slowed linear growth velocity	Endocrinologic contributor (eg, hypothyroidism, Cushing syndrome)
	Hyperphagia from early childhood, developmental delay, obesity onset under age 5 y, or syndromic features	Various genetic etiologies (see Table 2, genetic syndromes associated with obesity)
Respiratory	Shortness of breath	Obesity-related asthma phenotype, deconditioning
Gastrointestinal	Snoring, apnea, disordered sleep	Obstructive sleep apnea (OSA)
	Asymptomatic vague abdominal pain	NAFLD, NASH
	Heartburn, dysphagia, chest pain, regurgitation	Gastroesophageal reflux disease
	Abdominal pain, enuresis, encopresis, anorexia	Constipation
	Right upper quadrant pain	Gall bladder disease
Endocrine	Hyperphagia	Prader-Willi, other genetic causes
	Polyuria, polydipsia	Diabetes mellitus (DM) type 1 or 2
GYN	Oligomenorrhea, dysfunctional uterine bleeding	Polycystic ovarian syndrome
Orthopedic	Hip, thigh, or groin pain, painful or uneven gait	Slipped capital femoral epiphysis (SCFE)
	Knee pain	SCFE, Blount disease
	Foot pain	Increased weight bearing
	Back pain	Increased weight
	Proximal muscle wasting	Cushing syndrome
Mental health	Sadness, depression, anhedonia, body dissatisfaction, school avoidance, poor self-image	Depression or anxiety, bullying, sexual, physical, or emotional abuse
	Impulsive eating, distractibility, hyperactivity	ADHD
	Purging, restricting intake, binge-eating, night eating	Disordered eating or eating disorders
Urinary	Flat affect	Depression or anxiety
	Nocturia, enuresis	DM, OSA
Dermatologic	Rash	Intertrigo
	Darkened skin on flexural surfaces	Acanthosis nigricans
	Pustules, abscesses	Hidradenitis suppurativa
	Hirsutism in females	PCOS
	Flesh-colored striae	Rapid weight gain
	Purplish striae	Cushing syndrome
	Skin fold irritation	Candida
	Neurologic	Morning headaches
Daytime sleepiness		OSA
Persistent headache		Idiopathic intracranial hypertension (IIH)

Adapted from Krebs et al.<sup>14</sup>



# Evaluation of the Overweight/Obese Pediatric Patient

- Social Determinants of Health Screening
  - Safe Environment for Every Kid (SEEK) model (\$\$)
  - Accountable Health Communities Health-Related Social Needs Screening Tool (free)





# Evaluation of the Overweight/Obese Pediatric Patient

- Nutrition and Physical Activity History
  - 24-hour food recalls
  - Electronic and written food diaries,
  - Various smartphone applications that track food intake
  - Pedometers and other wearable activity monitors





# Evaluation of the Overweight/Obese Pediatric Patient

- Behavioral Health Screening
  - PHQ/GAD
  - Bullying
  - Eating disorders





# Comorbidities



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# Comorbidities



KAS 3. In children 10 y and older, primary care providers should evaluate for lipid abnormalities, abnormal glucose metabolism, and abnormal liver function in children and adolescents with obesity and for lipid abnormalities in children and adolescents with overweight.

3.1 - check for NAFLD and DM2 in those with above criteria



# Dyslipidemia



KAS 5. Primary care providers should evaluate for dyslipidemia by obtaining a fasting lipid panel in children 10 y and older with overweight and obesity and may evaluate for dyslipidemia in children 2 through 9 y of age with obesity.



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# Diabetes



**KAS 6. Primary care providers should evaluate for prediabetes and/or diabetes mellitus with fasting plasma glucose, 2-h plasma glucose after 75 -g oral glucose tolerance test (OGTT), or glycosylated hemoglobin (HbA1c).**



# Diabetes



**TABLE 10** Criteria for Diagnosing Prediabetes and T2DM<sup>90</sup>

	Prediabetes or Impaired Glucose Tolerance	Diabetes Mellitus <sup>a</sup>
Fasting plasma glucose (FBG) <sup>b</sup>	100–125 mg/dL	≥126 mg/dL
2-h plasma glucose (OGTT) <sup>c</sup>	140–199 mg/dL	≥200 mg/dL
Random plasma glucose (RBG) <sup>d</sup>	Not applicable	≥200 mg/dL
HbA1c <sup>e</sup>	5.7% to 6.4%	≥6.5%

<sup>a</sup> In the absence of unequivocal hyperglycemia, diagnosis is confirmed if 2 different tests are above threshold or a single test is above threshold on 2 separate occasions.

<sup>b</sup> Fasting for at least 8 h with no calorie intake.

<sup>c</sup> Oral glucose tolerance test (OGTT) using a load 1.75 g/kg of body weight of glucose with a maximum of 75 g.

<sup>d</sup> In patients with hyperglycemic crises or classic symptoms of hyperglycemia (eg, polyuria, polydipsia).

<sup>e</sup> Glycosylated hemoglobin (HbA1c) is the preferred test for monitoring prediabetes.<sup>478</sup>



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**TABLE 12** BP Categories by Age and Number of Visits Needed for Diagnosis

BP Category	Children 1–13 Years of Age	Children $\geq$ 13 Years of Age	Number of Visits to Diagnosis
Normal	BP < 90th percentile	BP <120/80 mm Hg	NA
Elevated	BP $\geq$ 90th percentile to <95th percentile	120/<80 to 129/<80 mm Hg	3
Stage 1	BP $\geq$ 95th percentile to <95th percentile + 12 mmHg	130/80 to 139/89 mm Hg	3
Stage 2	BP $\geq$ 95th percentile + 12 mm Hg	$\geq$ 140/90 mm Hg	2

Used with permission and adapted from the AAP HTN CPG,<sup>87</sup> Fig 2, and AAP Pediatric Obesity Clinical Decision Support Chart.<sup>494</sup> NA, not applicable.

## Other Comorbidities

- NAFLD - ALT measurement
  - ALT level  $\geq$ 80 IU/L had a sensitivity of 57% and a specificity of 71% for NASH in 10yos with overweight/obese
- HTN - percentile calculation!
  - Age 1-13 versus Age 13+



# Other Comorbidities



- OSA - sleep study versus pediatric ENT evaluation
- PCOS - adolescent specific criteria!
  - (1) evidence of clinical or biochemical hyperandrogenism,
  - (2) persistent irregular menstrual cycles (<20 days or >45 days) 2 years after menarche
  - No imaging recommended



# Other Comorbidities



- Depression - PHQ starting at age 12
- Idiopathic Intracranial Hypertension
- Orthopedic comorbidities
  - **Slipped Capital Femoral Epiphysis**
    - Weakening of the proximal femoral physis (growth plate) causes a slip the physis, with a corresponding displacement of the epiphysis (femoral head).
  - **Blount Disease**
    - Asymmetric tibia vara, tibial torsion, and procurvatum



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# Treatment



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# Treatment

KAS 4. Primary care providers should treat children and adolescents for overweight or obesity and comorbidities concurrently.



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# Lifestyle Programs



- Lifestyle management should be the primary management of related comorbidities
  - Interventions that meet the intensity “dose threshold” 25 hours or more over 2 to 12 months
- In adults, studies have shown that having the diagnosis of obesity on a problem list was independently predictive of at least a 5% weight loss!





# Lifestyle Programs



- In adults, obesity -related comorbidities have been shown to motivate patients to work on weight loss
- Youth with a known diagnosis of prediabetes had a greater decline in A1c per year than obese/overweight youth without a known diagnosis



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# Facilitators for Successful Health Behavior Lifestyle Treatment

## Longitudinal



Because obesity is a chronic disease with escalating effects over time, a life course approach to identification and treatment should begin as early as possible and continue longitudinally through childhood, adolescence, and young adulthood, with transition into adult care.

## Interaction



Allowing the family to have a safe space to understand and process the complexity of obesity and its chronicity takes tact, empathy, and humility. But, achieving this goal enables the patient and family to gain the knowledge and understanding needed under the guidance of a trusted and well-trained advocate - such as the pediatric clinician.

## Family Based



In all effective studies, the parent or the family unit was included in the treatment.

## Medical Home



The child's medical home should serve as a care coordinator in the treatment of children with obesity, coordinating with subspecialists, including obesity treatment specialists, and community resources

## Increased Frequency



Greater contact hours lead to greater treatment effect. The most consistently effective treatments deliver 26 or more hours of face-to-face, family-based, multi-component treatment over a 3-to-12-month period.

## Aligned Expectations



Clinicians are encouraged to help to set reasonable expectations for these outcomes among families, as there is a significant heterogeneity to treatment response. One factor in early attrition may be mismatched expectations for treatment outcomes.

## Prompt



There is no evidence to support either watchful waiting or unnecessary delay of appropriate treatment for children who have already developed obesity.

## Intensity



Health care providers in primary care settings should deliver the best available intensive treatment to all children with overweight and obesity.

## Empathic, Non-stigmatizing Care



Ongoing successful communication of support and empathy during obesity treatment is essential to reduce the effect of weight bias because families will not continue to seek help if they experience stigma.

## Motivational Interviewing



Prospective studies specifically examining motivational interviewing have demonstrated that the approach has positive effect on weight status, compared with controls.

## Self - Management



Effective obesity treatment helps patients and families develop self-management strategies that are critical for chronic disease management.

## Engagement and Participation



Limiting factors to comprehensive multi-component pediatric obesity treatment effectiveness are a lack of engagement or participation by families and high attrition rates.

# Lifestyle Programs



- In adults, obesity -related comorbidities have been shown to motivate patients to work on weight loss
- Youth with a known diagnosis of prediabetes had a greater decline in A1c per year than obese/overweight youth without a known diagnosis



# Treatment

- Obesity is a chronic condition
- Motivational interviewing
- Behavior Strategies
  - Reduce intake of sugary sweetened beverages
  - Choose My Plate (USDA)
  - 60 minutes of moderate to vigorous activity
  - Reduction in sedentary behavior
    - 1 hour of “screen time” for ages-~~2~~ years old
    - “Parent Monitored Media Plan” for older children



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# Treatment

- **Behavior Strategies**
  - AVOID breakfast skipping
  - Traffic Light Diet
  - 5 2 1 0
  - Use of screenbased physical activity (exergames)
  - Appropriate amount of sleep for age
    - Shorter sleep duration is associated with increase weight



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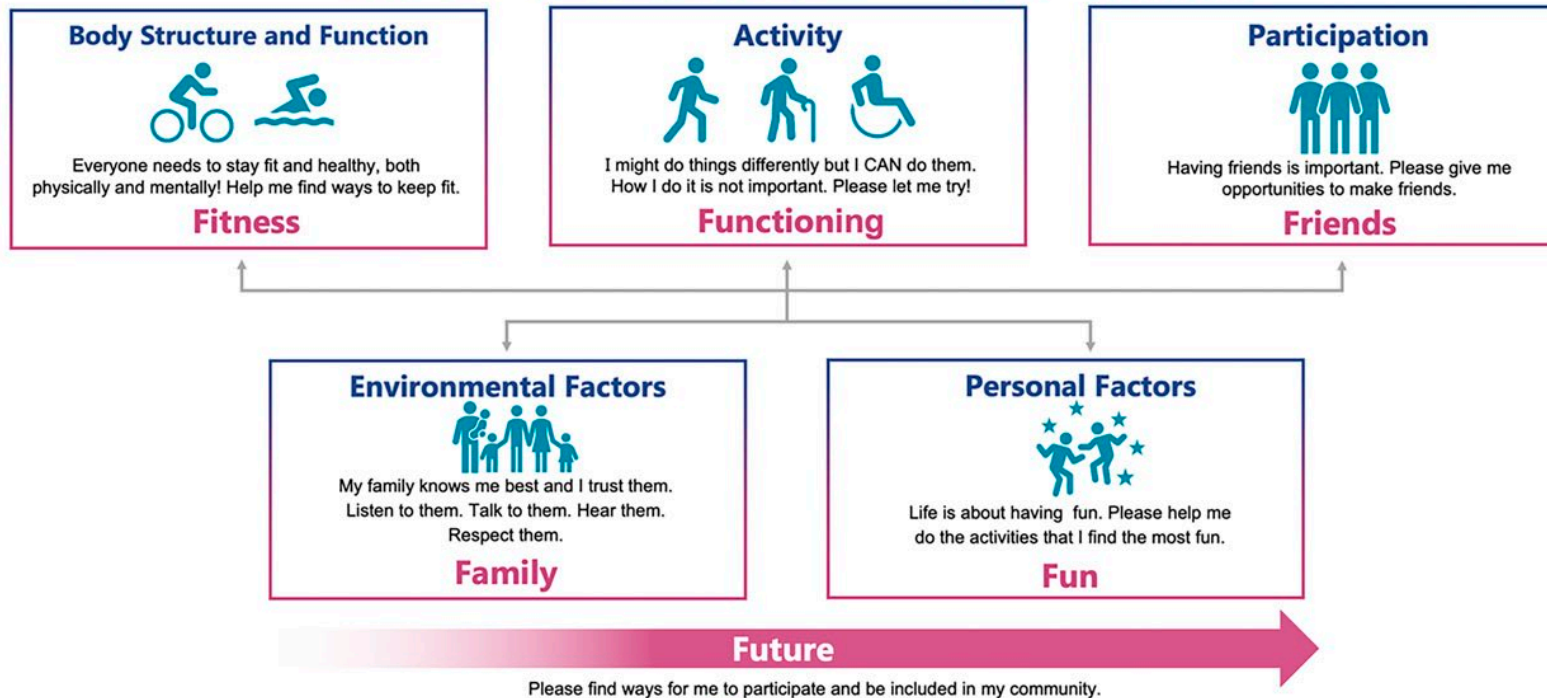
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# Treatment

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## The ICF Framework and the F-Words



For more information visit the F-words Knowledge Hub: [www.canchild.ca/f-words](http://www.canchild.ca/f-words)



- 1) World Health Organization. (2001) *International Classification of Functioning, Disability and Health (ICF)*
- 2) Rosenbaum P & Gorter JW. (2012). The 'F-words' in childhood disability: I swear this is how we should think! *Child Care Health Dev*; 38.



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**\*\*ALL OF THESE ARE SMALL STUDIES\*\***



What you've all been waiting for. . .

# PHARMACOTHERAPY



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# Treatment

- KAS 12. Primary care providers should offer adolescents 12 y and older with obesity weight loss pharmacotherapy, according to medication indications, risks, and benefits, as an adjunct to health behavior and lifestyle treatment.



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# Treatment - METFORMIN

- NOT approved as a weight loss medication by the FDA
- Used as an anti-diabetic medication in children 10 years and older
- Adolescents taking metformin reduced BMI by approximately 1 kg/m<sup>2</sup>
- BMI reduction of approximately 1 kg/m<sup>2</sup> at a dose of 1000mg PO BID x 6 months
  - NO additional BMI reduction was found after 6 months
- “Given the modest and inconsistent effectiveness, metformin may be considered as an adjunct to intensive health behavior and lifestyle treatment and when other indications for use of metformin are present.”



# Treatment - ORLISTAT

- FDA approved for children 12 years and older at a dose of 120 mg TID for long term use



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# Treatment – GLP-1 RECEPTOR AGONISTS

- **Exenatide** - BMI reduction of 0.9 -1.18 U in children as young as 8 years old
  - FDA approved for children 10-17 years old with DM2
- **Liraglutide** – BMI reduction of 5% BMI reduction (4.5kg body weight) in one year
  - FDA approved for long term treatment of obesity (w/ or w/o DM2) in children 12 years and older



# Treatment – MC4R AGONISTS ( Setmelanotide )

- FDA approved for patients 6 years and older with (confirmed with genetic testing)
  - Proopiomelanocortin (POMC) deficiency
  - Proprotein Subtilisin Kexin Type 1 Deficiency
  - Leptin Receptor Deficiency
- Daily dose of 1 -3 mg/daily SubQ results in 12 -25% weight loss over one year
- “MC4 receptors in the brain regulate hunger, satiety, and energy expenditure.”



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## Treatment – PHENTERMINE / TOPIRAMATE

- Phentermine
  - FDA approved for short course therapy (3 months) for 16+ year old adolescents
- Topiramate
  - FDA approved for children 2 years and older with epilepsy and for headache
  - FDA approved for headache prevention in children 12 years and older
- Combination Medication
  - Study of 1217 year old children with mean age 14yo and mean BMI 37.8 BMI percent change at 56 weeks of 10.44 (high dose)



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# Treatment - Surgery



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# Treatment - Surgery



KAS 13. Pediatricians and other PHCPs should offer referral for adolescents 13 y and older with severe obesity (BMI > 35) for evaluation for metabolic and bariatric surgery to local or regional comprehensive multidisciplinary pediatric metabolic and bariatric surgery centers.



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# Treatment - Surgery

- **DIFFICULT to find centers which perform pediatric/adolescent bariatric surgery**
  - DIFFICULT due to referral system + continuity of care needed by specialized center



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**THAT WAS A LOT!**

**Here are some key takeaways. . .**



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# Key Takeaways



- FDA approval on medications for pediatric and adolescent obesity are lacking
  - Metformin – not great long term data<sup>Ⓢ</sup>
  - Orlistat – 12yo+ but are the side effects worth it?
  - *Coming soon? GLP Agonists? MC4R agonists?*
- This chronic condition requires a team based approach ( *don't most patient conditions?* )
  - Patient + Parents + Public Health / SDOH / Society + Us (FM Physicians)
  - Dieticians? Psychologists? Therapists?
  - Lifestyle programs are implementable but require support!



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# Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity

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## References

See 801 references in the clinic practice guideline for more information!





# Questions & Comments?

Thanks for attending our HAFP Conference in person and on Zoom in Hilo!



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