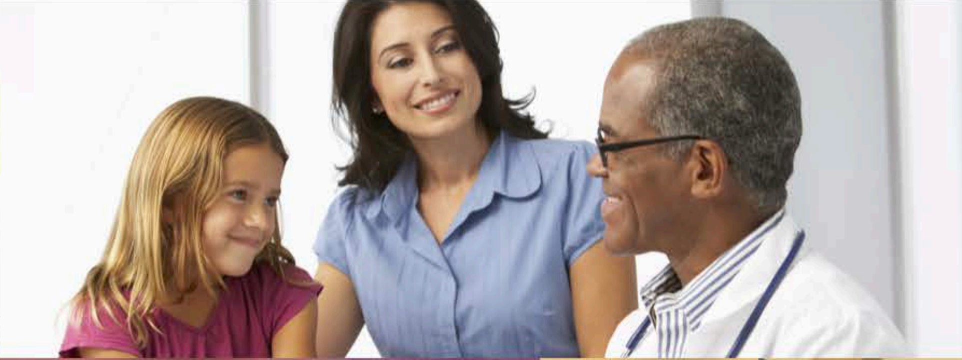
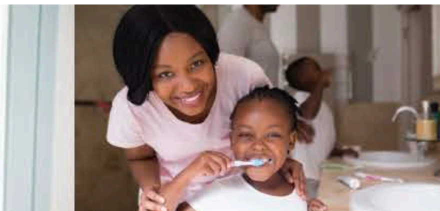
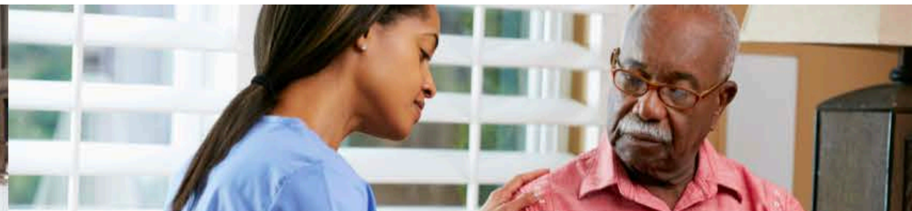


Childhood Obesity: Beyond BMI

Cheryl De Pinto, MD, MPH, FAAP

December 13, 2019

Objectives

By the end of the presentation, attendees will:

- Define childhood obesity;
- Understand body mass index (BMI) growth curves and BMI growth curve based definition of childhood overweight and obesity;
- Understand the influence of social-ecological factors in childhood obesity; and
- Be able to name important community-based activities to address childhood obesity to supplement BMI screening.

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Obesity Definition and Body Mass Index (BMI)

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Causes of Obesity

- Physiologic processes/critical periods of growth and development
- Genetics
- Environment
- Gene-environment interactions

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Definitions

- ***Overweight*** is excess body weight in relation to height.
- ***Obesity*** is a condition where there is high body fat in relation to lean body mass.

"abnormal or excessive fat accumulation that presents a risk to health."

-World Health Organization

Sources: https://www.cdc.gov/obesity/adult/defining.html (Accessed 12/10/2019);
https://obesitymedicine.org/definition-of-obesity/ (Accessed 12/10/2019)
https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight (Accessed 12/11/2019)

Definitions

- ***Overweight*** is excess body weight in relation to height.
- ***Obesity*** is a condition where there is high body fat in relation to lean body mass.

"a chronic, relapsing, multifactorial, neurobehavioral disease, wherein an increase in body fat promotes adipose tissue dysfunction and abnormal fat mass physical forces, resulting in adverse metabolic, biomechanical, and psychosocial health consequences."

-Obesity Medicine Association

Sources: https://www.cdc.gov/obesity/adult/defining.html (Accessed 12/10/2019); https://obesitymedicine.org/definition-of-obesity/ (Accessed 12/10/2019) https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight (Accessed 12/11/2019)

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Overweight and Obesity Definitions: BMI

$$\text{Body Mass Index} = \text{Weight (Kg)} / \text{Height (m)}^2$$

Adults:

Overweight=BMI $\geq$ 25

Obese =BMI $\geq$ 30

Children (2-18yo)

Obese =BMI ≥ 95th percentile for age and sex

Overweight = BMI 85th to < 95th percentile for age and sex

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2 to 20 years: Girls
Body mass index-for-age percentiles

NAME
RECORD #

Date	Age	Weight	Stature	BMI*	Comments

*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703

AGE (YEARS)

BMI Growth Curve Characteristics

- BMI curve is "U" shaped
- Up-swing after lowest value is called the "adiposity rebound"
  - After age 6-7 years BMI rises gradually into adulthood
  - Early age (<4-6 years) at adiposity rebound may increase risk of adult obesity
- At each percentile, as you track over time, BMI increases
- There are periods where BMI increases more rapidly (slope is steeper) and these times have increased risk of becoming overweight

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Limitations of BMI and Growth Curve

- Proxy for adiposity
  - Does not distinguish between overweight and excess adiposity
- Not as accurate in some body types
  - Does not take into consideration distribution of adipose tissue
- Crosses the Adult BMI cut-offs for older adolescents

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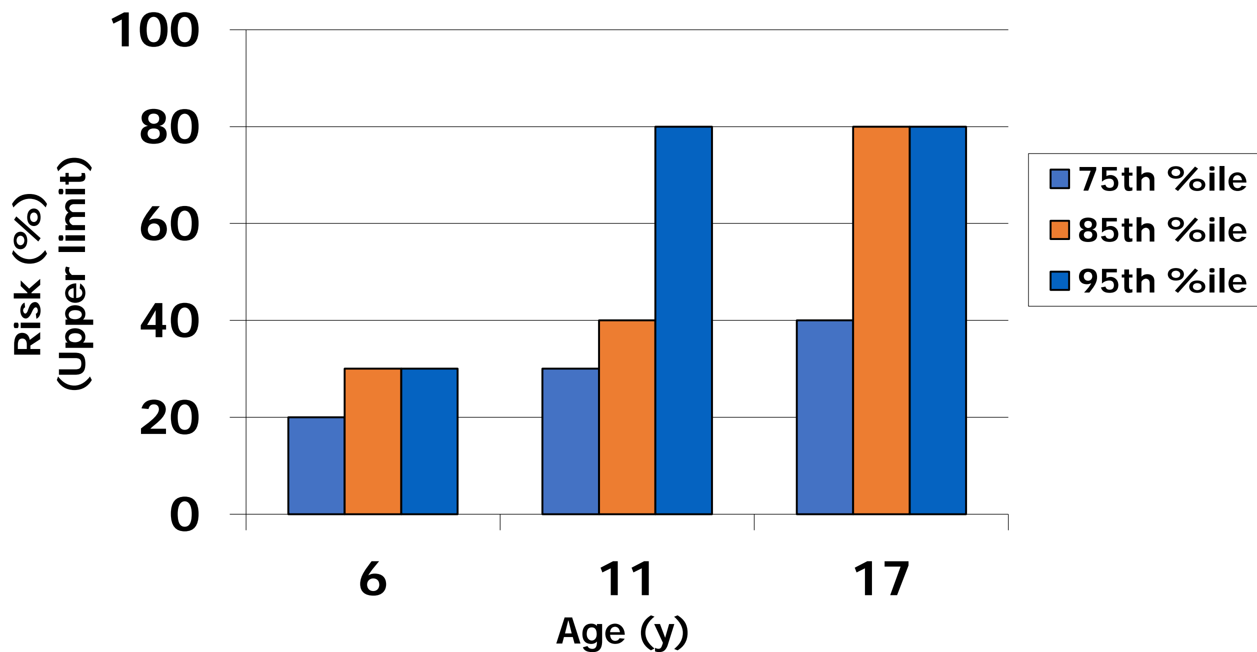
Childhood Overweigh and Obesity: Adult Obesity Risk



Prevention

- Most rapid weight gain is between 2-6 years of age
- Early Identification of BMI %ile acceleration trend
- Effective early childhood interventions are needed

Adapted from Guo SS, et al. 1999

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Social-Ecological Factors Related to Childhood Obesity

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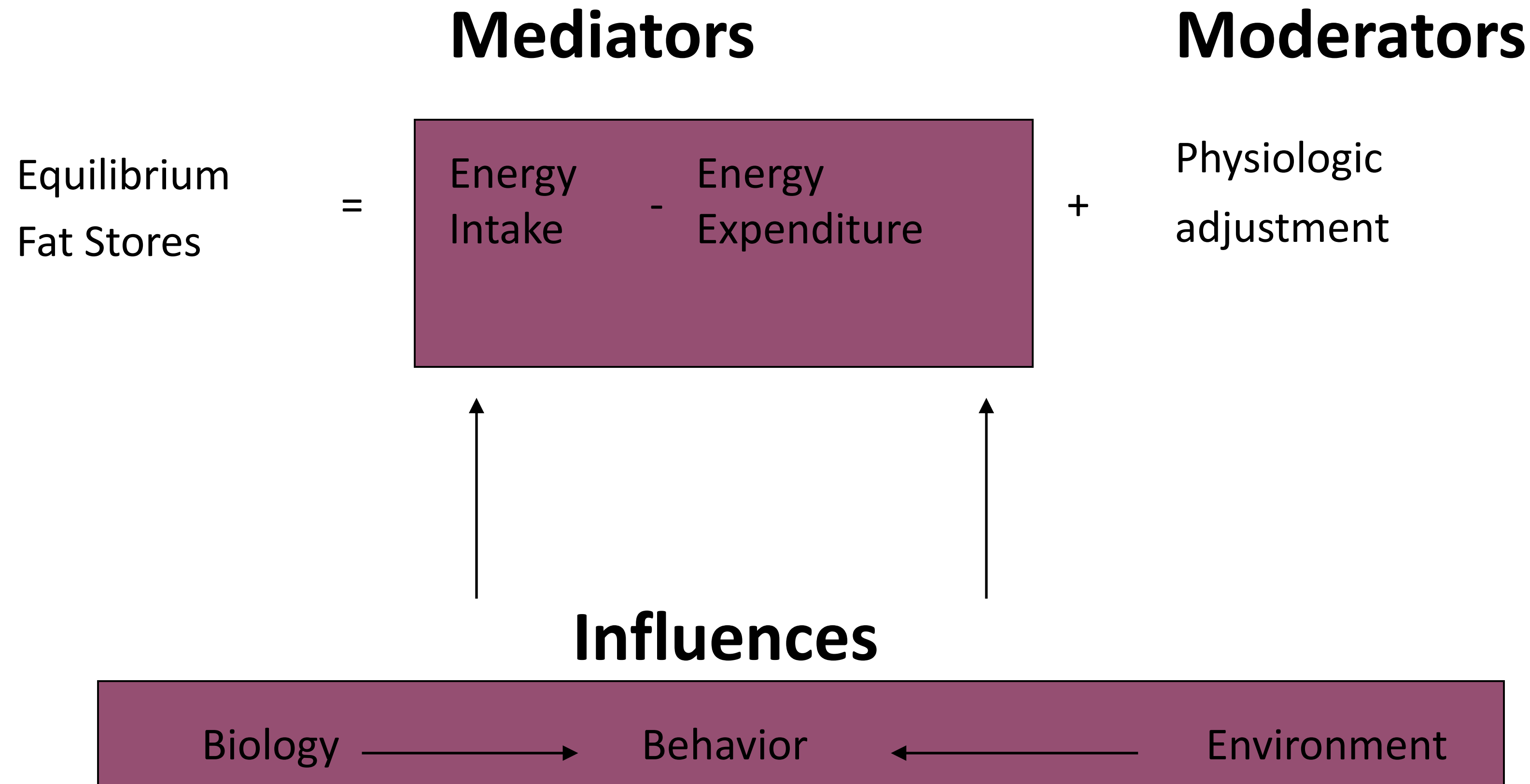
An Ecological Paradigm



Source: Egger G. BMJ 1997;315:477-480

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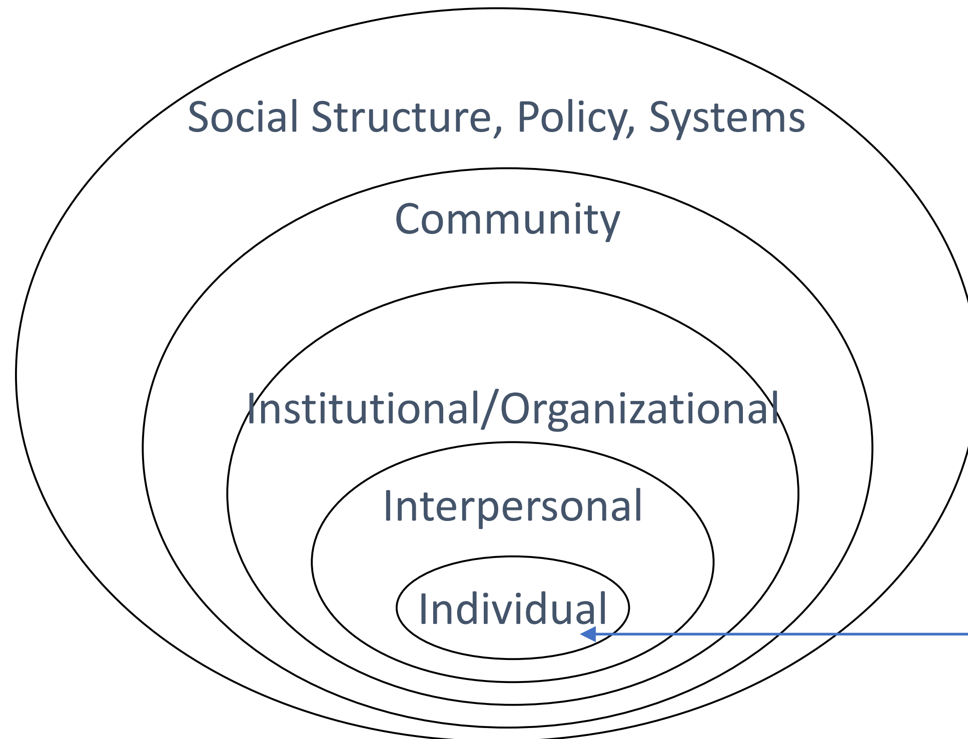
The Social-Ecological Model



<u>Individual Factors</u>

- ↑ **TV**, computers, video games
- ↓ **Physical activity/outdoor play**
- Fat intake
- Food preferences
- **Soft drinks**
- Food preparation

Health Educ Q 1988;15: 351-377

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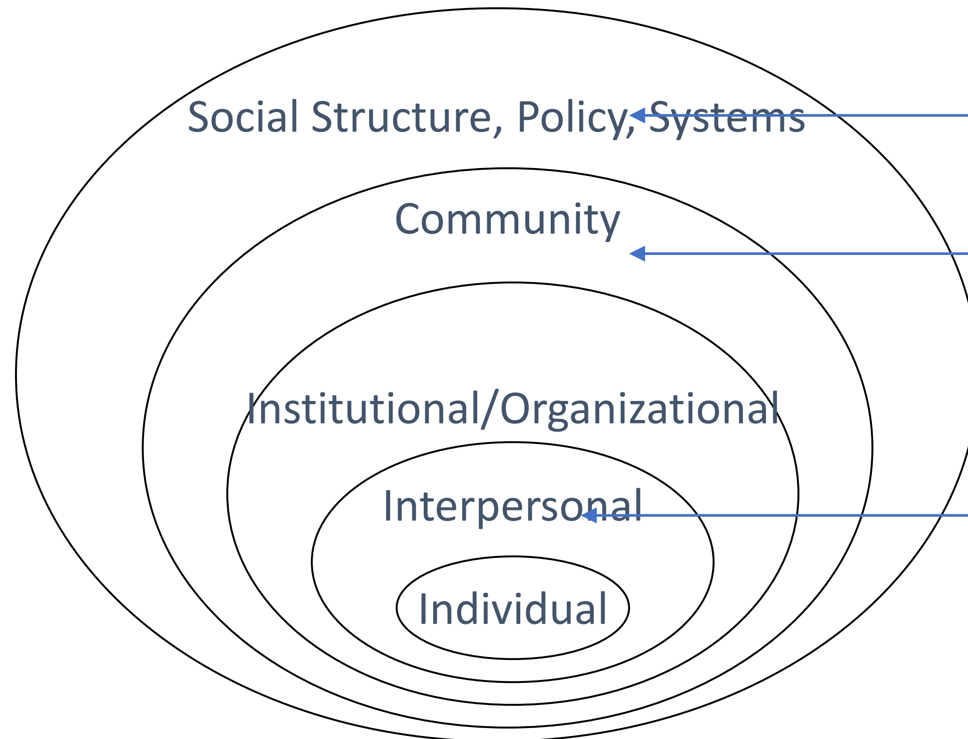
The Social-Ecological Model



Health Educ Q 1988;15: 351-377

Social/Environmental Factors/ Family Factors

- Parental eating patterns
- Feeding styles/child temperament
- **Eating out/food availability**
- Peer eating patterns and food choices
- Media
- Healthy food availability cost
- Cultural cooking patterns and food preferences

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BMI Screening and Other Interventions

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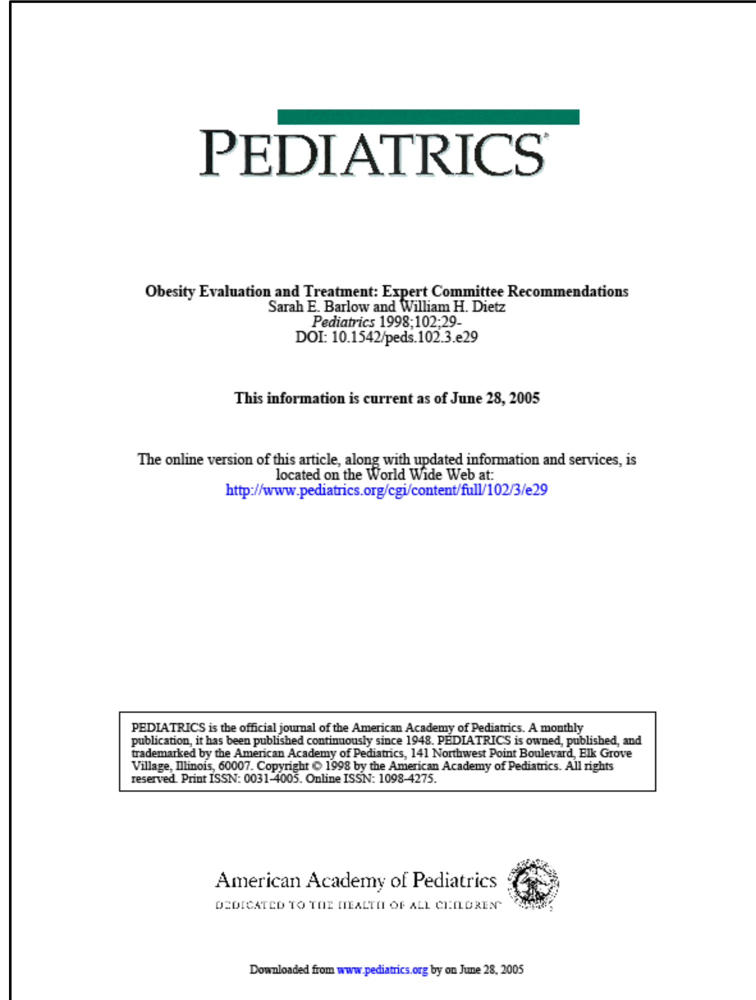
Obesity Screening Recommendations



PEDIATRICS

Obesity Evaluation and Treatment: Expert Committee Recommendations
Sarah E. Barlow and William H. Dietz
Pediatrics 1998;102;29-
DOI: 10.1542/peds.102.3.e29

This information is current as of June 28, 2005

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://www.pediatrics.org/cgi/content/full/102/3/e29

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Overweight and obesity recommendations have been promoted since 1998

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Obesity Screening Recommendations

SUPPLEMENT ARTICLE

Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report

Sarah E. Barlow, MD, MPH and the Expert Committee

Division of Pediatric Gastroenterology, Nutrition, and Hepatology, Department of Pediatrics, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas

The author has indicated she has no financial relationships relevant to this article to disclose.

ABSTRACT

To revise 1998 recommendations on childhood obesity, an Expert Committee, comprised of representatives from 15 professional organizations, appointed experienced scientists and clinicians to 3 writing groups to review the literature and recommend approaches to prevention, assessment, and treatment. Because effective strategies remain poorly defined, the writing groups used both available evidence and expert opinion to develop the recommendations. Primary care providers should universally assess children for obesity risk to improve early identification of elevated BMI, medical risks, and unhealthy eating and physical activity habits. Providers can provide obesity prevention messages for most children and suggest weight control interventions for those with excess weight. The writing groups also recommend changing office systems so that they support efforts to address the problem. BMI should be calculated and plotted at least annually, and the classification should be integrated with other information such as growth pattern, familial obesity, and medical risks to assess the child's obesity risk. For prevention, the recommendations include both specific eating and physical activity behaviors, which are likely to promote maintenance of healthy weight, but also the use of patient-centered counseling techniques such as motivational interviewing, which helps families identify their own motivation for making change. For assessment, the recommendations include methods to screen for current medical conditions and for future risks, and methods to assess diet and physical activity behaviors. For treatment, the recommendations propose 4 stages of obesity care; the first is brief counseling that can be delivered in a health care office, and subsequent stages require more time and resources. The appropriateness of higher stages is influenced by a patient's age and degree of excess weight. These recommendations recognize the importance of social and environmental change to reduce the obesity epidemic but also identify ways healthcare providers and health care systems can be part of broader efforts.

www.pediatrics.org/cgi/doi/10.1542/peds.2007-2329C

doi:10.1542/peds.2007-2329C

Key Words
obesity, prevention, assessment, treatment, clinical practice pattern, chronic care model, office management, motivational interviewing, overweight, patient education, nutrition assessment

Abbreviations
AST—aspartate aminotransferase
ALT—alanine aminotransferase
CDC—Centers for Disease Control and Prevention
NAFLD—nonalcoholic fatty liver disease
USDA—US Department of Agriculture
CE—consistent evidence
ME—mixed evidence

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The Recommendations from the Expert Committee

- Assessment
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- Treatment

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Obesity Screening Recommendations

Expert Committee Recommendations on the Assessment, Prevention and Treatment of Child and Adolescent Overweight and Obesity - 2007

- An Implementation Guide from the Childhood Obesity Action Network -

Overview:

In 2005, the AMA, HRSA and CDC convened an Expert Committee to revise the 1997 childhood obesity recommendations. Representatives from 15 healthcare organizations submitted nominations for the experts who would compose the three writing groups (assessment, prevention, treatment). The initial recommendations were released on June 6, 2007 in a document titled "Appendix: Expert Committee Recommendations on the Assessment, Prevention and Treatment of Child and Adolescent Overweight and Obesity" (www.ama-assn.org/ama/pub/category/11759.html)

In 2006, the National Initiative for Children's Healthcare Quality (NICHQ) launched the Childhood Obesity Action Network (COAN). With more than 40 healthcare organizations and 600 health professionals, the network is aimed at rapidly sharing knowledge, successful practices and innovation. This Implementation Guide is the first of a series of products designed for healthcare professionals by COAN to accelerate improvement in the prevention and treatment of childhood obesity.

The Implementation Guide combines key aspects of the Expert Committee Recommendations summary released on June 6, 2007 and practice tools identified in 2006 by NICHQ from primary care groups that have successfully developed obesity care strategies (www.NICHQ.org). These tools were developed before the 2007 Expert Recommendations and there may be some inconsistencies such as the term *overweight* instead of *obesity* for BMI ≥ 95%ile. The tools are intended as a source of ideas and to facilitate implementation. As tools are updated or new tools developed based on the Expert Recommendations, the Implementation Guide will be updated. The Implementation Guide defines 3 key steps to the implementation of the 2007 Expert Committee Recommendations:

- **Step 1 – Obesity Prevention at Well Care Visits** (Assessment & Prevention)
- **Step 2 – Prevention Plus Visits** (Treatment)
- **Step 3 – Going Beyond Your Practice** (Prevention & Treatment)

Step 1 – Obesity Prevention at Well Care Visits (Assessment & Prevention)

Action Steps	Expert Recommendations	Action Network Tips and Tools
Assess all children for obesity at all well care visits 2-18 years	Physicians and allied health professional should perform, at a minimum, a yearly assessment.	A presentation for your staff and colleagues can help implement obesity prevention in your practice.
Use Body Mass Index (BMI) to screen for obesity	▪ **Accurately measure height and weight** ▪ **Calculate BMI** BMI (English):[weight (lb) ÷ height (in) ÷ height (in)] x 703 BMI (metric):[weight (kg) ÷ height (cm) ÷ height (cm)] x 10,000 ▪ **Plot BMI on BMI growth chart** ▪ Not recommended: skinfold thickness, waist circumference	BMI is very sensitive to measurement errors, particularly height. Having a standard measurement protocol as well as training can improve accuracy. BMI calculation tools are also helpful. Use the CDC BMI %ile-for-age growth charts.
Make a weight category diagnosis using BMI percentile	▪ < 5%ile Underweight ▪ 5-84%ile Healthy Weight ▪ 85-94%ile Overweight ▪ 95-98%ile Obesity ▪ ≥ 99%ile	Until the BMI 99%ile is added to the growth charts, Table 1 can be used to determine the 99%ile cut-points. **Physicians should exercise judgement when choosing how to inform the family. Using more neutral terms such as *weight, excess weight, body mass index, BMI, or risk for diabetes and heart disease* can reduce the risk of stigmatization or harm to self-esteem.**
Measure blood pressure	▪ Use a cuff large enough to cover 80% of the upper arm ▪ Measure pulse in the standard manner	Diagnose hypertension using NHLBI tables. An abbreviated table is shown below (Table 2).
Take a focused family history	▪ Obesity ▪ Type 2 diabetes ▪ Cardiovascular disease (hypertension, cholesterol) ▪ Early deaths from heart disease or stroke	A child with one obese parent has a 3 fold increased risk of becoming obese. This risk increases to 13 fold with 2 obese parents. Using a clinical documentation tool can be helpful.

Childhood Obesity Action Network *The Healthcare Campaign to Stop the Epidemic* NICHQ

- **Step 1 – Obesity Prevention at Well Care Visits** (Assessment & Prevention)
- **Step 2 – Prevention Plus Visits** (Treatment)
- **Step 3 – Going Beyond Your Practice** (Prevention & Treatment)

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Obesity Screening Recommendations

- AAP and AAFP: 2003/2007 All children and adolescents should be screened yearly by BMI to allow early recognition of excessive weight gain for linear growth.
- USPSTF: 2005 The evidence is insufficient to recommend for or against routine screening for overweight in children and adolescents as a means to prevent adverse health outcomes.
  - Reflects the limited good-quality evidence on the effectiveness of interventions for this problem in the clinical setting.
- USPSTF: 2010/2017 Recommends screening children and adolescents 6 years of age and older and offer or refer them to comprehensive, intensive behavioral interventions to promote improvements in weight status. (B recommendation)

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Other Interventions

- School based education
- School physical activity and nutrition policy
- Family education
- Food pricing policy
- Etc.

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