Table 4: Signs and Symptoms of Conditions Associated with Obesity, Diagnosis and Referral Recommendations*

Symptoms or Signs	Suspected Diagnosis	Additional Lab Tests	Referral
Polydipsia, polyuria, weight loss, acanthosis nigricans	Type 2 Diabetes	Random glucose, fasting glucose, 2 hour GTT, urine ketones, HbA1c	Endocrine
Small stature (decreasing height velocity), goiter	Hypothyroidism	Free T4, TSH	Endocrine
Small stature (decreasing height velocity), purple striae, Cushingoid facies	Cushing's Syndrome	24 hour urine free cortisol	Endocrine
Hirsutism, excessive acne, menstrual irregularity	Polycystic Ovary Syndrome	Total and free testosterone	Adolescent Medicine or Endocrine or Gynecology
Abdominal pain	GE Reflux, Constipation, Gall Bladder Disease	Medication trial for suspected reflux or constipation, ultrasound for GB disease	Gastroenterology
Hepatomegaly, increased LFTs (ALT or AST >60 for ≥6 months)	Nonalcoholic Fatty Liver Disease	ALT, AST, bilirubin, alkaline phosphatase (also see Table 5)	Gastroenterology
Snoring, daytime somnolence, tonsillar hypertrophy, enuresis, headaches, elevated BP	Sleep Apnea, Hypoventilation Syndrome	Sleep Study	ENT or Pulmonology
Hip or knee pain, limp, limited hip range of motion, pain walking	Slipped Capital Femoral Epiphysis (SCFE)	X-rays of hip	Orthopedics
Lower leg bowing	Blount Disease	X-ray of lower extremities and knees	Orthopedics
Severe headaches, papilledema	Pseudotumor Cerebri	Head CT Scan	Neurology or Neurosurgery
Depression, school avoidance, social isolation, sleep disturbances	Depression, Anxiety, Teasing, Bullying	Validated depression screen (PSC, MFQ)	Psychiatry or Psychology
Binge eating, vomiting	Binge Eating Disorder and Bulimia	Validated screen for eating disorder	Psychiatry or Psychology Psychiatry, psychology, eating disorders center
Dysmorphic features, small hands and feet, small genitalia, no menses, undescended testes	Prader-Willi Syndrome	Genetic Testing for Prader Willi Syndrome	Genetics

*Referral recommendations are general considerations not standards of care.

** AAP, NHBPEP, NHLBI, Bright Futures, AHA recommend annual BP screening. AAFP and USPSTF state there is insufficient evidence for or against routine screening for high blood pressure in children and adolescents. See reference section of website for more information.

Table 5: Results Guide for Overweight and Obese Pediatric Patients**

Tests	Results	Action
Fasting Glucose	<100	Recheck every 2 years
	≥ 100, <126	Pre-diabetes. Provide counseling. Recheck yearly.
	≥126	Diabetes. Confirm with repeat test. Refer to Pediatric Endocrine.
Hemoglobin A1c	<5.7%	Recheck every 2 years
	5.8-6.4%	Prediabetes: Provide counseling. Recheck yearly.
	≥6.5%	Diabetes. Provide counseling. Refer to Pediatric Endocrine.
Random Glucose	≥200	Diabetes. Confirm with repeat test. Provide counseling. Refer to Pediatric Endocrine.
Fasting LDL	<110	Repeat in 2 years
	111-130	Repeat in 1 year
	131-160	Obtain complete family history. Initiate CHILD 1 diet and increase physical activity. Recheck in 6 months. If still elevated, +FH, or if other cardiovascular risk factors, consider referral to Pediatric Lipid Specialists.
	≥160	Refer to Pediatric Lipid Specialists.
Fasting HDL	≥40	Routine care. Recheck every 2 years, more frequently if weight gain accelerates.
	<40	Increase activity and Omega-3 fats (flax/fish oil). Recheck 1 year.
Fasting Triglycerides	<100 and <10 yo or <130 and 10-19 yo	Routine care. Recheck every 2 years, if weight gain accelerates.
	130-499	Consider Omega-3 fish oil therapy in conjunction with CHILD 1 diet. Recheck in 6 months. If persistently >200, consider referral to Pediatric Lipid Specialists.
	≥500	Refer to Pediatric Lipid Specialists.
ALT	≥60 <100	Recheck in 2 months if still elevated contact Gastroenterologist.
	>100	Refer to Gastroenterologist.
Blood Pressure •Ensure appropriate size BP cuff •Determine percentile from BP chart based on gender, age, height (link to that here) •Confirm with auscultation (manual BP) •Obtain 3 separate BP measurements and average to re-evaluate. •Can use school nurse for BP monitoring/ establishing a trend	<90%ile	Routine care, recheck annually
	91-95%ile (Pre-HTN)	•Increase physical activity •Child 1 diet (link to that here) •Ensure dietary sodium limit of <3g daily •Smoking cessation •Consider BUN/Cr, UA with microscopy and Culture, RUS with Doppler •Recheck in 6 months
	>95 to 99+5 (Stage 1)	•Repeat BP in 1-2 weeks •If confirmed, initiate basic workup: CBC, Electrolytes with BUN/Cr, U/A with microscopy and culture •Consider RUS with Doppler, funduscopic examine, renin level •Assess for LVH by echo •Continue CHILD 1 with sodium restrictions and activity promotion, avoiding cigarettes •Consider pharmacotherapy in patients with LVH, diabetes, symptoms, or persistent HTN unresponsive to lifestyle changes (starting with amlodipine 0.1mg/kg) •Non-urgent consult to Pediatric Hypertention Specialist. Monitor every 3-6 months
	>99+5 (Stage 2)	Workup as above. Urgent Pediatric Hypertension Specialist Consult.

Iowa Clinician's Guide to Prevention, Assessment & Treatment of Childhood Obesity

1. Assess healthy eating, active living behaviors and Body Mass Index (BMI) in children ages 2-18 annually.
2. Share prevention messages (**5-2-1-0**).
3. Plot BMI on gender-specific BMI-for-age chart to determine percentile.
4. Identify risk (Table 2) and comorbidities (Table 4).
5. History and physical exam, blood pressure, appropriate laboratory test and referrals (Tables 3, and 5).
6. Consider impact of social determinants of health.
7. Consider limitations and accommodations due to disabilities (physical, intellectual and cognitive) and special health care needs in some children.
8. Acknowledge weight stigma and bias in clinic.

Consistent Prevention Message: 5-2-1-0

5 or more servings of fruits and vegetables daily
2 hours or less of recreational screen time daily
1 hour or more physical activity a day
0 limit sugar-sweetened drinks

For additional resources, references and acknowledgement, visit:
https://iowamedical.org/iowa/Childhood_Obesity/Default.aspx

American Academy of Pediatrics
Iowa Chapter

IMS
IOWA MEDICAL SOCIETY

IDPH
Iowa Department of Public Health

IOWA ACADEMY OF FAMILY PHYSICIANS
STRONG MEDICINE FOR IOWA

Pediatric Obesity Prevention and Treatment Algorithm

BMI 5th to <85th percentile | **BMI 85th to <95th percentile without risk factors**

- Family history, review of systems and physical exams.
- Appropriate lab screening. See Table 3.

Prevention Counseling: Primary Care Office

- Positive reinforcement of healthy behaviors
- Assess motivation and attitudes
- Identify problem behaviors and elicit solutions from family
- Deliver consistent evidence-based messages regardless of weight (e.g., **5-2-1-0**)
- Activity engaging the whole family

Re-evaluate annually

BMI 85th to <95th percentile with Risk Factors | **BMI 95th to <99th percentile** | **BMI & ≥99th percentile (age 6+, consider starting at Step 2-3)**

Management and Treatment Stages for Patients with Overweight or Obesity

- Patients should start at the least intensive stage and advance through the stages based upon the response to treatment, age, BMI, health risks, and motivation.
- Children age 2-5 who have obesity should not lose more than 1 pound/month; older children and adolescents with obesity should not lose more than an average of 2 pounds/month.
- Augmented (obesity-specific) family history, review of systems and physical exams.
- Appropriate lab screening. See Table 3.

Stage 1 Prevention Plus: Primary Care Office

- **15-Minute Obesity Prevention Protocol**
- Partner with trained nursing staff, dietitian, wellness coach, physicial therapist, athletic trainer, or care coordinator for added support and counseling.
- **Follow-up:** Tailored to family motivation.
- Monthly contact
- 3-6 month office visits with provider.
- **Goal:** Positive behavior change, weight maintenance or decreased BMI velocity.
- Connect to community resources.

After 3-6 months: No improvement or stabilization in BMI/weight status, advance to Stage 2

Stage 2 Structured Weight Management: Primary Care Office with Support

- **15-Minute Obesity Prevention Protocol**
- Partner with trained nursing staff, dietitian, wellness coach, PT, athletic trainer, or care coordinator for added support and counseling.
- **Follow-up:** Tailored to family motivation.
- Weekly-monthly contact
- 3 month office visits with provider.
- **Goal:** Positive behavior change, weight maintenance or decreased BMI velocity.
- Connect to community resources.

If no improvement or stabilization from Stage 2 in 3-6 months

Stage 3 Comprehensive, Multidisciplinary Program
Stage 4 Tertiary Care Intervention

- **Stage 3:** Increased intensity of behavior changes, frequency of visits, and speciality involved. Structured behavioral modification program.
- Evaluation and follow-up with multidisciplinary team experienced in pediatric weight management
- Weekly visits for 8-12 weeks
- **After 3-6 months** if the BMI status has not improved consider advancing to Stage 4
- **Stage 4:** Intensive diet and activity counseling with consideration of the use of medication and surgery.

15-Minute Obesity Prevention Protocol

ASSESSMENT: (UTILIZE MOTIVATIONAL INTERVIEWING TECHNIQUES)

- Ask permission to discuss the topic
- Share information in an empathetic manner
- Elicit patient and family concerns/reflect
- Assess nutrition and physical activity behaviors
- Provide positive reinforcement of behaviors in optimal range
- Elicit response/reflect
- Provide neutral feedback for behaviors not in optimal range
- Elicit response/reflect

AGENDA SETTING:

- Assess readiness to change accepting and respecting it is their right to change or not to change (consider using readiness ruler)
- Engage and offer to partner with families and evoke their strengths and knowledge about their situation to empower them to set 1-2 small specific goals (consider using brief action planning)
- Engage whole family in lifestyle change.

ASSESSING CONFIDENCE:

- Assess confidence in ability to change (consider using confidence ruler)
- Elicit benefits, barriers and solutions

SUMMARIZE AND SCHEDULE FOLLOW-UP:

- Summarize goal (if ready to change) and set follow-up (to assess progress or reassess readiness for change)

Table 1: Weight Category by BMI* Percentile

BMI Percentile Range	Weight Category
<5th percentile	Underweight
5th to <85th percentile	Healthy Weight
85th to <95th percentile	Overweight
95th to <99th percentile (or BMI >30)	Obese
≥99th percentile	Obese with Increased Risk

**Accurate BMI assessment depends on accurate height and weight measurements, which may be difficult to obtain in some children with disabilities and special care needs.*

Table 2: Risk Factors for Comorbidities and Future Obesity

Personal Risk Factors	Risk Factors from Family History
• Elevated blood pressure • Ethnicity: African American, Hispanic, Native American, Asian/South Pacific Islander • Puberty • Medications associated with weight gain (steroids, anti-psychotic, antiepileptics) • Acanthosis Nigricans • Birth history of SGA or LGA • Disabilities • Increasing BMI or weight velocity(crossing 2 percentile lines)	• Type 2 Diabetes • Hypertension • High cholesterol • Parents with Obesity • Mother with Gestational Diabetes • Family member with early death from heart disease or stroke • Family member with history of bariatric surgery

Table 3: Laboratory Evaluation Recommendations*

Age	BMI	Risk Factor	Action Plan
9-11 years	<85th percentile	N/A	Non-fasting cholesterol
≥ 10 years	85th to <95th percentile	No risk factors or symptoms	Consider fasting lipids
		≥2 risk factors	Every two years: fasting lipid profile, fasting glucose, consider ALT and AST
2-10 years	≥95th percentile	N/A	Every two years: fasting lipid profile, fasting glucose, ALT and AST, other tests indicated by history and physical

**Based on multiple expert committee recommendations endorsed by AAP. Per AAFP and USPSTF current evidence is insufficient to assess the benefits and harms of screening for lipid disorders in youth.* *See reference page for additional information*