Treatment of Childhood Overweight and Obesity

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Now there are more overweight people in America than average-weight people. So overweight people are now average. Which means you’ve met your New Year’s resolution.

—Jay Leno

Learning Objectives:
1. Examine the definitions of overweight, obesity, and severe obesity in children
2. Identify appropriate communication styles and phrases that diminish stigma and increase family engagement
3. Develop an appropriate work-up for a child with overweight and with obesity
4. Prepare an individually tailored treatment plan that includes assessment of and motivational interviewing around modifiable health behaviors, and recognizes limitations and referral thresholds

Primary References:
1. AAP Institute for Healthy Weight 2-page algorithm summarizing the 2007 Expert Committee Recommendations on the Assessment and Management of Childhood Obesity: https://ihcw.aap.org/Documents/Assessment%20and%20Management%20of%20Childhood%20Obesity%20Algorithm_FINAL.pdf

CASE ONE:

Leptin comes in for her 8-year well-child check. She is friendly and playful, and reports that she enjoys school and gets along well with her siblings. Her past history is unremarkable. You glance at her growth chart. She followed the 75th percentile curves from ages one to three, but in the last few visits, her weight had increased. Today, her height is 1.35 meters and her weight is 45 Kg; both are greater than the 95th percentile.

1. What is Leptin’s Body Mass Index? What is the cut-off for being diagnosed with overweight? Obesity?

Body Mass Index (BMI) is calculated as weight (in Kg) divided by the square of the height (in meters), thus for Leptin, 45Kg / (1.35m)^2 = 24.7 Kg/m^2.

While overweight and obesity among adults are defined as a BMI over 25 and over 30, respectively, BMI is lower in children than in adults and changes over time. Thus, age- and gender-specific tables must be consulted for accurate interpretation of BMI in children. A child over the age of 2 with a BMI of ≥95th percentile should be diagnosed with “obesity” and a child whose BMI falls between the 85th and <95th percentiles with “overweight.” A link to growth charts recommended for use in the United States can be found in the Resources section below. These growth charts from the Centers for Disease Control (CDC) are based on data from a series of national health examination surveys from 1963 to 1994. Researchers have defined class 2 and class 3 obesity among children as 120% and 140% of the 95th percentile for age and sex. A set of growth charts have been developed for use in medical records that allow tracking of these higher-risk children.

US recommendations are, in fact, to screen for obesity and overweight using BMI charts, and to offer counseling and intensive intervention as needed. However, pediatric health care providers have
classically underdocumented the diagnoses of obesity and overweight. Given the tremendous health consequences, the need to identify and actually diagnose these problems is clear.

When comparing Leptin’s BMI of 24.7 to the 95th percentile for her age (20.6), you can see that Leptin can now be diagnosed with obesity.

**CASE continued:**

Leptin’s mom is confused. She asks you how she can have an elevated percentile when so many of her peers look the same as she does.

2. How do you sensitively frame the BMI discussion and help families to understand the issue at hand?

It is important to effectively communicate with families about weight concerns in a way that makes sense and avoids contributing to weight stigma. Stigma and shame, instead of motivating people to change their habits, contribute to disordered eating and social isolation, damage the provider-patient relationship, and have been associated with increased weight gain. Focus instead on healthy habits and healthy growth.

In a meta-analysis of studies that investigated whether parents were able to recognize their own children’s weight status, 51% of parents of children with overweight and obesity underestimated their children’s weight category. Parents were less likely to recognize a problem the closer the child’s BMI was to normal (and thus possibly easier to get back on track). A separate study that used National Health and Nutrition Examination Survey (NHANES) data found that parental perceptions of childhood obesity are changing; parents today are less likely to perceive a child as having overweight/obesity than in previous decades. This is not surprising when we consider trends in obesity prevalence over time. Results from national surveys of children’s health show that, while the prevalence of childhood obesity was ~5% in 1963, overall prevalence in 2015-2016 was 18.5% -- 13.9% among preschoolers, 18.4% among school-aged children, and 20.6% among adolescents.

The CDC growth charts used to determine growth percentiles are based on data from a series of national health examination surveys from 1963 to 1994. The definitions of overweight and obesity among children are based on studies that have linked elevated BMI percentiles on these CDC growth charts with short- and long-term negative health consequences, including type II diabetes mellitus (T2DM), hypertension, asthma, obstructive sleep apnea (OSA), nonalcoholic fatty liver disease (NAFLD), gastroesophageal reflux, constipation, slipped capital femoral epiphysis, Blount disease, foot pain, depression, and anxiety. Helping families understand this can be tricky, especially among families with limited health literacy and numeracy.

The majority of families (mixed-income, mixed-weight) in a study of a primary care center in Michigan stated that the physician’s office was an appropriate place to discuss their children’s weight; half preferred the statement “gaining too much weight,” while a quarter preferred the term “overweight.” A Massachusetts study including focus groups with parents of children with obesity observed a strong aversion to use of the words “obese” or “obesity” among parents when discussing their children’s weight. These words were felt by many parents to be stigmatizing and offensive. Yet, parents generally felt it was very important for pediatricians to discuss their children’s weight in an understandable and personalized way. Parents appreciated when doctors would discuss weight trends over time and focus on implications for their children’s health and wellbeing rather than on weight alone. While providers should be sensitive to the psychological ramifications of this diagnosis within a family, they should recognize that family-centered care cannot begin without actually discussing the problem. Discussion of “healthy weight” and “health lifestyles” are increasingly more common when communicating with families about weight concerns. The Obesity Society along with 4 other obesity-related professional societies put out a position statement recommending that clinicians exclusively use “people-first language” when speaking about people with obesity (i.e., avoiding the term “obese children” and instead “children with obesity”) as recommended for all health conditions to avoid labelling/equating people with their condition.
CASE continued:

You note that Leptin’s mom also has obesity. Upon further questioning her mom shares, “I try to give her only healthy foods, but we’re really busy and end up eating fast food a lot because it is faster. The convenience store near our house does not really have much fruits or veggies. I give her fruit juice so she can get the vitamins she needs, but not too much soda.” On exam, her blood pressure is normal. She does not have skin changes, moon facies, “buffalo hump,” or edema.

3. What is your differential diagnosis for Leptin’s obesity?

There is a long list of potential diagnoses, falling under the broad categories of endocrinology (e.g., Cushing’s or hypothyroidism), drugs (e.g., exogenous steroids), and genetics (e.g., Prader-Willi, Turner syndrome). In addition, new data indicates that there are other chromosomal deletions and copy-number variations that are associated with the leptin-melanocortin regulation pathway, wherein children usually present with early-onset hyperphagia, very steep infant growth curves with weight gain predominantly in fat stores, and hyperinsulinemia compared to controls with obesity. Pediatric providers should be on the alert for other signs of disease, such as a goiter (for hypothyroidism), deep purple striae, “moon facies,” or “buffalo hump” (for Cushing’s syndrome), or hirsutism (polycystic ovary syndrome). Any dysmorphic features or intellectual disability should prompt appropriate chromosomal or enzyme analysis. However, these diagnoses describe a small minority of children with obesity.

Endocrine Society guidelines recommend that in most cases “clinicians should not test for endocrine causes of obesity unless the patient is short relative to genetic potential and has decreased growth velocity against the backdrop of continued weight gain.” Although exceptions exist, in the setting of increased BMI with a normal or increased height for age, the great majority of these can be excluded on clinical grounds alone. Endogenous obesity is the most common diagnosis by far.

4. What further historical information do you need to collect?

Moderators may wish to group the suggestions into three general categories: changeable lifestyle behaviors, risk for medical comorbidities, and readiness to change.

First, identify changeable lifestyle behaviors that may have increased Leptin’s chances of developing obesity. In addition, you should check Leptin’s medication list to make sure that she is not on any medications which predispose to weight gain. These include antipsychotic agents, selective serotonin reuptake inhibitors, tricyclic antidepressants, anticonvulsants, mood stabilizers, prednisone, or oral contraceptives.

Next, assess Leptin’s current and future risk for medical comorbidities. A history in first- and second-degree relatives of obesity, T2DM, cardiovascular disease, hypertension, or dyslipidemia can help to gauge the child’s likelihood of future medical problems. The history and physical can be focused to include symptoms and signs of conditions that result from or are associated with obesity, such as the ones described above. For example, to evaluate for possible OSA the history should contain items about sleep disruption, snoring, and abnormal breathing patterns during sleep. Per the 2012 AAP guidelines on OSA, children with overweight/obesity who snore ≥3 times/week should be evaluated with a sleep study.

Finally, and arguably most importantly, assess the family’s readiness to change. The family must be interested in improving Leptin’s health, and must be motivated to think about, start, or maintain a change. Motivational interviewing (MI), with its patient-centered emphasis, is promoted by the 2007 Expert Committee as a method for counseling families whose children have overweight or obesity and showed dose-dependent efficacy in an RCT of practices participating in a research network with families getting MI.

5. Are there lab tests you should order for Leptin? What about for a child who does not have obesity, but has overweight?

According to the report of the Expert Committee on obesity, any child with obesity should have fasting lipid levels, AST and ALT levels, and fasting glucose levels repeated biannually starting at age 10. These
labs screen for common obesity-related comorbidities including hyperlipidemia, non-alcoholic fatty liver disease, and diabetes.

A child with overweight and who has risk factors (defined as elevated blood pressure, hyperlipidemia, tobacco use, or family history of obesity-related diseases) should have the same screening tests as listed above for children with obesity. Children who have overweight and have no risk factors can be screened with fasting lipid levels only. While the summary Expert Committee recommendations expressly state that these screens are for children age 10 and older, they do not preclude testing younger children with compelling circumstances. In particular, the 2008 AAP guideline on dyslipidemias recommends that children as young as 2 years of age be screened with fasting lipid levels if they have obesity or overweight, hypertension, diabetes, or a positive family history of dyslipidemia or premature cardiovascular disease.

Studies have begun to demonstrate the efficacy of screening with hemoglobin A1C (HbA1C); in a group of adolescents with obesity, when compared to fasting blood glucose a cut-off point of 6% yielded similar sensitivity and specificity for impaired glucose tolerance, and improved sensitivity and specificity for type II diabetes. Additionally, national data on screening for hyperlipidemia demonstrate that a preliminary screening need not be done while the child is fasting. This implies that a patient with obesity (or overweight with risk factors) may simply have bloodwork after the visit instead of having to return for another visit, and therefore may increase the number of children appropriately screened. Since triglycerides are sensitive to fasting status, obtaining total cholesterol and HDL alone are sufficient on the initial non-fasting lipid screen. If hypertriglyceridemia is present, it will be associated with low HDL. Any abnormal finding on initial, non-fasting lipid screen should be followed up with a fasting lipid profile.

The table below modifies the current AAP recommendations with the new findings.

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<td>Overweight, w/ family or personal risk factors</td>
<td>consider screening labs based on risk profile</td>
<td>Non-fasting Total Cholesterol and HDL, ALT, HbA1c every 2 years</td>
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<tr>
<td>Obesity</td>
<td>consider screening labs based on risk profile</td>
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6. **What treatment should you recommend for Leptin? What treatment is recommended for a child who does not have obesity, but merely overweight?**

The goal for children who have not achieved skeletal maturity is to stabilize weight while height increases, so that BMI can gradually trend downwards until it becomes less than the 85th percentile.

Multiple community, home-based, and lifestyle interventions have been attempted. The most successful of these have frequent contact and operate at multiple sites (e.g., home and community, home and school). The optimal length and intensity of programs is yet to be determined, but a meta-analysis of lifestyle interventions showed significant weight loss and improvement in biochemical measures (cholesterol, fasting insulin, and blood pressure), compared with no-treatment conditions or usual care. Based on meta-analyses, the US Preventive Services Task Force found sufficient evidence (Grade B) to recommend that clinicians screen children aged 6 years and older for obesity, and offer or refer to comprehensive, intensive behavioral intervention to promote improvement in weight status with a minimum of 26 contact hours over 2-12 months.

In the pediatric office, the Expert Committee on Obesity of the AAP recommended a staged treatment protocol for all children who have either overweight or obesity. For most children (those who have no significant comorbidities), the first step is “Prevention Plus,” which can take place in the provider’s office and focuses on the following principles (note that the first 4 are known also as 5-2-1-0, for the numbers associated with them; there are multiple patient guides developed having to do with this subset):
• 5: Recommend ≥5 servings of fruits and vegetables per day
• 2: Television: ≤2 hours of screen time per day, no television in room where child sleeps, and no television if ≤2 years of age
• 1: Recommend ≥1 hour of physical activity per day - the amount of physical activity may need to be graded for children who are sedentary; they may not achieve 1 hour/day initially
• 0: Minimize or eliminate sugar-sweetened beverages

Address eating behaviors (e.g., minimize eating away from home, eat breakfast daily, eat family dinners ≥5 times/week)

• Involve the whole family in lifestyle changes, including nutrition, activity, and sleep.
• Acknowledge cultural differences.

Notably, 5-2-1-0 neglects to promote adequate sleep which is increasingly being recognized as a modifiable risk factor for obesity in children. Sleep duration, day-to-day variability in sleep duration, and sleep quality should be reviewed in the context of NIH recommendations. Recommended amounts of sleep for newborns are 16-18 hours per day, for preschool children 11-12 hours per day, for school-aged children at least 10 hours per day, and for teens 9-10 hours per day.

Other strategies: As dishware size has been correlated with absolute caloric intake, it is prudent to address use of child-sized plates, and further to discuss the portion sizes of various parts of the meal. The Healthy Eating Plate may be used as a model for the family, as it is relatively simple to show the relative proportions of foods (see Resources). Families should be encouraged to modify the environment, for example putting away the cookie jar and taking out the fruit bowl, or storing more calorie-dense foods in the back of the shelves (or not purchasing these at all). Self-monitoring techniques which allow the child or child and family to log food, physical activity, and sedentary activity may provide a tangible reinforcement of goals; if used, the family should begin by targeting one or two behaviors, and add additional ones as time progresses. Families are more likely to achieve goals that are taken on together. As an extension of this principle, all goals should be shared with any adult taking care of the child to lessen the chances of sabotage.

Visits to the primary care provider should be frequent, i.e., every 3 months. This will not only allow for improved monitoring, but it will allow the provider to readdress the ideas of healthy eating and activity and assess the family’s motivation and adherence.

If after 3 to 6 months of Prevention Plus, the BMI is not trending downwards despite good effort by the family, then “Structured Weight Management (SWM),” which involves a higher degree of restriction, can be employed. The goal of SWM is still primarily to make the BMI slowly trend downward to below the 85th percentile, but due to the caloric restriction, weight loss may occur. Weight loss may be up to 1 pound per month for children up to 11 years of age, and no more than 2 pounds weekly for children above 11 years of age.

The primary care provider should still be the primary coordinator, but a nutritionist would ideally be involved for dietary and physical activity counseling. All providers should consider using Motivational Interviewing to improve adherence. Visits to the primary care provider under SWM should be monthly. The principles here are:
• Balanced-macronutrient diet emphasizing small amounts of energy-dense foods - because diet provides less energy, ensure that protein is high quality and sufficient to prevent loss of muscle mass
• Increase structure of daily meals and snacks
• Reduce screen time to ≤1 hour/day
• Increase time spent in physical activity (≥60 min of supervised active play per day)
• Instruct patient and/or parent in monitoring (e.g., screen time, physical activity, dietary intake, and restaurant logs) to improve adherence

Perform medical screening (e.g., vital signs, assessment tools, and laboratory tests as needed)

If there is no downward trend seen in BMI within 3 to 6 months of beginning SWM, patients should be moved to the next higher level of management, “Comprehensive Multidisciplinary Intervention.” This involves referral to a multidisciplinary obesity care team, consisting of a behavioral counselor, registered dietitian, and exercise specialist. The purpose here is to utilize the same principles of management, but in a more intensive setting (e.g., weekly meetings, group sessions). Failure here would mean referral to a subspecialist treating obesity issues.
Bariatric surgery as an adolescent may be an option. While the data on efficacy is mixed, a recent multicenter observational study showed a mean 27% decrease in weight in participants, with excellent responses in type 2 diabetes, renal dysfunction, and hypertension among patients with these conditions at baseline. Although not FDA approved for this, Metformin has been used to promote weight loss in children (primarily in those with abnormal glucose metabolism and severe obesity); it appears to have a small magnitude of effect (BMI reduction of <1 kg/m²) of unclear clinical significance. There is inadequate evidence on long-term outcomes and adverse events. Orlistat is FDA approved for use in adolescents ≥12 years, also has a similarly small magnitude of effect of uncertain clinical significance, and is associated with moderate harms including abdominal pain, flatus, and oily stools with a risk of incontinence. Thus, clinicians are still advised “to promote behavioral interventions as the primary effective intervention for weight loss in children and adolescents.”

Additional References:


Resources:
1. Childhood Obesity in Primary Care modules from the AAP Institute for Health Weight: https://ihcw.aap.org/Pages/ChildhoodObesityPC.aspx
5. Healthy Eating Plate from Harvard School of Public Health healthy eating plate: Children’s version: https://www.hsph.harvard.edu/nutritionsource/kids-healthy-eating-plate/ Adult’s version: https://www.hsph.harvard.edu/nutritionsource/healthy-eating-plate/