Thinking and acting upstream: prevention strategies for childhood obesity

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Generation XXL

Fat for Life?
Six Million Kids Are Seriously Overweight. What Families Can Do.

By Geoffrey Cowley & Sharon Begley
Objectives

• To describe the state of science on childhood obesity prevention

• To discuss clinical recommendations

• To evaluate an innovative program
  – iStart Smart program
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 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 or less than 85th percentile).

A 10-year-old boy with a BMI of 13 would be in the underweight category (less than 5th percentile).
Childhood obesity trends

NOTE: Obesity is defined as body mass index (BMI) greater than or equal to sex- and age-specific 95th percentile from the 2000 CDC Growth Charts.

2011 State Prevalence Among Low-Income Children Aged 2 to 4 Years

![Map showing obesity prevalence among states and territories](image-url)

**Obesity Prevalence Among Territories and Indian Tribal Organizations**
- Cheyenne River Sioux (SD)
- Choctaw (MS)
- Chippewa (WI)
- Crow (MT)
- Eastern Shoshone (WY)
- Inter Tribal Council of Arizona
- Navajo Nation (AZ, NM, UT)
- Puerto Rico
- Rosebud Sioux (SD)
- Standing Rock Sioux (ND)
- Three Affiliated Tribes (ND)
- Virgin Islands
Racial disparities

CDC 2007-2008 data
Good News

- Preschool-age children: ↓ from 15.21% in 2003 to 14.95% in 2010.

- Several cities and states have reported declines in childhood obesity prevalence (Philadelphia, New Your City, Mississippi and CA)
  - These states have taking comprehensive action such as post calorie information on menu, nutrition program in public schools)
WHY DO WE CARE?
RISK OF OBESE CHILDREN BECOMING OBESE ADULTS

<table>
<thead>
<tr>
<th>Age</th>
<th>Risk Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschool</td>
<td>32</td>
</tr>
<tr>
<td>School-age</td>
<td>50</td>
</tr>
<tr>
<td>Adolescent</td>
<td>80</td>
</tr>
</tbody>
</table>

The Vicious Cycle of Childhood Obesity

- Healthy Child
- Obese Adult
- Obese Childhood
- Extra 20-50 lbs
- Exercise intolerable & painful
- Severely Obese Child
- Mildly Obese Child
- Moderately Obese Child
- High meat intake
- All Study - No Action
- High Snacks
- Snack Foods
- High Sugars
- High Calories
- Fast Foods
- Snack Foods
- TV & GAMES
- Weights & BMI
- Childhood Obesity
- Childhood Mortality
Complications of Childhood Obesity

Psychosocial
- Poor self-esteem
- Depression
- Quality of life

Neurological
- Pseudotumor cerebri
- Risk for stroke

Cardiovascular
- Dyslipidemia
- Hypertension
- Left ventricular hypertrophy
- Chronic inflammation
- Endothelial dysfunction
- Risk of coronary disease

Renal
- Glomerulosclerosis
- Proteinuria

Endocrine
- Type 2 diabetes
- Precocious puberty
- Polycystic ovary syndrome (girls)
- Hypogonadism (boys)

Gastrointestinal
- Pancreatitis
- Steatohepatitis
- Liver fibrosis
- Gallstones
- Risk for cirrhosis
- Risk for colon cancer

Musculoskeletal
- Forearm fracture
- Blount’s disease
- Slipped capital femoral epiphysis
- Flat feet
- Risk for degenerative joint disease

Skeletal
- DVT/PE

Stress incontinence
- Risk of GYN malignancy
## Incidence of Type 2 Diabetes

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>10-14 yrs</th>
<th>15-19 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native American</td>
<td>25.3/100,000 person yrs</td>
<td>49.4</td>
</tr>
<tr>
<td>African American</td>
<td>22.3</td>
<td>19.4</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>11.8</td>
<td>22.7</td>
</tr>
<tr>
<td>Hispanic</td>
<td>8.9</td>
<td>17.0</td>
</tr>
<tr>
<td>Non Hispanic White</td>
<td>3.0</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Dabelea, D. et al, JAMA, 2007; 297:2715-2724
Psychological Morbidity

• Obesity Associated Psychological Conditions
  – Depression
  – Anxiety
  – Low self esteem
  – Teasing/Bullying
  – Binge eating disorder
Stigma and obesity

- No one is immune
  - Children as young as 3 years old express negative attitudes
  - Parents express negative attitudes about their own children
  - These negative attitudes strengthen over time

> Schwartz and Puhl, Obesity review, 2003;4;57-71.
Chronic care model for childhood obesity

- MI, education and monitor
- Ways to identify pts
- Evidence-based guidelines
- Progress evaluation

- Community
- Health System Primary Care Clinic
- Self-management Support
- Delivery System Redesign
- Decision Support
- CIS
- Resources & Policies
Can you see risk?

- 3 year and 3 weeks old boy
- Is his BMI-for-age
  - normal?
  - overweight?
  - obese?
3 yr old boy
BMI=18.24
*95th percentile
Obese

- Height is 39.7 inches (101 cm, 1.01m)
- Weight is 41.0 pounds (18.6 kg)
- BMI calculation
  weight (kg)/height² (m)
Obesity Prevention, Screening, and Treatment: Practices of Pediatric Providers Since the 2007 Expert Committee Recommendations

John Conrad Rausch, MD, MPH¹, Emily Rothbaum Perito, MD², and Patricia Hametz, MD, MPH¹

Clinical pediatrics, 2011, 50; 434-441
Study methods

• Cross-sectional; surveys general pediatric and family medicine attending and residents in 2009 (5 community-based hospitals)

• 3 sets of questions focused on screening practices, perceptions of counseling and services offered.

• N = 96
  – 78% female
  – 81% general pediatrics, 15% family medicine, 4% adolescent medicine
  – 45% Residents, 38% Attendings and 17% Interns
Key findings

• All checked height and weight at least yearly.
• The majority reported checking BMI (90%) and BMI percentile (83%).
• < 50% of attendings and < 25% of interns and residents used the recommended criteria for obesity.
• The majority of providers always or sometimes asked patients or their families about family history of complications of obesity.
• Only 21% always or sometimes asked about a family history of obesity.
Figure 1. Provider’s comfort level with counseling Response was significantly different based on level of training ($\chi^2 P$-value = .006).
Figure 2. Provider’s self-reported effectiveness of counseling
Response was not significantly different based on level of training
($\chi^2$ p-value = .08).
Pediatric Nurse Practitioners’ Assessment and Management of Childhood Overweight/Obesity: Results from 1999 and 2005 Cohort Surveys

Study Methods

• Cohorts of PNP (N=413)
  – 97% were female
  – In 1999 40.7% of PNP have < 5 yrs of practice
  – In 2005 20% of PNP have < 5 yrs of practice
  – In both 1999 and 2005, about 93% of PNP practiced in pediatrics specialty area (90% in primary care)

• Online surveys
## Childhood obesity assessment

<table>
<thead>
<tr>
<th>Assessment</th>
<th>1999 M (SD)</th>
<th>2005 M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of overweight</td>
<td>35.33 (15.73)</td>
<td>48.97 (15.58)</td>
</tr>
<tr>
<td>Medical condition screening</td>
<td>45.30 (25.68)</td>
<td>55.36 (25.63)</td>
</tr>
<tr>
<td>Laboratory evaluations</td>
<td>45.20 (18.42)</td>
<td>62.52 (19.36)</td>
</tr>
<tr>
<td>Psychological, emotional, and behavioral</td>
<td>87.57 (19.33)</td>
<td>79.83 (23.54)</td>
</tr>
<tr>
<td>assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of family history</td>
<td>73.59 (26.39)</td>
<td>78.05 (20.90)</td>
</tr>
<tr>
<td>Physical activity assessment</td>
<td>93.95 (17.45)</td>
<td>95.00 (14.13)</td>
</tr>
<tr>
<td>Type of counseling</td>
<td>1999 M (SD)</td>
<td>2005 M (SD)</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Nutritional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td>85.23 (15.04)</td>
<td>88.17 (13.96)</td>
</tr>
<tr>
<td>School-aged</td>
<td>93.67 (12.73)</td>
<td>94.48 (9.72)</td>
</tr>
<tr>
<td>Adolescence</td>
<td>94.98 (8.93)</td>
<td>94.38 (10.06)</td>
</tr>
<tr>
<td>Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td>88.46 (16.44)</td>
<td>91.37 (13.27)</td>
</tr>
<tr>
<td>School-aged</td>
<td>99.73 (2.61)</td>
<td>99.78 (2.32)</td>
</tr>
<tr>
<td>Adolescence</td>
<td>99.55 (3.32)</td>
<td>98.49 (10.05)</td>
</tr>
</tbody>
</table>
A systematic review of primary healthcare provider education and training using the Chronic Care Model for Childhood Obesity

D. Jacobson and B. Gance-Cleveland

Primary care intervention: Does it work?

Components of primary care interventions to treat childhood overweight and obesity: a systematic review of effect

G. M. Sargent¹, L. S. Pilotto¹ and L. A. Baur²

Major findings

- 47% found significant anthropometric changes.
- 30% reported significant improvement in metabolic measures.
- 60% reported significant behavioral changes.
- Tailored intervention produced better outcomes if:
  - Behavior change is feasible in short and low-intensity.
  - Intense intervention (1 contact per week) that includes PA sessions.
  - Have more than 5 contacts during the course of intervention.
• The use of up to three of the following behavior change targets:
  – Incorporating both healthier diet and activity into the daily routine
  – Decreasing sedentary behavior
  – Maintaining a calorie restricted diet
  – Attending physical activity sessions
  – Achieving a healthier diet.

• The use of up to three of the following strategies to affect behavior change
  – Counseling or education
  – Provision of written resources
  – Motivation or support
Thinking and Acting Upstream: Prevention strategies for childhood obesity

Monica Kwan, MD
CANP Conference
March 24, 2013
Objectives

• Brief review of Expert Committee Recommendations from 2007

• Describe our clinical model for intervention: iStart Smart!
Goals of the Expert Recs

Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity (2007)

• Screen for BMI and obesity-related risk factors
• Targeted clinical interventions by the primary care provider, which include:
  – Messages of obesity-focused education
  – Family-centered communication
  – Emphasis on long-term changes in behaviors
• Staged approach to weight management
Well Visit Assessment

- **Annual check of BMI in kids ≥ age 2**
  - Overweight 85-94%ile, Obese ≥95%ile

- **Focused family hx**
  - Obesity, type 2 diabetes, cardiovascular disease, early death from heart disease or stroke

- **Assess behaviors & attitudes**
  - Diet, exercise, screens, readiness to change

- **Focused ROS**
  - Consider comorbidities
Well Visit Assessment

**Blood pressure**
- NHLBI tables: gender, age, ht

**Order appropriate labs**
- BMI 85-94%ile without risk factors
  - Fasting Lipid profile
- BMI 85-94%ile, age 10 yrs+ with risk factors OR BMI 95%ile, age 10 yrs+
  - Fasting Lipid profile, AST/ALT, Fasting glucose
Our message is the same

Drink less or 0 soda and juice. Try water and low-fat milk instead.
Staged Approach to Management

Primary care based

- Stage 1: Prevention Plus
- Stage 2: Structured Weight Management
- Stage 3: Comprehensive Multidisciplinary Intervention
- Stage 4: Tertiary Care Intervention

Tertiary care based

Advance stages if no improvement in weight/BMI status in 3-6 months AND family ready to change.
## Weight Loss Targets

<table>
<thead>
<tr>
<th>Age</th>
<th>BMI 85-94%ile No Risks</th>
<th>BMI 85-94%ile With Risks</th>
<th>BMI 95-98%ile</th>
<th>BMI &gt;= 99%ile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 2-5 Years</td>
<td>Maintain weight velocity</td>
<td>Decrease weight velocity or weight maintenance</td>
<td>Weight maintenance</td>
<td>Gradual weight loss of up to 1 pound a month if BMI is very high (&gt;21 or 22 kg/m²)</td>
</tr>
<tr>
<td>Age 6-11 Years</td>
<td>Maintain weight velocity</td>
<td>Decrease weight velocity or weight maintenance</td>
<td>Weight maintenance or gradual loss (1 lb per month)</td>
<td>Weight loss (average is 2 pounds per week)*</td>
</tr>
<tr>
<td>Age 12-18 Years</td>
<td>Maintain weight velocity. After linear growth is complete, maintain weight</td>
<td>Decrease weight velocity or weight maintenance</td>
<td>Weight loss (average is 2 pounds per week)*</td>
<td>Weight loss (average is 2 pounds per week)*</td>
</tr>
</tbody>
</table>

*Decreased BMI Velocity*
## Recommendations for treatment of childhood obesity

<table>
<thead>
<tr>
<th>Stage</th>
<th>Staff and skills</th>
<th>Nutrition goals</th>
<th>Activity goals</th>
<th>Behavior intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Prevention plus</td>
<td>Primary care provider</td>
<td>• Encourage consumption of 5 or more servings of vegetables or fruit daily</td>
<td>• Less than 2 hours of television or other screen</td>
<td>• Reinforce goals at each health care visit, additional visits as tolerated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Minimize sugared beverages</td>
<td>time per day</td>
<td>• Allow child to self-regulate, avoid overly strict eating regimens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eat breakfast every day</td>
<td>• More than 1 hour of physical activity daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eat most meals at home and as a family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: Structured weight management</td>
<td>Primary care physician or provider with additional training in nutrition or behavioral counseling (eg, dietitian)</td>
<td>Stage 1 plus: • Daily eating plan, with scheduled meals and snacks</td>
<td>Stage 1 plus: • Less than 1 hour of television or other screen time daily</td>
<td>• Monthly patient-provider contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Emphasize foods with low energy density</td>
<td>• More than 1 hour of physical activity daily</td>
<td>• Monitor eating and physical activities through logs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduce frequency and quantity of foods with high energy density (eg, fried foods, baked goods, fats)</td>
<td></td>
<td>• Use positive reinforcement techniques (reward system)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Limit portion size</td>
<td></td>
<td>• Strong parental involvement for school-aged children</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Set explicit behavior goals</td>
<td></td>
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</tr>
</tbody>
</table>

*UpToDate 2013*
### Comprehensive Multidisciplinary Intervention

- Multidisciplinary team with childhood obesity expertise OR primary care-based program with counselor, dietitian, and use of structured outside activity program.

### Stage 2 Plus

- Structured diet and physical activity designed for negative energy balance.

### Similar to Stage 2, Supported by Behavioral Interventions

- Weekly patient-provider contact (and/or phone).
- Similar, but with increased structure and accountability.
- Parent training in behavioral techniques to improve home eating and activity environment.

### Tertiary Care Intervention

- Multidisciplinary team with childhood obesity expertise, including obesity medicine physician to rigorously assess comorbidities.

As guided by established protocols. Various modalities are available, including: highly structured diets, medications, or bariatric surgery.

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Most children 2 years and older who are overweight or obese start at stage 1 (Prevention plus). Those who are older than 6 years progress to higher stages if there is no improvement in BMI percentile or trend after 3 to 6 months of treatment. Initiating treatment at higher stages of intervention is appropriate for children who are older, more severely obese (BMI >99th percentile) and motivated. 

1 Identification
Calculate and plot BMI at every well child visit

2 Assessment
Medical Risk
- Sedentary time
- Eating
- Physical activity

Behavior Risk
- Family and patient concern and motivation

Attitudes
- Target behavior
- Identify problem behaviors
- If no problem behaviors, praise current practice

3 Prevention
- Patient/family counseling
- Review any risks (e.g., DM)
- Use patient-directed techniques to encourage behavior change (see algorithm table)

BMI 5th-84th percentile
- Child history & exam
- Child growth
- Parental obesity
- Family history

BMI 85th-94th percentile
- Child history & exam
- Child growth
- Parental obesity
- Family history
- Laboratory, as needed

BMI ≥ 95th percentile
- Child history & exam
- Child growth
- Parental obesity
- Family history
- Laboratory

Intervention for Treatment
(Advance through stages based on age and BMI)

Stage 1 Prevention Plus
Primary care office

Stage 2 Structured Weight Management
Primary care office with support

Stage 3 Comprehensive Multidisciplinary Intervention
Pediatric weight management center

Stage 4 Tertiary Care Intervention (select patients)
Tertiary care center
Developing a Unique Partnership

Research

Health Ed

Medical Exams

Fitness

NEMS
NORTH
EAST
MEDICAL SERVICES

iStart Smart! 「精英少年」計劃
iStart Smart! Goals

- Rates of overweight/obese kids on the rise
- Established intervention, evidence-based, positive health outcomes

- Treatment requires a multidisciplinary team approach
- Patients benefit from peer and health coach support

- Structured interval follow up in motivated cohorts
- Leads to improved compliance with medical visits

- Improve medical care
- Increase patient satisfaction
- Create self-funding program
Primary care provider referrals

Baseline assessment

INTERVENTION x 8 weeks
- Health education for kids (45min/week)
- Fitness class for kids (60min/week) *
- Parent workshop x 1 hour
- Family Field Trip
- Medical visits with MD x 2

Follow up assessment immediately after intervention *

3 month post-intervention assessment*

(* Graduates offered weight checks q2-3months, and ongoing fitness class)


Methods

• A pre- and post study design was utilized.

• Measurements include:
  • children’s weight, height, BP, waist circumference, and physical activity levels, self-efficacy at baseline ($T_0$), immediately ($T_1$), and 3 months ($T_2$) post-intervention

• $N = 22$
  • The mean age of children was 9.86 years (SD=1.56). The mean BMI was 25.53(SD=3.65).
  • 95% of families reported annual household income less than $40,000.
## Other outcomes

<table>
<thead>
<tr>
<th></th>
<th>Child</th>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program was fun</td>
<td>70%</td>
<td>91%</td>
</tr>
<tr>
<td>Learn something news</td>
<td>80%</td>
<td>95%</td>
</tr>
<tr>
<td>Eat more F/V</td>
<td>79%</td>
<td>85%</td>
</tr>
<tr>
<td>More active</td>
<td>68%</td>
<td>81%</td>
</tr>
</tbody>
</table>
iStart Smart lessons

Enhanced EMR