OVERVIEW

- BMI basics and definitions for children and youth
- Use a prevention model to address overweight and obesity
- Intervention basics
- Clinical Decision Support guide
What is BMI?

• Body Mass Index
• A number calculated from a person's weight and height.
• BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems.
• The BMI number is plotted on the BMI-for-age growth charts (for either girls or boys) to obtain a percentile ranking.
• The percentile indicates the relative position of the child's BMI number among *children of the same sex and age*.
• The growth charts show the weight status categories used with children and teens (underweight, healthy weight, overweight, and obese).
How is BMI Calculated?

Same way for adults & children. Calculation is based on the following formula:

<table>
<thead>
<tr>
<th>Measurement Units</th>
<th>Formula and Calculation</th>
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<tbody>
<tr>
<td>Pounds and inches</td>
<td><strong>Formula: weight (lb) / [height (in)]^2 x 703</strong></td>
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Calculate BMI by dividing weight in pounds (lbs) by height in inches (in) squared and multiplying by a conversion factor of 703.

Example: Weight = 150 lbs, Height = 5'5" (65")

Calculation: \[\frac{150}{(65)^2} \times 703 = 24.96\]
WHAT BMI IS HEALTHY?

Adults:

- BMI between 18.5 and 24.9 = healthy weight
- BMI between 25 and 29.9 = overweight.
- BMI of 30 or higher is considered obese.
- BMI (Body Mass Index) correlates with the amount of body fat – it does NOT directly measure body fat.
- Other methods of estimating body fat and its’ distribution exist, including measurements of skinfold thickness and waist circumference, calculation of waist-to-hip circumference ratios, and others.
What about BMI in children?
(BMI percentages factor in age & gender)

Percentiles for Assessing Overweight and Obesity Percentile Status:

- \( \leq 4^{th} \) = Underweight
- \( 5^{th} \) to \( 85^{th} \) % = Healthy weight
- \( 85^{th} \) – \( 94^{th} \) = Overweight
- \( \geq 95^{th} \) = Obese
TYPICAL GROWTH CHART

2 to 20 years: Boys
Stature-for-age and Weight-for-age percentiles

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<tr>
<th>NAME</th>
<th>RECORD #</th>
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Mother's Stature | Father's Stature
<table>
<thead>
<tr>
<th>Date</th>
<th>Age</th>
<th>Weight</th>
<th>Stature</th>
<th>BMI*</th>
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*To Calculate BMI: Weight (kg) = Stature (cm) - Stature (cm) x 10,000
or Weight (lb) = Stature (in) - Stature (in) x 703
A 10-year-old boy with a BMI of 23 would be in the obese category (95th percentile or greater).

A 10-year-old boy with a BMI of 21 would be in the overweight category (85th to less than 95th percentile).

A 10-year-old boy with a BMI of 18 would be in the healthy weight category (5th percentile to less than 85th percentile).

A 10-year-old boy with a BMI of 13 would be in the underweight category (less than 5th percentile).
My two children have the same BMI values, but one is considered obese and the other is not. Why is that?

• The interpretation of BMI-for-age varies by age and sex.
• Calculating BMI-for-age for children of different ages and sexes may yield the same numeric result, but that number will fall at a different percentile for each child for one or both of the following reasons:
  ○ The normal BMI-related changes that take place as children age and as growth occurs.
  ○ The normal BMI-related differences between sexes.

See the following graphic for an example for a 10-year-old boy and a 15-year-old boy who both have a BMI-for-age of 23. (Normally the measurement for only one child is plotted on a growth chart.)
Body mass index-for-age percentiles: Boys, 2 to 20 years

A 10-year-old boy with a BMI of 23 would be in the obese category (95th percentile or greater).

A 15-year-old boy with a BMI of 23 would be in the healthy weight category (5th percentile to less than 85th percentile).
Michigan numbers and prognosis

18.2 percent of Michigan youth ages 10-17 years old are overweight and 12.4 percent are considered obese, compared to the U.S. percentage of 15.3 overweight and 16.4 obese. (National Survey of Children’s Health, 2007)

Overweight adolescents have a 70% chance of becoming overweight adults. This increases to 80% if 1 or both parents are overweight.

http://www.cdc.gov/obesity/data/childhood.html
PREVENTION

• Primary – prevent the disease before it begins
  – Clean water
  – Immunizations
• Secondary – catch it early
  – Pap smears and cervical cancer
  – Mammograms
• Tertiary – prevent progression and complications
  – Diabetes
**PREVENTION AND OBESITY**

- **Primary prevention** – promote healthy weight for all children
- **Secondary prevention** – identify children and youth at high risk for obesity (BMI > 85\textsuperscript{th} percentile for age) and bend the curve
- **Tertiary prevention/treatment** – identify those with BMI > 95\textsuperscript{th} percentile for age – Identify co-morbid conditions, lower the BMI
Contributors to Childhood Overweight

1. **Food Choices** - diets higher in calories (including fats and simple sugars) and lower in fruits and vegetables are linked with overweight.

2. **Physical Activity vs. Sedentary Activity** - less physical activity and more time spent participating in activities such as watching TV results in less energy expenditure.

3. **Parental Obesity** - children of obese parents are more likely to be overweight themselves. There is an inherited component to childhood overweight that makes it easier for some children to become overweight than others. Even children with genetic risk for overweight will still only become overweight if they consume more calories than they use. Parental obesity may also reflect a family environment that promotes excess eating and insufficient activity.

4. **Eating Patterns** - skipping meals or failure to maintain a regular eating schedule can result in increased intakes when food is eaten.

5. **Parenting Style** - some researchers believe that excess parental control over children's eating might lead to poor self-regulation of kid's energy intake.

6. **Diabetes during pregnancy** - overweight and type 2 diabetes occur with greater frequency in the offspring of diabetic mothers (who are also more likely to be obese).
Contributors to Childhood Overweight
(continued)

7. **Low Birth Weight** - Low birth weight (<2500 g) is a risk factor for overweight in several epidemiological studies.

8. **Excessive weight gain during pregnancy** - Several studies have shown that excessive maternal weight gain during pregnancy is associated with increased birth weight and overweight later in life.

9. **Formula Feeding** - Breast feeding is generally recommended over formula feeding. Although the exact mechanism in unknown, several long-term studies suggest that breast feeding may **prevent** excess weight gain as children grow.

10. **Parental Eating and Physical Activity Habits** - Parents with poor nutritional habits and who lead sedentary lifestyles role model these behaviors for their children, thereby creating an "obesigenic" home environment.

11. **Demographic Factors** - Certain demographic factors are associated with an increased risk of being overweight in childhood.

http://www.obesity.org/resources-for/childhood-overweight.htm
Promote breastfeeding
Educate and encourage healthy food choices and eating patterns
Educate and encourage physical activity
Promote healthy parenting styles
Follow bright future guidelines
5 4 3 2 1 GO!

- 5 - Eat more than 5 servings of fruits and vegetables
- 4 - Drink 4 glasses of water
- 3 - Have 3 servings of low fat or fat free dairy
- 2 - Spend less than 2 hours at a T.V. or computer
- 1 - Take 1 full hour to get a runnin’ and a jumpin’

GO! – For a healthier you!
SECONDARY PREVENTION

- Track BMI on a growth chart
- Identify children and youth with BMI > 85\textsuperscript{th} percentile
- Intervene with more intensive counseling when BMI > 85\textsuperscript{th} percentile
- Create a registry to monitor
- Follow the CDS guidelines
TERTIARY PREVENTION AND TREATMENT

- Prevent progression
- Avoid development of co-morbid conditions
- Prevent negative psychological/emotional consequences
- Identify co-morbid conditions and treat
- Promote weight loss
- Promote healthy behaviors even if weight loss is not attainable
Potential Negative Psychological Outcomes:

a. Depressive symptoms
b. Anxiety
c. Poor Body Image
d. Low Self-Concept
e. Risk for Eating Disorders
f. Behavior and Learning Problems
HEALTH CO-MORBIDITIES ASSOCIATED WITH OVERWEIGHT

- Orthotic problems
- Eating Disorders
- GERD
- Joint pain
- Heart disease
- Asthma
- Elevated Cholesterol levels
- Metabolic syndrome

- Insulin Resistance to Type 2 Diabetes
- HTN
- Sleep apnea, snoring
- Abnormal menses
- Polycystic ovarian syndrome
- Early Puberty
- Elevated Liver enzymes
Interventional Goals:

How fast should my child lose weight?

Children 2 to 18 years of age:

- BMI 85th to 94th percentile:
  GOAL = Weight maintenance, resulting in decreasing BMI as age increases

- BMI >95th percentile with no comorbidity:
  GOAL = Weight maintenance, resulting in decreasing BMI as age increases

- BMI >95th percentile with comorbid conditions or severely obese:
  GOAL = Gradual weight loss that should not exceed 1 pound per month in children 2 to 11 years of age
  or
  2 pounds per week in older obese children and adolescents

http://brightfutures.aap.org/pdfs/Guidelines_PDF/5-Promoting_Healthy_Weight.pdf
INTERVENTION

- Information
  - Food choices
  - Portion sizes
  - Reading labels
- Setting goals
- Developing strategies
- Back up strategies – life happens
Hey kids! Eating right helps you bee better!

Half of my plate is FRUITS & VEGETABLES!

WHOLE GRAINS fit here!

This much MEAT & PROTEINS!
Serving size examples:

1. Visual hints:
   i. golf ball = 1/4 cup
   ii. cupcake or muffin paper liner = 1/2 cup
   iii. tennis ball = 1 cup
   iv. an inch diameter sauce cup = 1 oz
   v. pint deli container = 16 oz or 2 cups

2. Meats:
   i. deck of playing cards = 3 oz meat serving
   ii. 1 inch meatball = 1 oz
   iii. 4 oz of raw, lean meat = 3 oz cooked
   iv. size of a checkbook = 3 oz grilled fish

3. Fruits & Veggies:
   i. tennis ball = 1 medium apple, peach or orange
   ii. 3 medium pieces of fruit = 1 pound
   iii. Fist = 1 cup of veggies or mashed potatoes
   iv. 1 cup of lettuce = 4 leaves
Serving size examples (continued):

4. Cereal & Pasta:
   i. handful of cereal, snacks, or chips = 1/2 to 1 cup (initially grab a handful and measure for accuracy and future reference)
   ii. tennis ball = 1 cup of pasta
   iii. hockey puck = avg size bagel

5. Cheese, Butter & Spreads:
   i. 1 inch square, size of thumb or 4 stacked dice = 1 oz cheese,
   ii. thumb = 1 T of peanut butter,
   iii. Area of thumbnail = 1 tsp of peanut butter,
   iv. a typical salad dressing ladle in a restaurant = 3-4 Tbsp of dressing.
What are fruits & veggies?

a. How to read labels
   i. First to last listings indicate amount from highest to lowest
   ii. The more listings, the less “healthy”

b. Whole fruits, frozen, canned, dried (although, usually sweetened)

c. Fruit juices (usually sweetened)
   i. Limit
   ii. Dilute with water
   iii. Avoid putting in bedtime bottles/sippy cups

d. Fruit gummies and fruit roll-ups: NOT fruit: mostly sugar

e. Veggies: raw (cooked), frozen, canned
   i. V-8 juice
BREAKFAST OF CHAMPIONS?
TOP 10 CEREALS IN ORDER OF MOST TO LEAST SUGAR CONTENT:

1. Kellogg’s: Honey Smacks 55.6% (more than a Twinkie)
2. Post: Golden Crisp 51.9%
3. Kellogg’s: Fruit Loops Marshmallow 48.3%
4. Quaker Oats Cap’n Crunch’s OOPS! All Berries 46.9%
5. Quaker Oats: Cap'n Crunch Original 44.4%
6. Quaker Oats: Oh!s 44.4%
7. Kellogg's: Smorz 43.3%
8. Kellogg’s: Apple Jacks 42.9%
9. Quaker Oats: Cap’n Crunch’s Crunch Berries 42.3%
10. Kellogg’s: Fruit Loops 41.4%
What foods are “nutritious?”

a. Oatmeal, Cream of Wheat, etc. – good choice
b. Yogurt
c. Eggs
d. Cereal with fruit and / or nuts (if no allergies)
e. Fiber One Original – 0%
f. Kashi 7 Whole Grain Puffs – 0%
g. General Mills Cheerios - 4% sugar
h. Kellogg’s Corn Flakes - 7% sugar
i. Post Grape Nuts – 7%
j. General Mills Kix – 10%
k. Kellogg’s Crispix – 10%

http://www.hsph.harvard.edu/nutritionsource/what-should-you-eat/cereal-sugar-list/
INFORMATION IS NOT ENOUGH

- Significant change in family life style
- Emotional components
- Cultural components
- Social and economic constraints
- Sensitive topic
SUMMARY: PREVENTION

- Primary prevention: Healthy weight guidance should be part of anticipatory guidance at health maintenance visits – consider using a survey tool to shine a light on the issue and focus the discussion.
- Secondary prevention: BMI should be calculated and tracked beginning at 2 years age.
SUMMARY: INTERVENTION

- Children/youth with BMI > 85th%tile should be identified for more focused counseling
- Tertiary prevention: multipronged approach for children/youth with BMI > 95th%tile
- Identify co-morbid conditions
- Address the emotional, social and psychological causes and consequences