

Screening, Diagnosis, and Management of Child & Adolescent Obesity

Rationale & Scope

According to the Centers for Disease Control, nearly 20% of children and adolescents have obesity which amounts to about 14.7 million humans aged 2-19 years. Obesity is a chronic medical condition that is associated with serious health and social consequences if not treated. It has long been stigmatized as a reversible consequence of personal choices but has, in reality, complex genetic, physiologic, socioeconomic, and environmental contributors¹

The scope of this guideline is to detail recommendations for screening, testing, diagnosis, and management of obesity in children and adolescents to improve patient care outcomes and minimize long-term consequences. This CPG is intended to be used for patients that do not require subspecialty care (i.e. endocrinology, nephrology, etc.) and/or as a resource until referral is appropriate. This guideline is an adoption of the 2023 American Academy of Pediatrics Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents with Obesity and has been modified in consideration to local resources.

Evaluation, Management, and Treatment of Children and Adolescents with Overweight or Obesity

Summary of Key Management Statements

- Obesity is a complex, chronic medical condition with multifactorial etiologies and multilevel contributors. Early diagnosis of obesity with identification of obesity-related comorbidities is recommended and likely reduces morbidity and mortality.
- Stigma, bias and structural inequalities are barriers to obesity management. Understanding these barriers and using appropriate tools to address, such as person first, patient-centered language, are essential.
- Screen all patients 2 years and older in the outpatient primary care setting annually for overweight and obesity and appropriately document diagnosis.
- Screen patients with overweight or obesity for obesity-related comorbidities including hypertension, dyslipidemia, prediabetes/diabetes, metabolic dysfunction-associated steatotic liver disease (MASLD) in addition to neuromuscular, sleep, and mental health disorders.
- Treat and/or refer patients accordingly for management of obesity-related comorbidities or underlying causes.
- Non-pharmacologic interventions such as nutrition, physical activity, and sleep modification are the foundations of healthy behavior and lifestyle treatment and should be prescribed by all clinicians. Behavioral interventions including motivational interviewing and SMART goal setting can assist patients with lifestyle modification.
- Anti-obesity medications and bariatric surgery should be considered for all pediatric patients who qualify.

Inclusion and Exclusion Criteria

- The target audience for this guideline is physicians, advanced practice providers, nurses, dietitians, therapists, and clinical pharmacists involved in obesity management in non-specialty clinics.
- This guideline does not include management for chronic organic, genetic or syndromic obesity or underlying metabolic illnesses that contribute to obesity; however, this document may be used as a resource.

INCLUSION CRITERIA

- a. Child and adolescent patients aged 2-18 years

EXCLUSION CRITERIA

- a. Children < 2 years old

Definitions and Body Mass Index (BMI) Classifications

- Body Mass Index (BMI): a measure used to screen for excess body adiposity. A child's BMI category is determined using an age- and sex-specific percentile for BMI.
- Obesity: a chronic disease of excess adiposity that results in altered anatomy, physiology, and metabolism – all of which adversely affect the physical and mental health trajectory of children and adolescents.

Child BMI	Category
BMI \geq 85 th percentile to < 95% percentile	Overweight
BMI \geq 95 th percentile to < 120% percentile or BMI 30 kg/m ² to 35 kg/m ² (whichever is lower based on age and sex)	Obesity (Class 1)
BMP \geq 120% to < 140% of the 95 th percentile for age and sex OR BMI \geq 35 kg/m ² to <40 kg/m ² (whichever is lower based on age and sex)	Severe obesity (Class 2)
BMI \geq 140% of the 95 th percentile) or BMI \geq 40 kg/m ² (whichever is lower based on age and sex)	Severe obesity (Class 3)

Structural Inequities and Disparities that Contribute to Childhood Obesity

In regards to children with obesity, health care disparity only defines the difference between groups and does not account for the inequities that causes differences among the populations. This distinction is important as obesity risk factors are embedded in the socioecological and environmental fabric of children's lives. Inequalities in poverty, unemployment, and home ownership attributable to structural racism have been linked to increased obesity rates.²

It is dangerous to stigmatize children with obesity and their families on the basis of race and ethnicity, and gender based on the disparity of the healthcare outcome. Racism experienced in everyday life has also been associated with increased obesity prevalence. Youth with overweight and obesity have been found to be at increased risk not only for weight-based harassment but also for sexual harassment and harassment based on race and ethnicity, socioeconomic status (SES), and gender.

Studies have shown that non-Hispanic Black children (22.7%), Mexican American youth 6-11 years of age (28.2%) , American Indian (18.5%), and Alaska Native (29.7%) children and adolescents have a higher prevalence of obesity compared with non-Hispanic white children (15.5%). Social Determinants of Health likely play a role in this increased prevalence.

Multilevel Influencers and Contributors to Childhood Obesity

- The following list is adapted from the AAP Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents with Obesity and is not exhaustive. It reflects the individual, environmental, community, and policy factors that commonly contribute to childhood obesity.

Individual	<ul style="list-style-type: none"> • Genetic and epigenetic factors • Parental risk (obesity, maternal weight gain, gestational diabetes, and maternal smoking) • Postnatal risk (birth weight, early breastfeeding cessation and formula feeding, rapid weight gain during infancy and early childhood, and early use of antibiotics) • Underlying medical and mental health conditions and developmental delays (Ex: endocrine disorders, children with autism spectrum disorder, use of weight-promoting medications)
Family and Home Environment	<ul style="list-style-type: none"> • Dietary factors (sugar-sweetened beverages, portion sizes, snacking behavior, parenting feeding style, dining out and family meals) • Activity (screen time, sedentary behavior) • Sleep habits • Psychosocial stress and adverse childhood experiences

Neighborhood and Community	<ul style="list-style-type: none"> • School environment • Lack of fresh food access • Fast food proximity • Access to safe physical activity • Environmental health
Policy	<ul style="list-style-type: none"> • Marketing of unhealthy foods • Under resourced communities • Food insecurity

Screening and Identification of Obesity
<ul style="list-style-type: none"> • Pediatricians and other Pediatric Health Care Providers (PHCPs) should measure height and weight, 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, obesity, and severe obesity.¹ • Pediatricians and other PHCPs should evaluate children 2 to 18 y of age with overweight (BMI ≥85th percentile to <95th percentile) and obesity (BMI ≥95th percentile) for obesity-related comorbidities by using a comprehensive patient history, mental and behavioral health screening, SDoH evaluation, physical examination, and diagnostic studies.¹

Screening and Evaluation for Overweight and Obesity Related Comorbidities
<ul style="list-style-type: none"> • Obesity puts children and adolescents at risk for serious short- and long-term adverse health outcomes later in life, such as, HTN; dyslipidemia; insulin resistance; T2DM; and metabolic dysfunction-associated liver disease (MASLD), as well as sleep, neuromuscular, or mental health disorders. • See the table below for guidance on screening for obesity-related co-morbidities.

Table 1: Screening for Overweight and Obesity-related Co-Morbidities			
Co-morbidity	Screening Test	Screening Recommendations	If normal, recommended repeat frequency
Hypertension	Blood Pressure	Obtain blood pressure at every ambulatory visit (using proper technique)	Repeat every visit
Dyslipidemia	Non-fasting/Fasting Lipid Panel <i>(fasting lipid panel ideal but non-fasting may be more feasible and suitable for initial screening test 2-11 yr old)</i>	Perform laboratory fasting or non-fasting lipid panel testing for children 2-9 years old with obesity (BMI > 95 th percentile) Perform laboratory fasting or non-fasting lipid panel testing once between 9-11 yr old Perform laboratory <i>ideally</i> fasting blood testing once between 17-21 yr old. If impractical to obtain fasting panel, obtain non-fasting lipid profile + serum triglycerides + direct LDL	Repeat every 2 years; consider annually if either of the following are present: <ul style="list-style-type: none"> • Family history of early CVD (early defined as males < 55 yr old or females < 65 yr old; assess 1st and 2nd degree relatives' history) • BMI increased by ≥ 3-kg/m² since last lipid panel
Dysglycemia	HbA1c	Perform laboratory HbA1c testing in patients with obesity ≥ 10 yrs old Perform laboratory HbA1c testing in patients with overweight ≥ 10 yrs old plus any two of the following risk factors: <ol style="list-style-type: none"> 1) Family history of T2DM in 1st or 2nd degree relative, 2) Native American, African-American, Latino, Asian-American, or Pacific Islander; or 	Repeat every 2 years; consider annually if the following are present: <ul style="list-style-type: none"> • Family history of T2DM in 1st or 2nd degree relative; • Native American, African-American, Latino, Asian-



		3) Signs of insulin resistance or conditions associated with insulin resistance	American, or Pacific Islander; <ul style="list-style-type: none"> Signs of insulin resistance or conditions associated with insulin resistance
Liver Disease	ALT	Perform laboratory ALT testing once in patients with obesity between 9-11 yr old Consider ALT testing for patients with overweight between 9-11 yr old and risk factors (sleep apnea, insulin resistance, central adiposity, and/or family history of MASLD)	Repeat every 2 years; consider annually if any of the following are present: <ul style="list-style-type: none"> Sleep apnea, Insulin resistance, Central adiposity, or Family history of MASLD
Sleep	History	Annual assessment of sleep health habits and sleep related disorder symptoms: insufficient sleep, insomnia, circadian sleep wake problems, snoring and/or noisy breathing, daytime consequences (somnolence, inattention, behavioral), nocturnal enuresis, nocturnal awakenings and/or morning headaches	Repeat every 1 year
Neuromuscular	History and Physical	Assess for the following common neuromuscular impairments and complications of childhood obesity: <ul style="list-style-type: none"> Increased pain (e.g., musculoskeletal pain, neck/back pain, lower limb pain) Reduced lower limb muscle strength (relative to body mass or during mass-dependent tasks) Impaired balance (e.g., during challenging balance tasks involving a narrowed stance ± vision) Impaired coordination Gait deviation (e.g., increased pelvic/hip/knee motion, prolonged stance phase, wider based gait) Postural malalignment (increased lumbar lordosis, genu valgum, pes planus) Flexibility Reduced motor skill proficiency 	Repeat every 1 year
Mental health	History and applicable screening tools	Screen children and adolescents for depression annually beginning at age 10 using the PHQ-A/PHQ-9 Consider screening children and adolescents for anxiety annually starting at age 8 or based on symptoms and presentation. See <i>Outpatient Screening and Treatment for Pediatric Anxiety Disorders</i> for more information	Repeat every 1 year

Table 2: Management of Abnormal Screening Results for Overweight and Obesity-related Co-morbidities

Co-morbidity	Result Interpretation & Management of Abnormal Result			
Hypertension		1 to <13 years	≥ 13 years	All Ages – Management According to Abnormal Blood Pressure Measurements
	Normal	< 90 th percentile	Systolic: < 120 mmHg Diastolic: <80mmHg	<ul style="list-style-type: none"> Repeat annually
	Elevated	90-94 percentile OR Systolic: 120-129 mmHg Diastolic: <80mmHg (whichever is lower)	Systolic: 120-129 mmHg Diastolic: <80mmHg	<ul style="list-style-type: none"> Provide lifestyle counseling with initial elevated measurement; allow for 3-6 months of lifestyle modification Repeat in 6 months, if second measurement elevated, check upper and lower limb extremity BP Repeat in 6 months, if third measurement elevated, refer to nephrology for evaluation
	Stage 1 HTN	95 percentile to 95 percentile + 11 mmHg OR Systolic: 130-139 mmHg Diastolic: 80-89 mmHg (whichever is lower)	Systolic: 130-139 mmHg Diastolic: 80-89 mmHg	<ul style="list-style-type: none"> Provide lifestyle counseling with initial elevated measurement Repeat in 1-2 weeks, if second measurement elevated, check upper and lower limb extremity BP Repeat within 3 months, if third measurement elevated, refer to nephrology for evaluation
	Stage 2 HTN	≥ 95 percentile + 12 mmHg OR Systolic: ≥140 mmHg Diastolic: ≥ 90 mmHg (whichever is lower)	Systolic: ≥140 mmHg Diastolic: ≥90 mmHg	<ul style="list-style-type: none"> If initial measurement elevated, repeat in 1 week and check upper and lower limb extremity BP If second measurement elevated, refer to nephrology within 1 week If the patient is symptomatic or BP > 30 mmHg above the 95th percentile (or > 180/120 mmHg in an adolescent), refer to the Emergency Department.
<p>In general, refer patients to nephrology for any of the following:</p> <ul style="list-style-type: none"> 3 elevated blood pressure readings on 3 separate occasions based the grid above Concern for secondary hypertension Stage II hypertension Persistent hypertension after 3-6 months of lifestyle modifications <p>NOTE: Consider cardiology referral in addition to nephrology if strong family history of CV disease or having CV symptoms</p>				

Hyperlipidemia	<p>Recommendations for Repeat Testing for Abnormal Non-Fasting Testing:</p> <p>If non-fasting lipid panel screen is abnormal, with either non-HDL \geq 145 OR HDL $<$ 40: THEN needs follow-up lipid assessment.</p> <ul style="list-style-type: none"> Ideally, obtain follow-up as fasting lipid panel. If impractical to follow-up with fasting panel, then obtain: non-fasting lipid profile + serum triglycerides + direct LDL cholesterol. <table border="1" data-bbox="302 447 1135 957"> <thead> <tr> <th>Category</th> <th>Acceptable mg/dL (mmol/L)</th> <th>Borderline mg/dL (mmol/L)</th> <th>Abnormal mg/dL (mmol/L)</th> </tr> </thead> <tbody> <tr> <td>TC</td> <td>$<$ 170 (4.4)</td> <td>170-199 (4.4-5.2)</td> <td>\geq 200 (5.2)</td> </tr> <tr> <td>LDL-C</td> <td>$<$ 110 (2.8)</td> <td>110-129 (2.8-3.3)</td> <td>\geq 130 (3.4)</td> </tr> <tr> <td>Non-HDL-C</td> <td>$<$ 120 (3.1)</td> <td>120-144 (3.1-3.7)</td> <td>\geq 145 (3.8)</td> </tr> <tr> <td>HDL</td> <td>45-79</td> <td>30-44</td> <td>$<$ 30 or $>$80</td> </tr> <tr> <td>TG</td> <td></td> <td></td> <td></td> </tr> <tr> <td>0-9 years</td> <td>$<$ 75 (0.8)</td> <td>75-99 (0.8-1.1)</td> <td>\geq 100 (1.1)</td> </tr> <tr> <td>10-19 years</td> <td>$<$ 90 (1mmol/L)</td> <td>90-129 (1-1.5)</td> <td>\geq 130 (1.5)</td> </tr> </tbody> </table> <p><i>Local modification of Daniels SR, Benuck I, Christakis DA, et al. Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents.</i></p>			Category	Acceptable mg/dL (mmol/L)	Borderline mg/dL (mmol/L)	Abnormal mg/dL (mmol/L)	TC	$<$ 170 (4.4)	170-199 (4.4-5.2)	\geq 200 (5.2)	LDL-C	$<$ 110 (2.8)	110-129 (2.8-3.3)	\geq 130 (3.4)	Non-HDL-C	$<$ 120 (3.1)	120-144 (3.1-3.7)	\geq 145 (3.8)	HDL	45-79	30-44	$<$ 30 or $>$ 80	TG				0-9 years	$<$ 75 (0.8)	75-99 (0.8-1.1)	\geq 100 (1.1)	10-19 years	$<$ 90 (1mmol/L)	90-129 (1-1.5)	\geq 130 (1.5)	<p>Refer to Endocrinology for Specialty Lipid Clinic for:</p> <ul style="list-style-type: none"> Fasting LDL: $>$160 mg/dL Fasting TG: $>$400 mg/dL or TG 200-399 mg/dL <u>with</u> non-HDL \geq 145 mg/dL Persistent ($>$12 months) Fasting TG: 200-399 mg/dL Fasting or non-fasting panel: Non-HDL $>$ 190 Any HDL $<$ 30 or $>$ 80 <p>All patients with borderline or high lipid results should receive information on lifestyle changes.</p> <p>Consider referral to Endocrinology for Specialty - Lipid Clinic if any value in abnormal range, no improvement in 6-12 months or for high-risk patients.</p>
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				Upon referral order to GI, order with liver ultrasound with doppler
	Abnormal; Elevated (>2x UNL)	>52 U/L	>44/L	Recheck in 2-3 months; add "Elevated ALT" to problem list, and prescribe healthy weight lifestyle modifications. If persistently elevated on repeat test (>2x UNL), place referral to GI and order liver ultrasound with doppler
	Abnormal, elevated with "red flag" result	≥80 U/L	≥80 U/L	Refer to GI for additional testing; order liver ultrasound with doppler
Sleep Disorders	<p>Assess for the presence of sleep disordered breathing: snoring and/or noisy breathing, daytime consequences (somnolence, inattention, behavioral), nocturnal enuresis, nocturnal awakenings and/or morning headaches</p> <p>Assess for insufficient sleep, insomnia and/or circadian rhythm abnormalities</p> <p>For educational material for all patients, consider resources developed by pediatric sleep medicine (e.g. handout on sufficient sleep and healthy sleep habits)</p>			<ul style="list-style-type: none"> • If concern for obstructive sleep apnea (OSA), refer directly to sleep lab for sleep testing. Most children will need in lab PSG testing. In limited cases (older teen, able to learn and wear a portable device), home sleep apnea testing can be considered <i>Note: Home testing is not covered by most Medicaid plans/caresource etc.</i> • For educational material, consider resources developed by pediatric sleep medicine (e.g. handout on sufficient sleep and healthy sleep habits) • For behavioral modification of insomnia/circadian rhythm, consider referral to sleep behavior REF180 • For complex sleep disturbance, consider sleep medicine referral REF160
Neuromuscular	<p>If history and/or physical exam reveals limitations that prevent patient from increasing or achieving physical activity goals (i.e. pain, impaired balance and coordination, or limping), evaluate and make appropriate referrals</p>			<ul style="list-style-type: none"> • Refer to physical therapy, sports medicine, physiatry, or orthopedics based on extent of neuromuscular limitation and diagnosis
Mental Health	<p>If mental health screenings result in abnormal results, follow usual follow-up assessments</p>			<ul style="list-style-type: none"> • See Depression and/or Anxiety guideline

Management and Treatment Recommendations
<ul style="list-style-type: none"> • Treat overweight (BMI ≥85th percentile to <95th percentile) and obesity (BMI ≥95th percentile) in children and adolescents, following the principles of the medical home and the chronic care model, using a family-centered and non-stigmatizing approach that acknowledges obesity's biologic, social, and structural drivers. • Language is important; use non-stigmatizing language and preferred terms to avoid evoking strong, negative responses. <ul style="list-style-type: none"> ○ Use person-first language (ie. "patient with obesity" instead of "obese patient") to emphasize the condition/disease or disorder is only one part of the patient, not their whole identity. • Ask permission to discuss weight. it is reasonable to discuss lifestyle modification (nutrition, activity, sleep) without directly discussing weight if that approach makes the patient/family feel more comfortable. • Use motivational interviewing (MI) to engage patients and families in treating. It is reasonable to discuss lifestyle modification (nutrition, activity, sleep) without directly discussing weight if that approach makes the patient/family feel more comfortable.



- See **Motivational Interviewing** section below.
- **Intensive Health Behavior and Lifestyle Treatment (IHLBT)** is a safe and proven approach to treating children and adolescents with overweight or obesity. The goal is to lower medical risks primarily through overall good health, quality of life, and self-esteem while promoting respect for bodies of all shapes.
 - **The most effective IHLBT programs incorporate 26 or more hours of contact time over 3-12 months.**
 - If a formal IHLBT program is not available, **health behavior and lifestyle treatment is more effective with greater contact hours.**
 - See **Foundation of Health Behavior and Lifestyle Treatment** section below.
 - Recommend as many interventions and contact points as the patient and family can tolerate and are able to do.
 - Contact hours may include appointments and assessments related to mental health, physical therapy, social work, nutrition, group activities/visits, weight checks, as well as telehealth or face-to-face time with physicians, nurses, or dietitians.
- Use the **Management of Abnormal Screening Results for Obesity-related Co-morbidities** table for guidance. In general,
 - **Hypertension:** provide lifestyle counseling with initial elevated blood pressure measurement, monitor, and refer to nephrology as indicated.
 - **Hyperlipidemia:** All patients with borderline or high lipid results should receive information on lifestyle changes and refer to endocrine for lipid specialty as indicated.
 - **Hyperglycemia:** A1C 5.7-5.9% may be followed clinically. For A1C \geq 6%: Refer to pediatric endocrinology and/or urgent consult based on severity of abnormality.
 - **Liver Disease:** Counsel on lifestyle modifications and refer to GI for persistently elevated ALT, ALT $>$ 2x UNL, or red flag level.
 - **Sleep Disorders:** Provider educational sleep content. If concern for obstructive sleep apnea (OSA), refer directly to sleep lab for sleep testing. For non-OSA sleep related concerns, consider sleep medicine/behavior consult.
 - **Neuromuscular:** Refer to physical therapy, sports medicine, physiatry, or orthopedics based on extent of neuromuscular limitation and diagnosis
 - **Mental Health:** see guidance for anxiety or depression as clinically indicated.
- **Pharmacotherapy.** 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.¹
 - There is no evidence to support the use of weight loss medication alone.
 - Providers may choose to refer prescribing of weight loss medications to pediatric obesity experts.
 - Visit the [Pediatric Endocrine Society Anti-Obesity Medication Guideline](#) for medication protocols inclusive of dosing, contraindications, side effects, monitoring, follow-up, and when to discontinue.
- **Bariatric Surgery.** Bariatric surgery is reserved for patients with Class II or Class III Severe Obesity (BMI \geq 120% of the 95th percentile or BMI \geq 35 kg/m).
 - This option and information should be offered to patients and families. Some health systems in Northeast and Central Ohio offer this surgical procedure.

Motivational Interviewing

- Use motivational interviewing to help patients and their caregivers to select appropriate goals that they feel ready to work towards achieving.
- Motivational Interviewing is evidence based treatment used to engage and empower patients to change
- Core principles of Motivational Interviewing are:
 - Express empathy
 - Roll with resistance
 - Develop discrepancy
 - Support self-efficacy
- Starting the conversation:
 - Always start by first asking for permission
 - Use person first language to avoid labeling (i.e. "patient with obesity" as opposed to "obese patient")
 - Be conscious of word choice



- More favorable: unhealthy weight, gaining too much weight for age, height or health
- Unfavorable: obese, morbid obesity, fat, overweight, chubby

Foundation of Health Behavior and Lifestyle Treatment

- **Nutritional Counseling.** The Big Five Healthy Habits are:
 - Limit sweetened beverages
 - Limit fast food
 - Eat meals as a family
 - Limit media time
 - Habitual physical activity
- **Sleep**
 - Early foundation of healthy sleep habits can be carried into adulthood.
 - A bedtime routine made up of predictable brief steps can help to “cue” the patient that it is time for bed.
 - **Healthy sleep-wake habits** will allow one to initiate and maintain sleep easier.
 - Remain active and expose oneself to bright light during day, and especially morning light
 - Quiet activities prior to sleep to allow one to unwind. This would include reading, with the light behind you and not shining directly into your face, and listening to soft music or relaxation tapes.
 - Regular exercise promotes sleep but avoid strenuous activity just prior to bed
 - Avoid screens and bright lights at least 1 hour prior to bedtime including phone, television, computers and video games.
 - Avoid caffeine
 - Do your sleep routine around the same time every night and aim for the amount of sleep needed for age (8-10 hours for teenagers; 9-11 hours for school aged children; 10-12 hours for preschoolers)
 - The goal of **stimulus control** is to re-establish the bedroom and bed as the place where one sleeps.
 - Only use the bed for sleeping (avoid doing homework, and other “non-sleep” activities in bed)
 - Only go to bed when sleepy or close to being able to fall asleep.
 - If unable to sleep within a 15-20minute period, get out of bed. Perform non-stimulating activities (reading, listening to soft music, doing something “boring” or doing relaxation techniques) and return to bed when drowsy.
 - The goal of **relaxation techniques** is to get the brain in a better position for sleep.
 - **Deep Breathing techniques**
 - Breathe in (using the nose only if possible) slowly for 10 seconds, hold for a few seconds, then release slowly breathing out for 10 seconds
 - The mind may drift which is ok. If it shifts to thoughts which are disturbing, refocus on breathing
 - **Progressive Muscle Relaxation**
 - Contract and relax sequential groups of muscles from your toes to your head. This starts with one body part, such as the toes, then moving up the body. Each muscle gets squeezed then relaxed. This activity can be done when getting out of bed (using stimulus control) and sitting in a chair in the room.
- **Physical Activity**
 - **All patients need at least a total of 60 minutes of activity per day. This can be broken up into segments.**
 - Educate patients that this does not have to be an organized sport. Children should be encouraged to try different physical activities to find one that they find enjoyable. It may take some time for the child to find something that they enjoy doing.
 - **Develop an exercise prescription that the patient can carry into adulthood.** Collaboratively establish an individualized physical activity goal that considers neuromuscular impairments and prolonged sedentary lifestyle. You may need to start slow - *even 5 minutes is a good start that can eventually build up to 60 minutes a day.*



- Determine whether signs and symptoms contraindicate participation in an exercise intervention or whether the design or implementation of the exercise intervention should be modified based on identified red flags.
- Ask about current physical activity frequency and duration and enjoyment of movement
- Assess any gap between current and recommended activity level
- Identify gaps in fundamental movement skills development, confidence, or desire to be active and devise a plan to remedy (eg, motivational interviewing, physical therapy, community program)
- Encourage active transportation (walking, cycling to school and activities), and chores (ex. walking the dog).
- **Gradually increase activity** in ways the child enjoys. Strategies for youth with any degree of physical inactivity include:
 - To achieve goal increase time (minutes) per day and number days per week.
 - To reach the recommended 60 minutes per day, increase activity by 10% per week.
 - Use multiple, smaller time increments in activity that are additive throughout the day.
 - Use realistic and obtainable physical activity goals comparable to the child's own baseline abilities, not normal weight peers.
 - **Encourage fun and socialization.**
 - Incorporate fitness preferences (e.g. dance, yoga, running, hiking, sports)
- The following table outlines age-appropriate recommendations for physical activity and may be a guide when developing an exercise prescription

	Preschool (3-5 y)	Elementary (5-10 y)	Middle School (11-14 y)	Adolescent (15-18 y)
Frequency	Daily	Daily	Daily	Daily
Intensity	Any, including some moderate to vigorous	Moderate to vigorous	Moderate to vigorous	Moderate to vigorous
Minutes per day	At least 180 min/day, at least 60 min are moderate to vigorous	At least 60 min per day	At least 60 min per day	At least 60 min per day

Major References

1. Hampl SE, Hassink SG, Skinner AC, et al. Executive Summary: Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity. *Pediatrics*. 2023;151(2):e2022060641
2. Hampl SE, Hassink SG, Skinner AC, et al. Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity. *Pediatrics*. 2023;151(2):e2022060640
3. Daniels SR, Benuck I, Christakis DA, et al. Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents. Full report, 2011. National Health and Lung and Blood Institute at: http://www.nhlbi.nih.gov/guidelines/cvd_peds/peds_guidelines_full.pdf
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How was this Guideline Developed?

- Primacy care and adolescent medicine providers experienced in the evaluation and management of overweight and obesity developed this guideline. Gastroenterology, endocrinology, nephrology, pulmonary, and sleep medicine clinicians were consulted and participated in consensus based recommendations for management and follow-up of obesity related co-morbidities.
- This guideline is an adoption of the 2023 American Academy of Pediatrics Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents with Obesity. Recommendations were adopted or adapted.
- Local consensus statements (i.e. expert opinion) that are not graded should be interpreted as low-level evidence.

Acronyms and Abbreviations

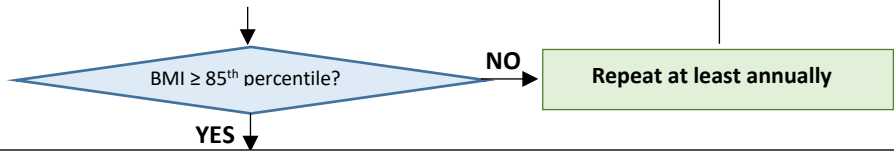
MASLD	Metabolic dysfunction-Associated Steatotic Liver Disease
PSG	Polysomnography
T2DM	Type 2 Diabetes Mellitus

Disclaimer: Practice recommendations are based upon the evidence available at the time the clinical practice guidance was developed. Clinical practice guidelines (including summaries and pathways) do not set out the standard of care and are not intended to be used to dictate a course of care. Each physician/practitioner must use his/her independent judgement in the management of any specific patient and is responsible, in consultation with the patient and/or the patient's family to make the ultimate judgement regarding care. If you have questions about any of the clinical practice guidelines or about the guideline development process please contact the Rainbow Evidence Practice Program at RainbowEBPprogram@uhhospitals.org

Initial Approval October 2024

During outpatient encounter or visit, measure height & weight, calculate BMI, and assess BMI percentile using age-and sex-specific CDC growth charts or severe obesity growth charts for all children 2-18 years.

Exclusion: < 2 years of age



Determine Diagnosis + Add E66.8 or E66.9 Diagnosis Codes to Problem List + Z Code Based on Percentile			
Overweight Add Z Codes: 68.25-68.3 or higher BMI ≥85 th to <95 th percentile	Obesity Add Z Code: 68.54 BMI ≥95 th percentile or BMI ≥ 30 kg/m ²	Class II Severe Obesity: Add Code: Z68.55 BMI ≥120% of the 95 th percentile or BMI ≥ 35 kg/m ²	Class III Severe Obesity Add Z-Code: Z68.56 BMI ≥140% of the 95 th percentile or BMI ≥ 40 kg/m ²

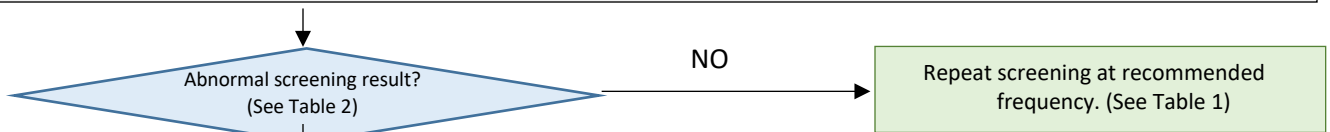
Screen and Evaluate for Overweight and Obesity Related Co-Morbidities (Table 1)

	Overweight		Obesity	
	< 10 yr old	≥ 10 yr old	< 10 yr old	≥ 10 yr old
1. Comprehensive history & physical	✓	✓	✓	✓
2. Perform assigned mental health and behavioral screening	✓	✓	✓	✓
3. Perform SDOH screening & evaluation	✓	✓	✓	✓
4. Obtain blood pressure using proper technique at every visit.	✓	✓	✓	✓
5. Assess for sleep disorder related symptoms	✓	✓	✓	✓
6. Neuromuscular exam	✓	✓	✓	✓
7. Additional diagnostic studies per grid	Lipid panel once b/n 9-11 years old	Lipid panel if not yet done; repeat at age 17	Lipid panel 2-9 yrs old and repeat b/n 9-11 years old	Lipid panel if not yet done; repeat at age 17
	HbA1C if has risk factors* for T2DM	HbA1C	HbA1C if has risk factors* for T2DM	HbA1C
	ALT once b/n 9-11 years old if has risk factors [§] for MASLD	ALT once b/n 9-11 years old if has risk factors [§] for MASLD	ALT once b/n 9-11 years old	ALT once b/n 9-11 years old

Sleep Disorder findings or symptoms: snoring, daytime somnolence, nocturnal enuresis, morning headaches, or inattention

* **T2DM risk factors:** family history of T2DM in 1st or 2nd degree relative, maternal gestational diabetes, signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, or small-for-gestational-age birth weight), obesogenic psychotropic medication.

§ **MASLD risk factors:** Male sex, prediabetes/diabetes, obstructive sleep apnea, dyslipidemia, or sibling with MASLD.



- See Box 2 for Management of Abnormal Screening Results for Obesity-Related Comorbidities
- Place follow-up and referral orders as indicated for presence of co-morbidities that may be managed by Primary Care and/or Pediatric Sub-specialties.

Develop a Comprehensive Treatment Plan using a family-centered and non-stigmatizing approach that acknowledges obesity's biologic, social, and structural drivers

- **Start the conversation** by asking for permission to discuss weight and incorporate motivational interviewing
- **Prescribe health behavior and lifestyle treatment modifications** that take into account the patient/family ability. Set goals together. Follow-up every 1-3 months. **Add Z-codes for nutrition counseling (Z71.3) and exercise counseling (Z71.82)**
- ≥ 12 yrs old with obesity: Consider pharmacotherapy as an adjunct to health behavior and lifestyle modifications. See [Pediatric Endocrine Society Anti-Obesity Medication Guideline](#)
- ≥ 12 yrs old with obesity and management complexity is beyond scope of PCP: Offer referral to Adolescent Medicine for weight management
- ≥ 13 yrs old with Class II Obesity or Class III obesity are candidates for bariatric surgery. Offer referral to Adolescent Medicine to discuss available options if interested

Table 1: Screening and Evaluate for Overweight or Obesity-Related Co-Morbidities			
Co-morbidity	Screening Test	Screening Recommendations	If normal, recommended repeat frequency
Hypertension	Blood Pressure	Obtain blood pressure at every ambulatory visit (using proper technique)	Repeat every visit
Dyslipidemia	Non-fasting/Fasting Lipid Panel <i>(fasting lipid panel ideal but non-fasting may be more feasible and suitable for initial screening test 2-11 yr old)</i>	Perform laboratory fasting or non-fasting lipid panel testing for children 2-9 years old with obesity (BMI > 95 th percentile) Perform laboratory fasting or non-fasting lipid panel testing once between 9-11 yr old Perform laboratory <i>ideally</i> fasting blood testing once between 17-21 yr old. If impractical to obtain fasting panel, obtain non-fasting lipid profile + serum triglycerides + direct LDL	Repeat every 2 years; consider annually if either of the following are present: <ul style="list-style-type: none"> Family history of early CVD (early defined as males < 55 yr old or females < 65 yr old; assess 1st and 2nd degree relatives' history) BMI increased by ≥ 3-kg/m² since last lipid panel
Dysglycemia	HbA1c	Perform laboratory HbA1c testing in patients with obesity ≥ 10 yrs old Perform laboratory HbA1c testing in patients with overweight ≥ 10 yrs old plus any two of the following risk factors: <ol style="list-style-type: none"> Family history of T2DM in 1st or 2nd degree relative, Native American, African-American, Latino, Asian-American, or Pacific Islander; or Signs of insulin resistance or conditions associated with insulin resistance 	Repeat every 2 years; consider annually if the following are present: <ul style="list-style-type: none"> Family history of T2DM in 1st or 2nd degree relative; Native American, African-American, Latino, Asian-American, or Pacific Islander; Signs of insulin resistance or conditions associated with insulin resistance
Liver Disease	ALT	Perform laboratory ALT testing once in patients with obesity between 9-11 yr old Consider ALT testing for patients with overweight between 9-11 yr old and risk factors (sleep apnea, insulin resistance, central adiposity, and/or family history of MASLD)	Repeat every 2 years; consider annually if any of the following are present: <ul style="list-style-type: none"> Sleep apnea, Insulin resistance, Central adiposity, or Family history of MASLD
Sleep	History	Annual assessment of sleep health habits and sleep related disorder symptoms: insufficient sleep, insomnia, circadian sleep wake problems, snoring and/or noisy breathing, daytime consequences (somnolence, inattention, behavioral), nocturnal enuresis, nocturnal awakenings and/or morning headaches	Repeat every 1 year
Neuromuscular	History and Physical	Assess for the following common neuromuscular impairments and complications of childhood obesity: <ul style="list-style-type: none"> Increased pain (e.g., musculoskeletal pain, neck/back pain, lower limb pain) Reduced lower limb muscle strength (relative to body mass or during mass-dependent tasks) Impaired balance (e.g., during challenging balance tasks involving a narrowed stance \pm vision) Impaired coordination 	Repeat every 1 year

		<ul style="list-style-type: none"> • Gait deviation (e.g., increased pelvic/hip/knee motion, prolonged stance phase, wider based gait) • Postural malalignment (increased lumbar lordosis, genu valgum, pes planus) • Flexibility • Reduced motor skill proficiency 	
Mental health	History and applicable screening tools	<p>Screen children and adolescents for depression annually beginning at age 10 using the PHQ-A/PHQ-9</p> <p>Consider screening children and adolescents for anxiety annually starting at age 8 or based on symptoms and presentation. See <i>Outpatient Screening and Treatment for Pediatric Anxiety Disorders</i> for more information</p>	Repeat every 1 year

Table 2: Management of Abnormal Screening Results for Overweight or Obesity Related Co-Morbidities

Co-morbidity	Result Interpretation & Management of Abnormal Result			
Hypertension		1 to <13 years	≥ 13 years	All Ages – Management According to Abnormal Blood Pressure Measurements
	Normal	< 90 th percentile	Systolic: < 120 mmHg Diastolic: <80mmHg	<ul style="list-style-type: none"> • Repeat annually
	Elevated	90-94 percentile OR Systolic: 120-129 mmHg Diastolic: <80mmHg (whichever is lower)	Systolic: 120-129 mmHg Diastolic: <80mmHg	<ul style="list-style-type: none"> • Provide lifestyle counseling with initial elevated measurement; allow for 3-6 months of lifestyle modification • Repeat in 6 months, if second measurement elevated, check upper and lower limb extremity BP • Repeat in 6 months, if third measurement elevated, refer to nephrology for evaluation
	Stage 1 HTN	95 percentile to 95 percentile + 11 mmHg OR Systolic: 130-139 mmHg Diastolic: 80-89 mmHg (whichever is lower)	Systolic: 130-139 mmHg Diastolic: 80-89 mmHg	<ul style="list-style-type: none"> • Provide lifestyle counseling with initial elevated measurement • Repeat in 1-2 weeks, if second measurement elevated, check upper and lower limb extremity BP • Repeat within 3 months, if third measurement elevated, refer to nephrology for evaluation
	Stage 2 HTN	≥ 95 percentile + 12 mmHg OR Systolic: ≥140 mmHg Diastolic: ≥ 90 mmHg (whichever is lower)	Systolic: ≥140 mmHg Diastolic: ≥90 mmHg	<ul style="list-style-type: none"> • If initial measurement elevated, repeat in 1 week and check upper and lower limb extremity BP • If second measurement elevated, refer to nephrology within 1 week • If the patient is symptomatic or BP > 30 mmHg above the 95th percentile (or > 180/120 mmHg in an adolescent), refer to the Emergency Department.
<p>In general, refer patients to nephrology for any of the following:</p> <ul style="list-style-type: none"> • 3 elevated blood pressure readings on 3 separate occasions based the grid above • Concern for secondary hypertension • Stage II hypertension • Persistent hypertension after 3-6 months of lifestyle modifications <p>NOTE: Consider cardiology referral in addition to nephrology if strong family history of CV disease or having CV symptoms</p>				

Hyperlipidemia	Recommendations for Repeat Testing for Abnormal Non-Fasting Testing: If non-fasting lipid panel screen is abnormal, with either non-HDL \geq 145 OR HDL $<$ 40: THEN needs follow-up lipid assessment. <ul style="list-style-type: none"> Ideally, obtain follow-up as fasting lipid panel. If impractical to follow-up with fasting panel, then obtain: non-fasting lipid profile + serum triglycerides + direct LDL cholesterol. 			Refer to Endocrinology for Specialty Lipid Clinic for: <ul style="list-style-type: none"> Fasting LDL: $>$160 mg/dL Fasting TG: $>$400 mg/dL or TG 200-399 mg/dL <u>with</u> non-HDL \geq 145 mg/dL Persistent ($>$12 months) Fasting TG: 200-399 mg/dL Fasting or non-fasting panel: Non-HDL $>$ 190 Any HDL $<$ 30 or $>$ 80 All patients with borderline or high lipid results should receive information on lifestyle changes. Consider referral to Endocrinology for Specialty - Lipid Clinic if any value in abnormal range, no improvement in 6-12 months or for high-risk patients.																														
	<table border="1"> <thead> <tr> <th>Category</th> <th>Acceptable mg/dL (mmol/L)</th> <th>Borderline mg/dL (mmol/L)</th> <th>Abnormal mg/dL (mmol/L)</th> </tr> </thead> <tbody> <tr> <td>TC</td> <td>$<$ 170 (4.4)</td> <td>170-199 (4.4-5.2)</td> <td>\geq 200 (5.2)</td> </tr> <tr> <td>LDL-C</td> <td>$<$ 110 (2.8)</td> <td>110-129 (2.8-3.3)</td> <td>\geq 130 (3.4)</td> </tr> <tr> <td>Non-HDL-C</td> <td>$<$ 120 (3.1)</td> <td>120-144 (3.1-3.7)</td> <td>\geq 145 (3.8)</td> </tr> <tr> <td>HDL</td> <td>45-79</td> <td>30-44</td> <td>$<$ 30 or $>$80</td> </tr> <tr> <td>TG</td> <td></td> <td></td> <td></td> </tr> <tr> <td>0-9 years</td> <td>$<$ 75 (0.8)</td> <td>75-99 (0.8-1.1)</td> <td>\geq 100 (1.1)</td> </tr> <tr> <td>10-19 years</td> <td>$<$ 90 (1mmol/L)</td> <td>90-129 (1-1.5)</td> <td>\geq 130 (1.5)</td> </tr> </tbody> </table> <p><i>Local modification of Daniels SR, Benuck I, Christakis DA, et al. Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents.</i></p>				Category	Acceptable mg/dL (mmol/L)	Borderline mg/dL (mmol/L)	Abnormal mg/dL (mmol/L)	TC	$<$ 170 (4.4)	170-199 (4.4-5.2)	\geq 200 (5.2)	LDL-C	$<$ 110 (2.8)	110-129 (2.8-3.3)	\geq 130 (3.4)	Non-HDL-C	$<$ 120 (3.1)	120-144 (3.1-3.7)	\geq 145 (3.8)	HDL	45-79	30-44	$<$ 30 or $>$ 80	TG				0-9 years	$<$ 75 (0.8)	75-99 (0.8-1.1)	\geq 100 (1.1)	10-19 years	$<$ 90 (1mmol/L)
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Liver Disease	ALT	Male	Female	Management of Abnormal Result
	Normal	$<$ 26 U/L	$<$ 22 U/L	Routine
	Abnormal; Elevated between 1-2x Upper Normal Limit (UNL)	26-52	22-44	Recheck in 6 months; add "Elevated ALT" to problem list, and prescribe healthy weight lifestyle modifications. If elevated on repeat test, schedule repeat ALT in 2-3 months and discuss GI referral with family.

				Upon referral order to GI, order with liver ultrasound with doppler
	Abnormal; Elevated (>2x UNL)	>52 U/L	>44/L	Recheck in 2-3 months; add "Elevated ALT" to problem list, and prescribe healthy weight lifestyle modifications. If persistently elevated on repeat test (>2x UNL), place referral to GI and order liver ultrasound with doppler
	Abnormal, elevated with "red flag" result	≥80 U/L	≥80 U/L	Refer to GI for additional testing; order liver ultrasound with doppler
Sleep Disorders	<p>Assess for the presence of sleep disordered breathing: snoring and/or noisy breathing, daytime consequences (somnolence, inattention, behavioral), nocturnal enuresis, nocturnal awakenings and/or morning headaches</p> <p>Assess for insufficient sleep, insomnia and/or circadian rhythm abnormalities</p> <p>For educational material for all patients, consider resources developed by pediatric sleep medicine (e.g. handout on sufficient sleep and healthy sleep habits)</p>			<ul style="list-style-type: none"> • If concern for obstructive sleep apnea (OSA), refer directly to sleep lab for sleep testing. Most children will need in lab PSG testing. In limited cases (older teen, able to learn and wear a portable device), home sleep apnea testing can be considered <i>Note: Home testing is not covered by most Medicaid plans/caresource etc.</i> • For educational material, consider resources developed by pediatric sleep medicine (e.g. handout on sufficient sleep and healthy sleep habits) • For behavioral modification of insomnia/circadian rhythm, consider referral to sleep behavior REF180 • For complex sleep disturbance, consider sleep medicine referral REF160
Neuromuscular	If history and/or physical exam reveals limitations that prevent patient from increasing or achieving physical activity goals (i.e. pain, impaired balance and coordination, or limping), evaluate and make appropriate referrals			<ul style="list-style-type: none"> • Refer to physical therapy, sports medicine, physiatry, or orthopedics based on extent of neuromuscular limitation and diagnosis
Mental Health	If mental health screenings result in abnormal results, follow usual follow-up assessments			<ul style="list-style-type: none"> • See Depression and/or Anxiety guideline