Health Care Guideline
Prevention and Management of Obesity for Children and Adolescents

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Evidence Grading

Literature Search

A consistent and defined process is used for literature search and review for the development and revision of ICSI guidelines. Literature search terms for the current revision of this document included pediatrics, children, childhood obesity published since November 2005, systematic reviews, randomized control trials, meta-analysis, restricted to human studies, limited to pediatrics in the following topic areas: prevention, screening, treatments/drug studies, medications, gastric bypass and/or bariatric surgery, lipid and cholesterol screening, activity recommendations, screen time (TV, computer, video gaming), genetic studies, family-based therapy, readiness for change, motivational interviewing, goal setting, managing chronic conditions, binge eating disorders, binge eating disorder assessment and scale.

GRADE Methodology

Following a review of several evidence rating and recommendation writing systems, ICSI has made a decision to transition to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system. GRADE has advantages over other systems including the current system used by ICSI. Advantages include:

- developed by a widely representative group of international guideline developers;
- explicit and comprehensive criteria for downgrading and upgrading quality of evidence ratings;
- clear separation between quality of evidence and strength of recommendations that includes a transparent process of moving from evidence evaluation to recommendations;
- clear, pragmatic interpretations of strong versus weak recommendations for clinicians, patients and policy-makers;
- explicit acknowledgement of values and preferences; and
- explicit evaluation of the importance of outcomes of alternative management strategies.

In the GRADE process, evidence is gathered related to a specific question. Systematic reviews are utilized first. Further literature is incorporated with randomized control trials or observational studies. The evidence addresses the same population, intervention, comparisons and outcomes. The overall body of evidence for each topic is then given a quality rating.

Once the quality of the evidence has been determined, recommendations are formulated to reflect their strength. The strength of a recommendation is either strong or weak. Low quality evidence rarely has a strong recommendation. Only outcomes that are critical are considered the primary factors influencing a recommendation and are used to determine the overall strength of this recommendation. Each recommendation answers a focused health care question.

- All existing Class B, C and D studies have been considered as low quality evidence unless specified differently by a work group member.
- All existing Class M and R studies are identified by study design versus assigning a quality of evidence. Refer to Crosswalk between ICSI Evidence Grading System and GRADE.
- All new literature considered by the work group for this revision has been assessed using GRADE methodology.

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<table>
<thead>
<tr>
<th>Category</th>
<th>Quality Definitions</th>
<th>Strong Recommendation</th>
<th>Weak Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Quality Evidence</td>
<td>Further research is very unlikely to change our confidence in the estimate of effect.</td>
<td>The work group is confident that the desirable effects of adhering to this recommendation outweigh the undesirable effects. This is a strong recommendation for or against. This applies to most patients.</td>
<td>The work group recognizes that the evidence, though of high quality, shows a balance between estimates of harms and benefits. The best action will depend on local circumstances, patient values or preferences.</td>
</tr>
<tr>
<td>Moderate Quality Evidence</td>
<td>Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.</td>
<td>The work group is confident that the benefits outweigh the risks but recognizes that the evidence has limitations. Further evidence may impact this recommendation. This is a recommendation that likely applies to most patients.</td>
<td>The work group recognizes that there is a balance between harms and benefits, based on moderate quality evidence, or that there is uncertainty about the estimates of the harms and benefits of the proposed intervention that may be affected by new evidence. Alternative approaches will likely be better for some patients under some circumstances.</td>
</tr>
<tr>
<td>Low Quality Evidence</td>
<td>Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change. The estimate or any estimate of effect is very uncertain.</td>
<td>The work group feels that the evidence consistently indicates the benefit of this action outweighs the harms. This recommendation might change when higher quality evidence becomes available.</td>
<td>The work group recognizes that there is significant uncertainty about the best estimates of benefits and harms.</td>
</tr>
</tbody>
</table>
### Recommendations Table

The following table is a list of evidence-based recommendations for the Prevention and Management of Obesity for Children and Adolescents.

Note: Other recommendation language may appear throughout the document as a result of work group consensus but is not included in this evidence-based recommendations table.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Quality of Evidence</th>
<th>Recommendations</th>
<th>Strength of Recommendation</th>
<th>Annotation Number</th>
<th>Relevant Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>High</td>
<td>Obesity prevention messages should be targeted at all families, starting at the time of the child’s birth.</td>
<td>Strong</td>
<td>1</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>An assessment of diet, physical activity and sedentary behaviors should be done annually, preferably at a well child visit. This assessment should be used to target appropriate messages to each family.</td>
<td>Strong</td>
<td>1</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Clinicians may suggest that children get at least 60 minutes of moderate exercise daily.</td>
<td>Strong</td>
<td>1</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Clinicians should counsel children and families to: • limit their child’s consumption of sugar sweetened beverages; • eat a diet with the recommended quantities of fruits and vegetables; • eat breakfast daily; • eat meals together as much as possible; • limit eating out, especially eating at fast food restaurants; • adjust portion sizes appropriately for age; • avoid television for children under the age of two; and • limit television and “screen time” to less than two hours per day.</td>
<td>Strong</td>
<td>1</td>
<td>Barlow, 2007; Choosemyplate.gov</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>It is recommended clinicians direct pediatric patients and their families to limit portion sizes (per USDA current recommendations, which may be different than serving sizes on the package label, and products may contain &gt; 1 serving).</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Clinicians should continue to promote milk and milk products to pediatric patients and their families for nutritional benefits including calcium, vitamin D and other micronutrients for bone health and potassium for healthy blood pressure with the understanding that current evidence points to consumption of these products as playing no unique role in weight management.</td>
<td>Strong</td>
<td>6</td>
<td>Lanou, 2008; Barlow 2007</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Clinicians should continue to promote a high-fiber diet to pediatric patients and their families in order to increase nutrient density, and promote healthy lipid profiles, normal gastrointestinal function and glucose tolerance with the understanding there is insufficient evidence that dietary fiber is protective against obesity at this time.</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007 Nutrition Evidence Library</td>
</tr>
</tbody>
</table>

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<tr>
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<th>Strength of Recommendation</th>
<th>Annotation Number</th>
<th>Relevant Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening and diagnosis</td>
<td>High</td>
<td>All children should have blood pressure checked annually, starting at age three. Refer also to blood pressure table.</td>
<td>Strong</td>
<td>2</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>All children ages 9-11 should be universally screened for dyslipidemia, using either a non-fasting total cholesterol or a fasting lipid profile. At other ages, a fasting lipid profile should be done if indicated by family history and/or risk factors.</td>
<td>Strong</td>
<td>2</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Health risks that increase the likelihood of obesity and/or related comorbidities should be assessed for at least annually.</td>
<td>Strong</td>
<td>2</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>BMI should be calculated and documented in the medical record on all children ages 2-18 at least annually.</td>
<td>Strong</td>
<td>2</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>CDC growth charts should be used for children ages 2-18; WHO growth curves should be used from birth through 23 months of age.</td>
<td>Strong</td>
<td>2</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Appropriate terminology should be used to classify pediatric overweight and obesity.</td>
<td>Strong</td>
<td>2</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td>Assess for major and minor comorbid conditions</td>
<td>High</td>
<td>Clinicians should obtain focused family history of obesity and type 2 diabetes mellitus (DM) and cardiovascular disease (CVD) in first- and second-degree relatives to assess the risk of current and future comorbidities associated with the patient’s weight status.</td>
<td>Strong</td>
<td>3</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Clinicians should conduct a focused review of systems and physical examination to identify potential weight-related comorbidities.</td>
<td>Strong</td>
<td>3</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Clinicians should obtain laboratory and radiographic evaluations depending on age, BMI, and physical and historical findings. Clinicians should also consider the likely impact on treatment strategies of the results obtained. If results are unlikely to alter treatment, then the value of the testing may be limited.</td>
<td>Strong</td>
<td>3</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td>Readiness to change – is patient ready to lose weight?</td>
<td>Moderate</td>
<td>Clinicians should use motivational interviewing techniques as a tool for encouraging behavior change.</td>
<td>Strong</td>
<td>4</td>
<td>Rollnick, 2008</td>
</tr>
</tbody>
</table>

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## Recommendations Table

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First Edition/July 2013

<table>
<thead>
<tr>
<th>Topic</th>
<th>Quality of Evidence</th>
<th>Recommendations</th>
<th>Strength of Recommendation</th>
<th>Annotation Number</th>
<th>Relevant Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition</td>
<td>High</td>
<td>Advise pediatric patients and their families to limit their consumption of sugar-sweetened beverages.</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007; Malik, 2006</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Advise pediatric patients and their families to eat a nutrient-dense breakfast daily.</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007; Rampersaud, 2005</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>It is recommended that clinicians counsel pediatric patients and their families to limit eating out at restaurants, particularly fast food restaurants.</td>
<td>Strong</td>
<td>6</td>
<td>Rosenheck, 2008; Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Advise pediatric patients and their families to eat family meals in which caregivers and children eat together.</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>It is recommended that clinicians educate their pediatric patients and their families to consume an eating pattern low in energy density.</td>
<td>Strong</td>
<td>6</td>
<td>Pérez-Escamilla, 2012; Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Advise pediatric patients and their families to model dietary intake per current USDA recommendations.</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>It is recommended that clinicians direct pediatric patients and their families to limit portion sizes (per USDA current recommendations, which may be different than serving sizes on the package label, and products may contain &gt; 1 serving).</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Clinicians should continue to promote milk and milk products to pediatric patients and their families for nutritional benefits including calcium, vitamin D and other micronutrients for bone health and potassium for healthy blood pressure with the understanding that current evidence points to consumption of these products as playing no unique role in weight management.</td>
<td>Strong</td>
<td>6</td>
<td>Lanou, 2008; Barlow, 2007</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Clinicians should continue to promote a high-fiber diet to pediatric patients and their families in order to increase nutrient density, and promote healthy lipid profiles, normal gastrointestinal function and glucose tolerance with the understanding there is insufficient evidence that dietary fiber is protective against obesity at this time.</td>
<td>Strong</td>
<td>6</td>
<td>Barlow, 2007 Nutrition Evidence Library</td>
</tr>
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<th>Strength of Recommendation</th>
<th>Annotation Number</th>
<th>Relevant Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical activity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Clinicians may encourage children and adolescents to engage in moderately intense physical activity for at least 60 minutes per day.</td>
<td>Strong</td>
<td>7</td>
<td>Barlow, 2007</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Clinicians should identify barriers the child, youth or parent might have against increasing physical activity such as time constraints, fear of injury, financial constraints and safety.</td>
<td>Strong</td>
<td>7</td>
<td>Strong, 2005</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Clinicians may recommend that parents become good role models.</td>
<td>Strong</td>
<td>7</td>
<td>Strong, 2005</td>
<td></td>
</tr>
<tr>
<td><strong>Behavior management</strong></td>
<td>High</td>
<td>Lifestyle interventions should be provided for overweight and obese youth.</td>
<td>Strong</td>
<td>8</td>
<td>Whitlock, 2010; Luttikhuis, 2009; Spear, 2007</td>
</tr>
<tr>
<td>Moderate</td>
<td>Providers should help establish target behaviors.</td>
<td>Strong</td>
<td>8</td>
<td>Faith, 2012</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Providers should encourage self-monitoring.</td>
<td>Strong</td>
<td>8</td>
<td>Faith, 2012; Barlow, 2007; Spear, 2007</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Providers should work with the child and/or primary adult caregiver (PAC) to set goal.</td>
<td>Strong</td>
<td>8</td>
<td>Faith, 2012</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Providers should teach children and PACs about stimulus control.</td>
<td>Strong</td>
<td>8</td>
<td>Faith, 2012</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Providers should promote self-management and self-efficacy skills for children and PACs.</td>
<td>Strong</td>
<td>8</td>
<td>Faith, 2012; Barlow, 2007</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>PACs should participate in the treatment process.</td>
<td>Strong</td>
<td>8</td>
<td>Dynamed, 2012; Faith, 2012; Knowlden, 2012; Collins, 2011; Barlow, 2007; American Dietetic Association, 2006</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>PACs should be taught about positive parenting practices and contingency management strategies.</td>
<td>Strong</td>
<td>8</td>
<td>Barlow, 2007; Spear, 2007</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>PACs should model healthy living.</td>
<td>Strong</td>
<td>8</td>
<td>Faith, 2012; Spear, 2007</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Youth can be taught cognitive restructuring.</td>
<td>Weak</td>
<td>8</td>
<td>Spear, 2007</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Youth and PACs can be taught problem-solving skills.</td>
<td>Weak</td>
<td>8</td>
<td>Whitlock, 2010; Spear, 2007; American Dietetic Association, 2006</td>
<td></td>
</tr>
</tbody>
</table>

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Foreword

Introduction

Childhood obesity has risen at an alarming pace over the past decade, making obesity the most prevalent health problem among children in the majority of the developed countries. Since 1980, obesity prevalence among children and adolescents in the United States has almost tripled (Ogden, 2008 [Reference]). One in three children (31.7%) is overweight or obese (White House Task Force on Childhood Obesity, 2010 [Reference]) and approximately 17% (or 12.5 million) of children and adolescents 2-19 years of age are obese.

There are significant racial, ethnic and socioeconomic disparities in obesity prevalence among U.S. children and adolescents. Children are more racially and ethnically diverse than the nation's population as a whole, and obesity prevalence rates are highest in this group (NHANES, 2008 [Reference]). Mexican-American and African American children ages 6-11 are more likely to be obese or overweight than white children. Almost 43% of Mexican-American children and almost 37% of African American children are obese or overweight, compared with about 32% of white children (NHANES, 2008 [Reference]). For two to four year olds, the highest rates of obesity are found in American Indian and Alaska Native (20.7%) and Hispanic (17.9%) children. In 2007-2008, Hispanic boys ages 2 to 19 years were significantly more likely to be obese than non-Hispanic white boys, and non-Hispanic black girls were significantly more likely to be obese than non-Hispanic white girls (Ogden, 2008 [Reference]).

The burden of obesity is greater for lower socioeconomic groups. Children living in families under 200% of the Federal Poverty Level are more likely than their more affluent counterparts to be overweight or at risk for being overweight (NIHCM Foundation, 2007 [Reference]). Children covered by Medicaid are nearly six times more likely to be treated for a diagnosis of obesity than children covered by private insurance (1,115 per 100,000 vs. 195 per 100,000) (Mardner, 2005 [Reference]). Low income families have greater obstacles to overcome in addressing the problem of obesity. Often due to limited finances, transportation and other barriers, low-income families have less access to healthy food choices and safe, affordable opportunities for physical activity for their children.

The causes of obesity are complex and multifactorial. Research on childhood obesity has demonstrated the role of race, ethnicity and social factors such as family income, family structure, and neighborhood safety and amenities. Studies show links between environmental influences, genetics, age, sleep and medication, bottle versus breastfeeding, comorbidities and social relationships, as well as health behaviors such as eating patterns, physical activity levels and screen time. In addition to individual traits and behaviors, the recent rise in obesity on a national level can be attributed to societal changes in eating habits, food and beverage availability, and less-active lifestyles, which has shifted the balance of energy intake and expenditure.

This societal shift has implications for the health of a generation. Childhood obesity is associated with major morbidity. Moreover, it is linked to obesity in adulthood and is a predictor of significant health consequences in early adulthood. Multiple studies have shown that the risk of adult obesity is at least twice as high for obese children as for non-obese children (Serdula, 2005 [Reference]). One study showed that as many as 80% of 10 to 15-year-old overweight children become obese adults (Roberts, 2005 [Reference]).

The body of research linking obesity in childhood to short- and long-term health consequences and obesity in adulthood is increasing. Obesity is associated with hypertension, dyslipidemia, atheroma, type 2 diabetes mellitus, the metabolic syndrome, systemic inflammation and oxidative stress (Molnár, 2008 [Reference]). Concern is growing for the future health of our nation, the economic burden and the effect obesity will have on our health care system.

While this problem spans all age ranges, childhood obesity can be considered unique in its diagnostic, treatment and follow-up considerations. Identification and early intervention of overweight and obesity is critical in preventing or delaying the onset of chronic diseases.
Scope and Target Population

This guideline addresses the prevention, diagnosis and management of childhood obesity from birth through 17 years of age. The guideline encompasses a range of approaches including education, behavioral and lifestyle changes, medication and surgical options. For optimal outcomes, the child's family or other social supports as well as a multidisciplinary team (primary care clinician, consultants, dietitian, school nurse, etc.) should be included in the education, counseling and follow-up.

While we recognize the importance of addressing comorbidities, the treatment of comorbid conditions is outside the scope of this document.

In addition to individual treatment modalities, slowing the national obesity trend will require social changes in the form of healthier policies, system reforms and environmental changes where children live, learn and play. Although this document focuses on individual treatment, we recognize that health care clinicians and health care systems can be effective partners in formulating policy decisions and community design that nurture healthy children.

Aims

1. Increase the percentage of patients ages 2 through 17 years who have an annual screening for obesity using body mass index (BMI) measured and whose BMI percentile status is determined. (Annotation #2)

2. Increase the percentage of patients ages 2 through 17 years with an annual BMI screening who have received education and counseling regarding weight management strategies that include nutrition and physical activity. (Annotations #1, 5, 6, 7, 8)

3. Increase the percentage of patients ages 2 through 17 years with a BMI screening percentile greater than 85 whose percentile decreased within 12 months of screening. (Annotations #1, 5, 6, 7, 8, 9, 10)

Clinical Highlights

- Childhood obesity has risen at an alarming pace over the past decade, making obesity the most prevalent health problem in the majority of the developed countries. (Introduction)

- Obesity prevention messages should be targeted at all families, starting at the time of the child’s birth. (Annotation #1; Aim #2)

- BMI should be calculated and documented in the medical record on all children ages 2-18 at least annually, ideally at a well child visit. (Annotation #2; Aim #1)

- Clinicians should conduct a focused review of systems and physical examination assessing for obesity-related comorbid conditions. (Annotation #3)

- Management intervention strategies are available and include nutrition, physical activity, behavior and lifestyle changes, medication and surgical considerations. (Annotations #5, 6, 7, 8, 9, 10; Aim #2)

- Clinicians should use motivational interviewing techniques as a tool for encouraging behavior change. (Annotations #4, 5, 6, 7, 8, 9, 10; Aim #2)

- Pediatric patients and their families should be counseled on nutritional interventions including limiting sugar-sweetened beverages, eating nutrient-dense breakfasts, limiting eating out at fast food restaurants, and families eating together, among other nutritional strategies. (Annotations #1, 6; Aim #2)
Clinicians should identify barriers the child, youth or parent might have against increasing physical activity such as time constraints, fear of injury, financial constraints and safety. *(Annotation #7; Aim #2)*

Lifestyle interventions should be provided for overweight and obese youth, and their primary adult caregiver (PAC). *(Annotation #8; Aim #2)*

Weight management requires a team approach. Be aware of clinical and community resources. The patient needs to have an ongoing therapeutic relationship and follow-up with a health care team. Weight management is a life long commitment and the health care team can assist with the setting of specific goals with the patient. *(Annotation #5)*

**Implementation Recommendation Highlights**

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline.

- Establish a system for using a Patient Readiness Scale to determine if the patient is ready to talk about weight loss and/or would like information.
- Establish a system for staff to efficiently calculate BMI prior to the clinician entering the clinic examination room. The BMI may provide more health risk information than traditional vital signs and should be built into the patient assessment protocol. A BMI chart should be placed by each scale in the clinic. All organizations with electronic medical records should build BMI calculators as a component for immediate calculation and review.
- Develop a tracking system that periodically reviews patient charts to identify patients who are overweight or obese so that clinicians are aware of the need to discuss the issue with the patient.
- Establish a system for staff and clinician training around skills and knowledge in the areas of motivational interviewing; brief, focused advice on nutrition, physical activity and lifestyle changes; and evaluation of evidence of effectiveness of treatment options.
- Establish a system for continuing education on evidence-based obesity management for clinicians, nurses and ancillary clinic staff.
- Remove barriers to referral programs for weight loss by understanding where programs are and what process is required for referrals.
- Develop medical record systems to track status of patients under the clinician's care with the capability to produce an outpatient tracking system for patient follow-up by clinician/staff.
- Use tools such as posters and brochures throughout the facility to assist with identifying and notifying patients about health risk related to obesity. Promote a healthy lifestyle around nutrition and activity while encouraging patient and parent knowledge of his or her BMI.
- Develop patient- and family-centered education and self-management programs, which may include self-monitoring, self-management and skills such as journaling.
- Build systems to track outcomes measures, as well as ongoing process measures. Track the response rate to various treatments/strategies.
• Systems to coordinate care ensure continuity and keep clinicians informed of progress:
  - Develop electronic tracking systems for panel or population management.
  - Educate patients and families to foster awareness and knowledge of BMI for self-monitoring and reporting.
  - Structure follow-up visits with patient per guideline recommendations.

Definitions

Clinician – All health care professionals whose practice is based on interaction with and/or treatment of a patient.

PAC – Primary adult caregiver
Algorithm Annotations

1. Prevention

Recommendations:

- Obesity prevention messages should be targeted at all families, starting at the time of the child's birth (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

- An assessment of diet, physical activity and sedentary behaviors should be done annually, preferably at a well child visit. This assessment should be used to target appropriate messages to each family (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

- Clinicians may suggest that children get at least 60 minutes of moderate exercise daily (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

- Clinicians should counsel children and families to:
  - Limit their child's consumption of sugar-sweetened beverages
  - Eat a diet with the recommended quantities of fruits and vegetables
  - Eat breakfast daily
  - Eat meals together as much as possible
  - Limit eating out, especially eating at fast food restaurants
  - Adjust portion sizes appropriately for age
  - Avoid television for children under the age of two
  - Limit television and "screen time" to less than two hours per day

(Strong Recommendation, High Quality Evidence) (Barlow, 2007)

The following counseling messages should be directed to all parents, regardless of the weight status of their child.

Healthy Diet

Breastfeeding: Studies suggest that exclusive breastfeeding to six months of age is associated with decreased rates of obesity later in childhood (Barlow, 2007 [High Quality Evidence]). See the ICSI Preventive Services guideline for further information.

Milk: The American Academy of Pediatrics recommends that children be started on cow's milk at 1 year of age. Whole milk is recommended for most children ages 12 months to two years. However, if the child is at risk for overweight or if there is a family history of obesity or cardiovascular disease, 2% milk is recommended. For children ages two years and up, a low-fat (skim or 1%) milk should be used.

Sugar-sweetened beverages: Families should limit their child's consumption of sugar-sweetened beverages (Barlow, 2007 [High Quality Evidence]). Current evidence indicates a strong association between sugar-sweetened beverage consumption and total daily energy intake. Decreasing consumption of sugar-sweetened beverages is one strategy to decrease total daily energy intake (Krebs, 2007 [Reference]).
100% fruit juice: Initial studies suggested there may have been a relationship between 100% fruit juice intake and increased BMI in preschoolers. Further studies have shown only a weak association at best (Krebs, 2007 [Reference]). A review of NHANES data from 1999-2002 shows no association between the consumption of 100% fruit juice and BMI in 2 to 11 year olds. This was based on a 24-hour diet recall (Nicklas, 2008 [Reference]). The American Academy of Pediatrics recommends no juice under the age of 6 months, no more than 4-6 ounces of juice per day for 1-6 year olds, and no more than 8-12 ounces per day for 7-18 year olds.

Fruits and vegetables: Children should eat a diet with the recommended quantities of fruits and vegetables, using the USDA standards at http://www.choosemyplate.gov (Barlow, 2007 [High Quality Evidence]). Fruits and vegetables are high in fiber and water content, which promote satiety and displace the consumption of energy-dense foods (Krebs, 2007 [Reference]).

Meal Structure:

- Children should eat breakfast daily (Barlow, 2007 [High Quality Evidence]). Evidence shows that skipping breakfast decreases the nutritional quality of the diets of both children and adults (Krebs, 2007 [Reference]). Families should eat meals together at the table as much as possible. Family meals are associated with a higher quality diet (Barlow, 2007 [High Quality Evidence]).

- Snacking should be neither encouraged nor discouraged. The current data on meal frequency and snacking are inconclusive (Krebs, 2007 [Reference]). It is the opinion of the work group that if this issue is addressed with families, the focus should be on the quality of meals and snacks, not on the quantity.

Eating out: Eating out at restaurants, especially fast food restaurants, should be limited. Restaurants, especially fast food restaurants, serve energy-dense food that can contribute significantly to a child's daily energy intake (Barlow, 2007 [High Quality Evidence]). The frequency of eating out is associated with body fatness in children and adults (Krebs, 2007 [Reference]).

Portion sizes: Children's portion sizes should be appropriate for age, using USDA recommendations as a guideline. Note that an appropriate portion size may differ from the serving size listed on the package (Barlow, 2007 [High Quality Evidence]). Portion sizes have been shown to influence daily energy intake (Krebs, 2007 [Reference]).

Child self-regulation: Children should be allowed to self-regulate their meals (Barlow, 2007 [Reference]). Encouragement of a "clean plate" should be avoided. One study showed that when children ages 3 to 5 years old are allowed to serve themselves, they serve themselves less than if a plate is prepared for them (Krebs, 2007 [Reference]).

Physical exercise

Clinicians may suggest that children get at least 60 minutes of moderate exercise daily (Barlow, 2007 [High Quality Evidence]). Analysis of 2001-2004 NHANES data shows that obese children are more likely to have low levels of active play, specifically less than seven days per week. Active play is defined as play that caused a child to sweat and breathe hard (Anderson, 2008 [Reference]).

Sleep

Evidence indicates that shorter sleep duration may be associated with increased risk of overweight and obesity in children ages 0-18. Children with a shorter sleep duration have an increased risk of obesity. Studies suggest a linear relationship between sleep duration and obesity for children under age 10. In one study, for each hour increase in sleep, the risk of obesity was reduced by 9% (Chen, 2008 [Reference]).
The following is the recommended sleep duration by age:

- 0-5 years: at least 11 hours
- 5-10 years: at least 10 hours
- 10 years and up: at least 9 hours

(National Sleep Foundation, http://www.sleepfoundation.org - Reference)

Television

The American Academy of Pediatrics recommends no television for children under the age of two, and recommends limiting television and other "screen time" to less than two hours per day for older children.

Increased time watching television has been associated with greater BMI in multiple studies. For example, in an analysis of the NHANES data 2001-2004, obese children ages 4-11 were significantly more likely to watch more than two hours of screen time per day (Anderson, 2008 [Reference]). Furthermore, in a study of children ages 9-12, those with televisions in their bedroom were 1.3 times more likely to be obese than children without it (Adachi-Mejia, 2007 [Reference]).

For a detailed review of age appropriate "well care," including screening, assessment and anticipatory guidance, the work group recommends http://www.brightfutures.org.

The importance of the community in promoting a healthy lifestyle for our children and in preventing overweight and obesity

The work group would like to acknowledge that though many important interventions to improve the health of our children will take place in the home, we all have a role to play. This includes:

- Public policy efforts to promote safe access to parks, trails and roads.
- School efforts to provide a healthy school lunch, decrease student access to "competitive foods" of lower nutritional quality, and to decrease the use of food as a reward. Schools are encouraged to address these and other issues in their wellness policies.
- Organizational efforts to promote physical activity and decrease the "treats" that are provided at children's events (e.g. cookies for players after soccer games).
- A useful resource is also http://www.brightfutures.org/.

2. Screening and Diagnosis

Recommendations:

- BMI should be calculated and documented in the medical record on all children ages 2-18 at least annually, ideally at a well child visit (Strong Recommendation, High Quality Evidence) (Barlow, 2007).
- CDC growth charts should be used for children ages 2-18; WHO growth curves should be used from birth through 23 months of age (Strong Recommendation, High Quality Evidence) (Barlow, 2007).
- Appropriate terminology should be used to classify pediatric overweight and obesity. (Strong Recommendation, High Quality Evidence) (Barlow, 2007).
Definitions

Body mass index (BMI) is a useful tool to assess body fat. It is defined as weight (in kilograms) divided by the square of height (in meters). BMI levels correlate with body fat and with concurrent health risks (Barlow, 2007 [High Quality Evidence]).

In children, an absolute scale for BMI is not used. Instead, a percentile scale is used, based on the child's age and sex.

Waist circumference measurements are a measure of visceral adiposity. In children, they are not currently recommended for clinical use. Reference values that identify risk beyond that already identified by BMI are not available for children (Barlow, 2007 [High Quality Evidence]; Krebs, 2007 [Reference]).

Skin fold thickness measurements are measures of subcutaneous fat. They are not recommended for assessing adiposity in children. They require specific training and are not feasible for routine clinical practice (Barlow, 2007 [High Quality Evidence]). Additionally, the measurement does not increase the accuracy of identifying those children with the highest BMIs or associated risk factors (Krebs, 2007 [Reference]).

Weight for length (WFL) is the appropriate assessment of adiposity for children under age two. There is evidence that children with a WFL at the upper quartile at six months had a 40% predicted probability of obesity at three years of age (Taveras, 2009 [Reference]).

Terminology

It is recommended that appropriate terminology be used when evaluating children's BMI.

The appropriate terminology for children ages 2-18 is as follows:
- "Underweight" for children with a BMI at less than the 5th percentile
- "Healthy weight" for children with a BMI from the 5th to the 84th percentile
- "Overweight" for children with a BMI from the 85th to the 94th percentile
- "Obesity" for children with a BMI greater than or equal to the 95th percentile

The subset of children with a BMI greater than or equal to the 99th percentile is receiving greater attention, as their health risks may be more significant. The terms "severe obesity" or "extreme obesity" are sometimes used as a diagnosis for children in this group.

For children ages 0-2

The term "overweight" should be used for children with a weight for length above the 95th percentile. The term "obesity" is not used in this age group.

It is important to understand the following:
- BMI is not a direct assessment of adiposity, but the sensitivity of a BMI greater than the 85th percentile is used in identifying the children with the highest adiposity (Barlow, 2007 [High Quality Evidence]).
- Some children in the overweight category may have high lean body mass and may not be "over-fat;" clinical judgment must be used to determine health risks and appropriate intervention for these children.
- Children with a BMI greater than the 95th percentile are very likely to have high body fat levels (Barlow, 2007 [High Quality Evidence]).
• Children ages 4 to 6 years old have a relative decrease in adiposity, which then "rebounds" as they get older. Children in this age group who do not show this decrease may be at a higher risk for overweight or obesity.

• The work group would also like to note that even some healthy-weight children may need focused anticipatory guidance if there is a significant increase in BMI and may require closer monitoring.

• See Appendix A for CDC and WHO growth charts.

Other Medical Screening

Recommendations:

• All children should have blood pressure checked annually starting at age 3 (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

• All children ages 9-11 should be universally screened for dyslipidemia, using either a non-fasting non-HDL cholesterol or a fasting lipid profile. At other ages, a fasting lipid profile should be done if indicated by family history and/or risk factors (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

• Health risks that increase the likelihood of obesity and/or related comorbidities should be assessed for at least annually (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

Blood pressure

• It is recommended that all children have a blood pressure checked annually, starting at age 3. This should be evaluated based on age, gender and height, using the table in Appendix B (National Heart, Blood, and Lung Institute, 2011 [Reference]).

Cholesterol

• It is recommended that children ages 9-11 be universally screened for dyslipidemia, using either a non-fasting non-HDL cholesterol or a fasting lipid profile (National Heart, Blood, and Lung Institute, 2012 [Reference]).

• At other ages, a fasting lipid profile should be done based if indicated by family history and/or risk factors (National Heart, Blood, and Lung Institute, 2012 [Reference]).

• See Appendix D for Acceptable, Borderline-High, and High Plasma Lipid, Lipoprotein and Apolipoprotein Concentrations (mg/dL) for Children and Adolescents.

Health risk assessment

• Health risks that increase the likelihood of obesity and/or related comorbidities should be assessed for at least annually.

• Parental obesity in one or both parents is associated with a higher risk of obesity in the child (National Heart, Blood, and Lung Institute, 2012 [Reference]).

• Family medical history, including type 2 diabetes and cardiovascular disease (hypertension and dyslipidemia) in first- and second-degree relatives, is an important predictor of risk for the child (National Heart, Blood, and Lung Institute, 2012 [Reference]).
3. \textbf{Assess for Major and Minor Comorbid Conditions}

\textbf{Recommendations:}

- Clinicians should obtain a focused family history of obesity, type 2 diabetes mellitus (DM) and cardiovascular disease (CVD) in first- and second-degree relatives to assess the risks of current or future comorbidities associated with the patient's weight status \textit{(Strong Recommendation, High Quality Evidence)} (Barlow, 2007).

- Clinicians should conduct a focused review of systems and physical examination to identify potential weight-related comorbid conditions \textit{(Strong Recommendation, High Quality Evidence)} (Barlow, 2007).

- Clinicians should obtain laboratory and radiographic evaluations depending on age, BMI, physical and historical findings. Clinicians should also consider the likely impact on treatment strategies of the results obtained. If results are unlikely to alter treatment, then the value of the testing may be limited \textit{(Strong Recommendation, Moderate Quality Evidence)} (Barlow, 2007).

\begin{table}[h]
\centering
\begin{tabular}{|l|l|}
\hline
\textbf{Respiratory} & Obstructive sleep apnea  
\textbf{ } & Central hypoventilation syndrome  
\textbf{ } & Exercise intolerance  
\textbf{ } & Worsening of asthma  
\hline
\textbf{Cardiovascular} & Hypertension  
\textbf{ } & High triglyceride, low HDL, high LDL  
\hline
\textbf{Endocrine} & Polycystic ovary syndrome  
\textbf{ } & Type 2 diabetes mellitus  
\hline
\textbf{Gastrointestinal} & Non-alcoholic fatty liver disease  
\textbf{ } & Gall stones  
\textbf{ } & Gastroesophageal reflux disease  
\textbf{ } & Constipation  
\hline
\textbf{Genitourinary} & Kidney stones  
\hline
\textbf{Orthopedic} & Slipped capital femoral epiphysis  
\textbf{ } & Blount disease  
\textbf{ } & Back, foot, knee and hip pain  
\hline
\textbf{Skin} & Acanthosis nigricans  
\textbf{ } & Intertrigo  
\hline
\textbf{Psychiatric} & Depression  
\textbf{ } & Anxiety  
\textbf{ } & Eating disorder  
\hline
\end{tabular}
\caption{Major and Minor Comorbid Conditions Associated with Obesity}
\end{table}
### Review of Systems for Weight-Related Problems

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Explanation</th>
<th>Potential Consequences/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sleep problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loud snoring or apnea (prolonged intervals without respiratory effort)</td>
<td>Obstructive sleep apnea</td>
<td>Poor sleep efficiency, poor attention, poor academic performance, pulmonary hypertension, right ventricular hypertrophy, or enuresis</td>
</tr>
<tr>
<td>Shorter sleep time, later onset of sleep, daytime sleepiness, or restlessness</td>
<td>Disordered sleep</td>
<td>Depression, poor attention, poor academic performance, food cravings, or difficulty responding to satiety cues</td>
</tr>
<tr>
<td><strong>Respiratory problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shortness of breath, exercise intolerance, wheezing, or cough</td>
<td>Asthma</td>
<td>Progression of disease, resistance to treatment, exacerbation of excessive weight gain, or exacerbation of asthma with weight gain</td>
</tr>
<tr>
<td><strong>Gastrointestinal problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vague recurrent abdominal pain</td>
<td>Non-alcoholic fatty liver disease</td>
<td>Fatty deposits in liver, small percentage progresses to steatohepatitis, cirrhosis, and future hepatocarcinoma</td>
</tr>
<tr>
<td>Shortness of breath, exercise intolerance, wheezing, or cough</td>
<td>Gastroesophageal reflux</td>
<td>Increased abdominal pressure or esophagitis</td>
</tr>
<tr>
<td>Abdominal pain and/or distention, flatulence, fecal soiling/encopresis, anorexia, or enuresis</td>
<td>Constipation</td>
<td>Disordered eating problems, physical inactivity, or decreased social interaction</td>
</tr>
<tr>
<td>Right upper quadrant or epigastric pain or vomiting and colicky pain</td>
<td>Gall bladder, with or without gallstones</td>
<td>Cholecystectomy (most patients with gallstones are asymptomatic)</td>
</tr>
<tr>
<td><strong>Endocrine disorders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyuria and polydypsia</td>
<td>T2DM</td>
<td>Lack of symptoms is normal for T2DM; unexpected weight loss may occur and may not indicate compliance with treatment of obesity</td>
</tr>
<tr>
<td><strong>Menstrual irregularities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligomenorrhea (&lt; 9 menses per year) or dysfunctional uterine bleeding (anovulatim)</td>
<td>Polycystic ovary syndrome</td>
<td>Insulin resistance, metabolic syndrome, T2DM, infertility, or worsening obesity with worsening of aforementioned conditions</td>
</tr>
<tr>
<td><strong>Orthopedic problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip pain, groin pain, thigh pain, painful gait, or waddling gait</td>
<td>Slipped capital femoral epiphysis</td>
<td>Permanent hip deformity and dysfunction, decreased physical activity, or worsening obesity</td>
</tr>
<tr>
<td>Knee pain</td>
<td>Slipped capital femoral epiphysis or Blount disease</td>
<td>Decreased physical function, decreased physical activity, or worsening obesity</td>
</tr>
<tr>
<td>Foot pain</td>
<td>Increased weight-bearing</td>
<td>Decreased physical activity or worsening obesity</td>
</tr>
<tr>
<td><strong>Mental health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flat affect or sad mood, loss of interest/pleasure, or worries/fears</td>
<td>Depression or anxiety</td>
<td>Worsening obesity, suicide, or eating disorder</td>
</tr>
<tr>
<td>Body dissatisfaction, school avoidance, problems with social interactions, poor self-esteem, or neglect</td>
<td>Depression or anxiety</td>
<td>Worsening obesity</td>
</tr>
<tr>
<td>History/ongoing sexual abuse</td>
<td>Depression or anxiety</td>
<td>Worsening obesity</td>
</tr>
<tr>
<td>Hyperphagia or binge eating, eating “out of control,” or bulimia</td>
<td>Disordered eating</td>
<td>Worsening obesity; medications may cause/exacerbate obesity</td>
</tr>
<tr>
<td><strong>Genitourinary problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nocturia or nocturnal enuresis</td>
<td>Disordered sleep</td>
<td>See above</td>
</tr>
<tr>
<td><strong>Skin conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rash or irritations acne</td>
<td>Infentigo attributable to increased skin-to-skin contact with persistent moisture</td>
<td>More serious skin infections and abscesses</td>
</tr>
</tbody>
</table>

(Krebs, 2007 [Reference])
## Physical Examination in Primary Care Settings

<table>
<thead>
<tr>
<th>System or Condition Assessed</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropometric features</td>
<td>Calculation of BMI (weight in kilograms and height in centimeters)</td>
</tr>
<tr>
<td>Vital signs</td>
<td>Pulse and blood pressure (use correct cuff size; often must be checked manually because of “white coat hypertension”)</td>
</tr>
<tr>
<td>General</td>
<td>Body fat distribution and affect</td>
</tr>
<tr>
<td>Skin</td>
<td>Acanthosis nigricans, keratosis pilaris, skin tags, intertrigo, excessive acne, hirsutism, or violaceous striae of Cushing syndrome</td>
</tr>
<tr>
<td>Eyes</td>
<td>Papiledema</td>
</tr>
<tr>
<td>Throat</td>
<td>Tonsilar size and abnormal breathing</td>
</tr>
<tr>
<td>Neck</td>
<td>Goiter</td>
</tr>
<tr>
<td>Chest</td>
<td>Auscultation for rhythm and sounds (heart) and rhonchi, rales, and wheezes (lungs)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Palpation for liver size, right upper quadrant tenderness, and epigastric tenderness</td>
</tr>
<tr>
<td>Secondary sexual characteristics</td>
<td>Premature/abnormal appearance of pubic hair, breast development, testicular enlargement, acne or comedones, axillary odor, appearance of microphthalmus because penis is buried in fat, or gynecomastia</td>
</tr>
<tr>
<td>Extremeties</td>
<td>Abnormal gait, hip or knee tenderness, limited range of motion in hip (slipped capital femoral epiphyses), Blount disease, joint and foot pain, small hands and feet, polydactyly, lower back pain or limited motion, deep tendon reflexes, or edema</td>
</tr>
<tr>
<td>Prader-Willi syndrome</td>
<td>Short stature, acromicria, characteristic facies, hypotonia, and development delay</td>
</tr>
<tr>
<td>POMC mutation</td>
<td>Red hair, pale skin, low blood pressure or rapid pulse, and corticotropin deficiency/adrenal insufficiency</td>
</tr>
<tr>
<td>Albright hereditary osteodystrophy</td>
<td>Developmental delay, short stature, and short fourth and fifth metacarpals</td>
</tr>
<tr>
<td>Laurence-Moon or Bardet-Biedl syndrome</td>
<td>Short stature, developmental delay, retinitis pigmentosum, and polydactyly</td>
</tr>
<tr>
<td>MC4R mutation</td>
<td>Tall stature and rapid growth, early onset obesity</td>
</tr>
<tr>
<td>Down syndrome</td>
<td>Typical phenotypic features</td>
</tr>
<tr>
<td>Fragile X syndrome</td>
<td>Macroorchia and developmental delay</td>
</tr>
</tbody>
</table>

*(Krebs, 2007 [Reference]*)

### Laboratory Workup

<table>
<thead>
<tr>
<th>BMI</th>
<th>Tests – Ages 2 to 8</th>
<th>Tests – Ages 9 to 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 85th-94th percentile with NO risk factors</td>
<td>No lab testing</td>
<td>Fasting lipid level#</td>
</tr>
<tr>
<td>&gt; 85th-94th percentile with risk factors (e.g., family history of obesity-related diseases, elevated blood pressure, elevated lipid levels or tobacco use)</td>
<td>Fasting lipid panel if family history or dyslipidemia or other high-risk condition</td>
<td>Fasting lipid panel Fasting glucose* AST*, ALT*</td>
</tr>
<tr>
<td>≥ 95th percentile</td>
<td>Fasting lipid panel</td>
<td>Fasting lipid panel Fasting glucose* AST*, ALT*</td>
</tr>
</tbody>
</table>

* Per Krebs, to be performed every two years starting at age 10 years.
# Per AAP, a non-fasting non-HDL cholesterol may be used for screening in this age group, to be followed up with a fasting lipid panel if the screen is abnormal.

*(Krebs, 2007 [Reference]*)
Considerations

• Obtaining thyroid studies is NOT recommended for the routine evaluation of overweight/obese children unless there are symptoms of hypothyroidism, evidence of decreased height velocity, or significant family history of thyroid disease.

• Results of a large, nationally representative study suggest that there are only small and likely clinically insignificant differences in total cholesterol, HDL, LDL and triglycerides between fasting and non-fasting blood samples. (Mean TC, HDL and LDL values for fasting samples were 2-5 mg/dL higher than non-fasting samples. Mean TG value for fasting sample was 7 mg/dL lower than non-fasting sample.) Thus, if obtaining a fasting sample is a barrier to testing, consideration should be given to obtaining non-fasting sample (Steiner, 2011 [Reference]).

• While hemoglobin A1c is recommended as a diabetes screening tool for adults, it is not currently recommended for children. Also, the oral glucose tolerance test is not recommended for routine clinical use, but may be required in the evaluation of patients when diabetes is still suspected despite a normal fasting plasma glucose (Silverstein, 2005 [Reference]).

• Screening of fasting glucose, AST and ALT should begin at age 10 years or at puberty if it occurs before age 10. Screening of lipid levels should begin at age two.

• Pending evidence based recommendations, the AAP Expert Committee on Childhood Obesity suggests biannual screening of AST, ALT, and fasting glucose starting at 10 years of age for children with BMI of ≥ 95th percentile and those with BMI of 85th to 94th percentile (Barlow, 2007 [High Quality Evidence]).

Further Clinical Comorbidity Assessment

| If cardiac disease is suspected | Electrocardiography, assessing length of QTc interval and cardiac rhythm, and echocardiography; consider measurement of lipoprotein(a) |
| If blood pressure is elevated | 24-hour ambulatory blood pressure monitoring |
| If non-alcoholic fatty liver disease is suspected | Ultrasonography of liver and alpha-1 antitrypsin, ceruloplasmin, antinuclear antibody, and hepatitis antibody measurements, liver biopsy if recommended by pediatric gastroenterologist |
| If goiter is present or hypothyroidism is suspected | Serum-free thyroxine measurement or total thyroxine measurement with resin triiodothyronine uptake, serum thyroid-stimulating hormone measurement, and anti-thyroid peroxidase and antithyroglobulin antibody measurements |
| If diabetes is suspected | Glucose tolerance test (measuring insulin levels as well as glucose over 3 hours) and urinary microalbumin (first morning void) or microalbumin/creatinine ratio measurement |
| If sleep apnea is suspected | Polysomnography, oxygen saturation measurement, and carbon dioxide measurement for carbon dioxide retention |
| If orthopedic disease is suspected | Radiographs of hip, knee and foot |
| If Cushing syndrome is suspected | 24-hour urinary-free cortisol measurement or salivary cortisol measurement at bedtime or midnight |
| If Albright hereditary osteodystrophy is suspected | Serum calcium and phosphate measurements |
| If hirsutism and oligomenorrhea is present | Plasma 17-hydroxyprogesterone (basal or corticotropin-stimulated), plasma DHEAS (basal or corticotropin-stimulated), androstenedione, testosterone and free testosterone, and sensitive (third-generation) LH and FSH measurements |
| If precocious puberty is suspected | Sensitive (third-generation) LH and FSH, sensitive testosterone (for boys) or estradiol (for girls), and DHEAS measurements |
| If specific syndrome is suspected (see Genetics section) | MCR4 evaluation, fluorescent in situ hybridization for Prader-Willi syndrome, or fragile X evaluation (high-resolution chromosomal analysis) |

(Krebs, 2007 [Reference])
See Appendix D for acceptable, borderline-high, and high plasma lipid, lipoprotein and apolipoprotein concentrations (mg/dL) for children and adolescents.


**Fasting lipid profile (FLP) x 2**, average results

- **LDL-C ≥ 130, < 250 mg/dL** → **Target LDL-C**
- **TG ≥ 100, < 500 mg/dL, < 10 y**
  - ≥ 130, < 500 mg/dL, 10 - 19 y
  → **Target TG** (see TG algorithm, Figure 9–2)
  - Exclude secondary causes
  - Evaluate for other risk factors (RFs)
  - Start Cardiovascular Health Integrated Lifestyle Diet (CHILD 1) → CHILD 2-LDL (Table 9–8) + lifestyle change x 6 months**

- **LDL-C < 130 mg/dL**
  → **Continue CHILD 2-LDL**
  → **Repeat FLP q. 12 months**

- **LDL-C ≥ 130 to 189 mg/dL**
  - Family history (FHx) (-)
  - No other RFs
  → **Continue CHILD 2-LDL**
  → Follow q. 6 m with FLP, FHx/RF update

- **LDL-C ≥ 190 mg/dL**
  → **Initiate statin therapy** (Tables 9–11 & 9–12)

- **LDL-C ≥ 160 to 189 mg/dL**
  - FHx (+) or
  - 1 high-level RF or
  - ≥ 2 moderate-level RFs
  → **Initiate statin therapy** (Tables 9–11 & 9–12)

- **LDL-C ≥ 130 to 159 mg/dL**
  + 2 high-level RFs or
  1 high-level + ≥ 2 moderate-level RFs OR clinical CVD
  → **Initiate statin therapy** (Tables 9–11 & 9–12)

- **LDL-C ≥ 130 to 189 mg/dL**
  Family history (FHx) (-)
  No other RFs
  → **Continue CHILD 2-LDL**
  Follow q. 6 m with FLP, FHx/RF update

- **LDL-C still ≥ 130 mg/dL, TG < 200 mg/dL**, refer to lipid specialist for addition of second lipid-lowering agent; monitor per Table 9–12
  → In high LDL-C patients, if non-HDL-C ≥ 145 mg/dL after effective LDL-C treatment, → **Target TG** (Figure 9–2)

**Dyslipidemia algorithm:** target LDL cholesterol. Values given are in mg/dL. To convert to SI units, divide results for TC, LDL cholesterol, HDL cholesterol, and non-HDL cholesterol by 38.6; for triglycerides, divide by 88.6. TG indicates triglycerides; C, cholesterol; RF, risk factor; FHx, family history; a Obtain FLPs at least two weeks but no more than three months apart. b Per Table 9–9, use of drug therapy is limited to children aged 10 years and older with defined risk profiles. c In a child with an LDL cholesterol level of > 190 mg/dL and other risk factors, a trial of the CHILD-2–LDL may be abbreviated.

*(National Heart, Lung, and Blood Institute 2012 [Reference]*)
Institute for Clinical Systems Improvement

www.icsi.org


Dyslipidemia algorithm: target triglycerides. Values given are in mg/dL. To convert to SI units, divide results for TC, LDL cholesterol, HDL cholesterol, and non-HDL cholesterol by 38.6; for triglycerides, divide by 88.6. C indicates cholesterol; a Obtain FLPs at least two weeks but no more than three months apart. b The FDA and the Environmental Protection Agency advise women of childbearing age who may become pregnant, pregnant women, nursing mothers, and young children to avoid some types of fish and shellfish and to eat fish and shellfish that are lower in mercury. For more information, call the FDA’s food information line toll-free at 1-888-SAFEFOOD or visit http://www.fda.gov/Food/ResourcesForYou/Consumers/default.htm.

(National Heart, Lung, and Blood Institute 2012 [Reference])

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Evidence-Based Recommendations for Dietary Management of Elevated LDL-C, non-HDL-C and TG

**Grades** reflect the findings of the evidence review.

**Recommendation levels** reflect the consensus opinion of the Expert Panel.

**Supportive actions** represent expert consensus suggestions from the Expert Panel provided to support implementation of the recommendations; they are not graded.

**NOTE:** Values given are in mg/dL. To convert to SI units, divide the results for total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL–C), and non-HDL-C by 38.6; for triglycerides (TG), divide by 88.6.

<table>
<thead>
<tr>
<th>Elevated LDL-C: Child 2 – LDL</th>
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<tbody>
<tr>
<td>2-21 years</td>
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<td></td>
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<tr>
<td>Supportive actions:</td>
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<td></td>
</tr>
<tr>
<td>Grade B strongly recommended</td>
</tr>
<tr>
<td>Grade A recommended</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elevated TG or Non-HDL-C: Child 2 – TG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-21 years</td>
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<td></td>
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<tr>
<td>Grade A recommended</td>
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<tr>
<td>Grade B recommended</td>
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<tr>
<td>Grade D recommended</td>
</tr>
</tbody>
</table>

*(National Heart, Lung, and Blood Institute 2012 [Reference]*)

**Return to Algorithm**

**Return to Table of Contents**

Select appropriate BP cuff size, measure BP at each well child visit over 3 years of age* (auscultatory method preferred)

Measure HT, WT, & calculate BMI

Determine BP category for age, HT, gender (Tables 8–3 & 8–4)

Determine BMI category for age and gender (CDC growth charts)

< 90th%ile (normal)

≥ 90th%ile or 120/80 mmHg to < 95th%ile (pre-HTN)

≥ 95th%ile to < 99th%ile + 5 mmHg (stage 1)

≥ 99th%ile + 5 mmHg (stage 2)

Repeat by auscultation if performed with oscillometric device

Average replicate BP measurements at initial visit

Re-evaluate BP category

Normotensive

Pre-HTN

Stage 1 HTN

Stage 2 HTN

Repeat BP at next visit

Repeat BP in 6 months

Repeat BP in 1-2 weeks

Evaluate or refer for treatment within 1 week

Educate on CHILD 1,† Activity levels**

CHILD 1/ activity education** &/or Weight management***

CHILD 1/ activity education** &/or Weight management***

CHILD 1/ activity education** &/or Weight management***

BP measurement and categorization. HT indicates height; WT, weight; HTN, hypertension; %ile, percentile. * See Table 8-2; † see "Nutrition and Diet" Table 5-1; ‡ see "Physical Activity;" § see "Overweight and Obesity." Adapted from High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. Pediatrics 2004;114(2 suppl 4th report):555-76.
**BP management according to category.** HTN indicates hypertension; CV, cardiovascular; Hx, history; PEx, physical examination; CBC, complete blood count; U/A, urinalysis; U/S, ultrasound; Ped, pediatric; LVH, left ventricular hypertrophy; Q, every; Rx, prescription; 2°, secondary; W/U, workup; TOD, target organ damage; s/p, status post; CKD, chronic kidney disease; %ile, percentile. 

- Workup for target organ damage/left ventricular hypertrophy if obese or positive for other cardiovascular risk factors; 
- see "Nutrition and Diet"; 
- see "Physical Activity"; 

*GOAL BP: < 95th%ile for age/sex/HT, < 90th%ile if CKD, DM, Target Organ Damage*
Type 2 Diabetes Mellitus

<table>
<thead>
<tr>
<th></th>
<th>Fasting blood glucose (at least 8 hours)</th>
<th>2-hour post challenge glucose</th>
<th>Random glucose + symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes mellitus</td>
<td>≥ 126</td>
<td>≥ 200</td>
<td>≥ 200</td>
</tr>
<tr>
<td>Impaired fasting glucose</td>
<td>100-125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impaired glucose tolerance</td>
<td>140-199</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>&lt; 100</td>
<td>&lt; 140</td>
<td></td>
</tr>
</tbody>
</table>

From Barlow, 2007 and ADA 2000 Consensus statement on Type 2 Diabetes Mellitus in Children

Considerations

- If diabetes is diagnosed, refer to pediatric endocrinology
- If impaired glucose tolerance or impaired fasting glucose is diagnosed
  - Refer for nutritional counseling
  - Follow up in three to six months for repeat fasting glucose
- This committee recognizes that hemoglobin A1c is not yet uniformly recommended by all expert groups as a diagnostic/screening tool for diabetes in children and adolescents. Obtaining a hemoglobin A1c may provide useful clinical information in the non-fasting patient.

Nonalcoholic Fatty Liver Disease

Nonalcoholic fatty liver disease (NAFLD) is subdivided into nonalcoholic fatty liver (NAFL) and nonalcoholic steatohepatitis (NASH). In NAFL, hepatic steatosis is present without evidence of significant inflammation, whereas in NASH, hepatic steatosis is associated with hepatic inflammation.

The diagnosis of NAFLD can be made only by liver biopsy. Transaminase elevation is not directly correlated to the presence or severity of NAFLD. Guidance for which children would benefit from liver biopsy diagnosis is not available based on current evidence. Families should not be reassured based on normal or mildly abnormal transaminase levels.

Expert opinion suggests that, in an obese child with transaminase elevation, evaluation for other common causes of liver disease be performed. This includes, but is not limited to, hepatic ultrasound with doppler, viral hepatitis studies, Wilson's disease, alpha-1 antitrypsin deficiency, and autoimmune hepatitis. FANA elevations may be seen in NAFLD; this finding may lead to biopsy to differentiate autoimmune hepatitis and NAFLD.

Consider further workup (or referral to pediatric gastroenterology) for patients with transaminase levels more than twice normal of lab's reference range.

Eating Disorder

Eating disorders, particularly binge eating disorder, may complicate the treatment of obesity, since the treatment recommendations for eating disorders are often diametrically opposed to those with obesity. As a result, the eating disorder often needs to be treated in conjunction with weight management plans.

Screening for eating disorders can include asking the following questions:

- Do you eat a large amount of food in a short period of time – like eating more food than another person may eat in, say, a two-hour period of time?
- Do you ever feel like you can't stop eating even after you feel full?
4. Readiness to Change – Is Patient Ready to Lose Weight?

Recommendations:

- Clinicians should use motivational interviewing techniques as a tool for encouraging behavior change (Strong Recommendation, Moderate Quality Evidence) (Rollnick, 2000).

Knowing the patient's readiness to change can help the clinician understand a patient's level of motivation and how to tailor communication about weight loss. Patients will need to set realistic, achievable goals and be held accountable to practice new behaviors that produce and maintain weight loss.

Introduction to Weight Management/Lifestyle Change

Weight management is a skill. Patients need to set realistic goals and to be held accountable to practicing the new behaviors that produce and maintain weight loss. Record keeping or self-monitoring (either by the patient or their family) of progress on specific behaviors is key to successful weight management.

The ICSI Patient Advisory Council reviewed the latest revision of the Prevention and Management of Obesity for Adults guideline and supports the value of the physician initiating the conversation and suggested that patients were more likely to act on the recommendations of his/her clinician. Because obesity can be an overwhelming condition for the patient and family, creating small achievable goals and celebrating those achievements are important for continued success and healthy choices. We recommend that clinicians guide goals using the acronym "SMART" (specific, measurable, action based, realistic, and time-based).

Stages of change model

When evaluating a patient with obesity, it is recommended to get a general sense of their readiness to change specific dietary and physical activity habits. Because a parent plays an important role in providing food and offering activities, the behavior modification will involve parents and children together. It will be helpful to assess both the parents' and child's readiness to make dietary and lifestyle changes to lose weight (Rhee, 2005 [Reference]).

The Transtheoretical Model of Change, also known as the Stages of Change model, can be helpful to understand where in the process of change the patient stands. This can be organized into five classes including pre-contemplation, contemplation, preparation, action and maintenance.

During the pre-contemplation stage, patients are not willing to change at all. They may have tried to lose weight unsuccessfully and have given up. They may not see that a clinician's advice to change their poor health habits may apply to them directly.

In the contemplation stage, patients are starting to think about change but fearful about moving forward. They know they should but have reservations, perhaps, about giving up something they enjoy very much. The patient is interested in learning ways to lose weight. This is when the patient thinks about the pros and cons of changing behavior. The patient is not considering the change in the near future.
During the preparation stage, patients are ready to make a change in their life but they do so in small changes. They experiment with these changes. The patient may make the change in the next month.

The action stage is where the patient has made a determined effort to reach a goal. This should be recognized by physicians and the patient should be encouraged to continue these good health practices. This is usually about three to six months long.

The maintenance stage involves continuing to maintain the new behavior over time and therefore reinforcing healthy habits. This stage is more than six months long.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>Not interested in changing behavior</td>
</tr>
<tr>
<td>Contemplation</td>
<td>Starting to think about change but not ready</td>
</tr>
<tr>
<td>Preparation</td>
<td>Planning to change behavior</td>
</tr>
<tr>
<td>Action</td>
<td>Practicing new behavior for a few months</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Continuing the new behavior for more than six months</td>
</tr>
</tbody>
</table>

Overview of Motivational Interviewing

Motivational interviewing is an empathy-based, patient-centered approach to behavior modification. It has been shown to help patients and their families set realistic, achievable goals and be held accountable to practicing new behaviors. This is a reversal from the traditional role of the physician as advisor and expert "problem solver" (Rollnick, 1999 [Moderate Quality Evidence]).

The "spirit" of MI is to elicit from patients their own good motivations for making behavior changes; it is collaborative and evocative, and honors a patient's autonomy. It recognizes that there is something in human nature that resists being told what to do or in being coerced (Rollnick, 2008 [Reference]).

The guiding principles of MI = RULE:

- **R**: Resist the righting reflex. Rather than seek to "fix" a patient, recognize the natural human tendency to resist persuasion (especially the ambivalent). Aim to support the patient's own discovery of the reasons for change.

- **U**: Understand your patient's motivations. If your consultation time is limited, you are better off asking patients why they would want to make a change and how they might do it, rather than telling them that they should.

- **L**: Listen to your patient. MI involves as much listening as informing; maintain empathetic interest and acknowledge that the answers most likely lie within the patient.

- **E**: Empower your patient. MI helps patients explore how they can make a difference in their health. A patient who is active in the consultation and thinking aloud about the why and how of change is more likely to do something about this afterward. Recognize and guide through "change talk" in which the patient states the good reasons for and steps toward change, rather than resisting change.

(Rollnick, 2008 [Reference])

The goal of motivational interviewing is to move the patient along the "stages of change," from one stage to the next. The majority of patients in the primary care office are either pre-contemplative or contemplative (Prochaska, 1998 [Reference]). As such, the success of motivational interviewing lies in the physician allowing the patient to "set the agenda" regarding which health behavior he or she is willing to address.
Once a topic has been identified, Rollnick, et al. emphasize separating readiness to change into two basic elements: "importance" and "confidence." The patient is asked to rate his or her perception of the importance of habit change on a scale, for example: from 1-10. The same is done for confidence in successful habit change. Patients who attribute little importance to behavior change can be asked to assess what they like about the particular behavior and what bothers them. Patients can then be asked to assess the pros and cons of making the behavior change. Scaling questions can again be asked, as well as "come-back" queries such as "you rated (X) a 5 …why not a 2?"

Patients who lack confidence in their ability to effect a behavior change may benefit from investigation of past successes and identification of obstacles. In discussion of how the patient might overcome identified obstacles, it is important that the patient himself generate solutions to his own problem, and that the physician refrain from slipping into the familiar role of advisor. In the event of a "mental block," patients can be given "brainstorming homework" to be addressed at a subsequent interval (Simons, 2007 [Reference]).

Refer to Appendix C for a sample of motivational interviewing scripting in pediatrics.

5210 guidelines for Healthy Habit Action Plans

The 5210 Toolkit is a nationally recognized weight management strategy aimed specifically at childhood obesity. It is widely endorsed by the American Academy of Pediatrics and can be used for primary care-based weight management goal setting. Used in combination with motivational interviewing, 5210 principles have been shown to be an effective foundation in sustainable behavior change. 5210 daily health habit goals include:

1. Five or more fruits and vegetables
2. Two hours or fewer recreational screen time
3. One hour or more of physical activity
4. Zero sugary drinks, more water and only low-fat milk

5. Intervention Management Strategy

In the 2007 report "Expert Committee Recommendations Regarding the Prevention, Assessment and Treatment of Child and Adolescent Overweight and Obesity," there is an algorithm that outlines how a primary care clinician can identify, assess and provide anticipatory guidelines for obesity for all their patients.
This report recommends universal assessment of obesity risk and identifies steps to prevention and treatment.

BMI (body mass index) is the initial screen for all children coming in for a well child visit. BMI should be calculated and plotted on a growth chart. Once calculated:

- Review BMI with parent and child
- Depending on the percentile, an assessment should be done on all patients

There are three assessments to be reviewed – medical risk, behavior risk and attitudes for change:

- Medical risk may include parental obesity or other family members/relatives with obesity.
- Behavior risk may include inquiry about their physical activity and eating behavior, e.g., family meals, and sedentary times, e.g., screen time.
- Attitudes for change include assessing both parents' and child's concern for weight and targeting those behaviors that the parent or child may be interested in changing.

Once the BMI is calculated and assessment is reviewed with parent and child, it is important to acknowledge and praise good behaviors if the child is in a healthy weight category.

If the child is overweight, the clinician should identify and target specific behaviors to prevent obesity. If there is a health risk such as family history of obesity, then prevention and intervention for treatment should be initiated. If the child’s BMI indicates obesity, it is important to target family and child’s concerns and motivation for change, and proceed to intervention and treatment stages.
Stages of Obesity Treatment

### Stage 1 – Prevention Plus

**Primary Care Office**

**Focus** on promoting healthy lifestyle eating, i.e., 5210

- 5 = Five fruits and vegetables per day
- 2 = Limit screen time to two hours or fewer per day
- 1 = One hour of moderate physical activity per day
- 0 = No sugary drinks

**Outcome**: Decreased BMI for child.

**Evaluation**: Child and family to be seen each month. If after three months with no improvement, advance to stage two.

### Stage 2 – Structured Weight Management

**Primary care office with support**

**Focus** on targeted behaviors

- Eating plans outlined and presented to the child and family by dietician
- Structured daily meals
- Healthy snacks
- Screen time limited to one hour per day or less
- Physical activity of one hour per day should be supervised and planned

**Outcome**: No more than one pound of weight loss per month for child 2-11 years of age. No more than two pounds of weight loss per week for adolescent.

**Evaluation**: Child and family need monthly assessment. If there is no change in weight or BMI after three to six months then advance to stage three.

### Stage 3 – Comprehensive Multidisciplinary Intervention

**Pediatric weight management center**

At this stage there is a requirement for the following:

- Increase in intensity of behavior changes
- Frequency of visits
- Specialist involvement to maximize behavior change

*Generally this type of program would exceed the capacity of a primary care provider office.*

**Focus**: A structured behavior modification program including:

- Food monitoring
- Short-term diet plan
- Physical activity goal setting
- Parental involvement, especially for child 12 years of age and younger
- Multidisciplinary team with a provider experienced in childhood obesity, a behavior counselor, registered dietician, and exercise specialist

**Outcome**: Weight loss or change in BMI

**Evaluation**: Frequent office visits should be scheduled for a minimum of 8-12 weeks.

### Stage 4 – Tertiary Care Intervention (select patients)

**Tertiary care center**

Interventions move beyond goal of balanced eating and physical activity. Lack of success with the comprehensive multidisciplinary intervention is not by itself an indication to move to this treatment level. Often times the child receiving this care would receive hospitalized care and often has significant comorbidities.

**Focus**: Continued diet and physical activity counseling as with the other stages. In this stage a child may be offered a very low calorie diet and medications may be offered.

In some cases of severe obesity where there is no response to behavioral interventions, there are specialty centers of excellence that may offer bariatric surgery.

*(Barlow, 2007 [High Quality Evidence]*)

### Community-Based Interventions

Clinic-based weight management centers may not have the availability or capacity to meet the existing demand to treat all obese patients who require stage three treatment. Further, there are other barriers to families utilizing specialized weight management centers, including the variability of insurance coverage for weight management services *(Luttkhuis, 2009 [High Quality Evidence]; Simpson, 2009 [Reference]), physical barriers (scheduling, parking, location), organizational barriers (clinical environment) and participant satisfaction with the type of educational content *(Sacher, 2010 [Reference]).*
Health care clinicians should be encouraged to utilize alternative pediatric weight management resources when appropriate (such as community-based interventions), as long as those resources employ key evidence-based elements of successful obesity interventions. These core evidence-based elements are cited in these ICSI guidelines and include combining dietary, physical activity, and behavioral components, a focus on key, evidence-based behavioral changes (Barlow, 2007 [High Quality Evidence]), family-targeted interventions (Savoye, 2011a [Reference]; Kalarchian, 2009 [Reference]; Golley, 2007 [Reference]), and interventions that achieve a certain threshold of intensity (Foster, 2012 [Reference]). Community-based childhood obesity interventions founded on the above principles and other existing evidence represent a promising option for many families and afford unique benefits such as removing transportation as a barrier and scalability.

6. Nutrition Intervention

Recommendations:

- Advise pediatric patients and their families to limit their consumption of sugar-sweetened beverages (Strong Recommendation, High Quality Evidence) (Barlow, 2007; Malik, 2006).

- Advise pediatric patients and their families to eat a nutrient-dense breakfast daily (Strong Recommendation, Moderate Quality Evidence) (Barlow, 2007; Rampersaud, 2005).

- It is recommended that clinicians counsel pediatric patients and their families to limit eating out at restaurants, particularly fast food restaurants (Strong Recommendation, Moderate Quality Evidence) (Rosenheck, 2008; Barlow, 2007).

- Advise pediatric patients and their families to eat family meals in which caregivers and children eat together (Strong Recommendation, Moderate Quality Evidence) (Barlow, 2007).

- It is recommended clinicians educate their pediatric patients and their families to consume an eating pattern low in energy density (Strong Recommendation, Moderate Quality Evidence) (Pérez-Escamilla, 2012; Barlow, 2007).

- Advise pediatric patients and their families to model dietary intake per current USDA recommendations (Strong Recommendation, Moderate Quality Evidence) (Barlow, 2007).

- It is recommended clinicians direct pediatric patients and their families to limit portion sizes (per USDA current recommendations, which may be different than serving sizes on the package label, and products may contain > 1 serving) (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

- Clinicians should continue to promote milk and milk products to pediatric patients and their families for nutritional benefits including calcium, vitamin D and other micronutrients for bone health and potassium for healthy blood pressure with the understanding that current evidence points to consumption of these products as playing no unique role in weight management (Strong Recommendation, Moderate Quality Evidence (Lanou, 2008; Barlow, 2007)).
• Clinicians should continue to promote a high-fiber diet to pediatric patients and their families in order to increase nutrient density, and promote healthy lipid profiles, normal gastrointestinal function and glucose tolerance with the understanding there is insufficient evidence that dietary fiber is protective against obesity at this time (Strong Recommendation, Low Quality Evidence) (Barlow, 2007).

Consumption of sugar-sweetened beverages (SSBs), in particular soda, has been on the rise in adolescents and children. SSBs often have high sugar content and low satiety, and offer inadequate nutrition profiles. SSBs have been linked to unhealthy weight gain and nutrition-related chronic disease. Education of caregivers and children regarding health consequences of both carbonated and non-carbonated SSBs is crucial.

Daily breakfast consumption is one tactic to address body weight management. A healthy breakfast can enhance children's health and overall nutritional profile for the day, while also helping to maintain an even distribution of energy intake for meals throughout the day (Dubois, 2009 [Moderate Quality Evidence]). Studies suggest children and adolescents who skip breakfast do not, on average, make up nutrient deficits at other meals and overall have decreased micronutrient intake. In addition, those who eat breakfast have a higher intake of fiber, reinforcing the point that daily breakfast is important to one's daily nutritional profile and promotion of a healthy weight.

Evidence indicates environmental and biological factors play a role in the increasing numbers of overweight and obese populations. There is a strong association between increased fast food consumption and increased caloric intake, resulting in an increased susceptibility to weight gain and obesity. Although further research is needed on children and adolescent subpopulations, fast food consumption among children in the U.S. appears to negatively affect dietary quality, thereby increasing the risk of obesity (Bowman, 2004 [Reference]).

Family systems have an important role on member's health behaviors (Berge, 2012 [Reference]). In general, family meals are associated with higher-quality food, decreased obesity prevalence and positive psychosocial benefits. The chances of overweight and obese family members increases when families report eating away from home within the past week (Fulkerson, 2011 [Reference]). In addition, some research indicates family meals and association to BMI is stronger in females than males, but further research is warranted (Goldfield, 2011 [Reference]). It is important to note that routine family meals are not without potential harms for some children if negative social interaction is present. Therefore, monitoring effectiveness and supporting caregivers is important to the potential success and its relation on the child's health (Anderson, 2010 [Reference]).

Energy density is a newer concept related to identification of weight control in children and adolescents. Energy density (ED) is the amount of energy per weight of food or beverage (kilojoules/gram [kJ/g] or kilocalories/gram [k/g]). Currently there is not an agreed-upon method by which to calculate ED and whether or not to include beverages in its calculation. The Dietary Guidelines for Americans 2010 encourages consumption of an eating pattern low in energy density because of the positive association between energy dense foods and increased adiposity. Examples of foods low in energy density include fruits, vegetables, low-fat dairy, lean meat and whole grains (Epstein, 2008 [Reference]).

MyPlate visually illustrates the 2010 Dietary Guidelines for Americans and shows what food groups to eat and in what quantity (see http://www.choosemyplate.gov and http://www.choosemyplate.gov/images/MyPlateImages/PDF/myplate_green.pdf). MyPlate encourages the enjoyment of food, but to eat less and avoid oversized portions. Clinicians are able to determine the daily food group recommendations for children and adolescents based on caloric needs (see http://www.cnpp.usda.gov/Publications/USDAFoodPatterns/USDAFoodPatternsSummaryTable.pdf). For more in-depth calorie need estimates based on age, gender and physical activity level, see the Web site http://www.cnpp.usda.gov/Publications/USDAFoodPatterns/EstimatedCalorieNeedsPerDayTable.pdf.
Dietary interventions should be tailored to each individual child. Fat-free milk is commonly recommended after age 2 years for the benefit of essential nutrients and avoidance of excess saturated fat and calories. The clinician may consider recommending fat-free milk earlier than age 2 years, taking into consideration the child's overall health (i.e., child's growth, risk for obesity, overall nutritional intake, appetite), as long as the child's diet supplies 30% of calories from fat (Expert Panel on Integrated Guidelines for Cardiovascular Health, 2011).


Children who increase their healthy eating showed greater reduction in BMI compared to children who decreased their consumption of high energy-dense food (Epstein, 2008 [Reference]). Thus, it may be useful for clinicians to teach children and families to focus on adding healthy foods versus telling them to decrease or completely eliminate foods low in nutritional value. The USDA has an online program called Supertracker that can assist children and families increase their health eating habits per USDA guidelines (see https://www.supertracker.usda.gov/default.aspx).

Currently there is limited research on the efficacy of dietary interventions in overweight or obese children and adolescents. Although medically supervised weight management programs may be indicated in some cases, more research is indicated. Research has shown that self-monitoring of energy intake is positively associated in adult weight loss and findings may prove to be similar in youth (Carel, 2008 [Reference]). In addition, one study indicates short-term restrictive diets may actually promote weight gain in adolescents (Field, 2003 [Reference]). Possible negative side effects should not deter overweight youth from pursuing a sensible form of weight loss. Current evidence, although improving, is insufficient to assess the balance of benefit and harm on altered macronutrient diets in children (i.e., low-fat, high-protein diets and calorie restriction) (Whitlock, 2010 [Low Quality Evidence]; Gibson, 2006 [Reference]; Butryn, 2005 [Reference]).

7. Physical Activity

Recommendations:

- Clinicians should encourage children and adolescents to engage in moderately intense physical activity for at least 60 minutes per day (Strong Recommendation, High Quality Evidence) (Barlow, 2007).

- Clinicians should identify barriers the child, youth or parent might have against increasing physical activity, such as time constraints, fear of injury, financial constraints and safety (Strong Recommendation, Moderate Quality Evidence) (Strong, 2005).

- Clinicians should recommend that parents become good role models (Strong Recommendation, Moderate Quality Evidence) (Strong, 2005).

The work group recognizes the limitations of influence on children's activities outside of the clinical setting and encourages clinicians to advocate for the following:

- Safe recreational venues and opportunities within communities and schools that are open after school hours and areas available to all children at a reasonable cost.

- School curricula that promote health benefits of regular, physical activity as well as the preservation of recess and free play time.
Children who suffer from severe obesity/deconditioning should be advised to begin an exercise program slowly and increase expenditure 10% per week so as to prevent injury. Those individuals with a history of prior injury or predisposing conditions such as generalized laxity, torsional abnormalities or flat feet, may benefit from an evaluation by a sports medicine physician, physical therapist, certified athletic trainer or other knowledgeable clinician.

**Infants and toddlers**

There is insufficient evidence to recommend exercise programs or classes for infants and toddlers as a means of promoting increased physical activity or preventing obesity in later years. The AAP recommends that children younger than 2 years not watch any television. Supervised, unstructured free play and activities such as neighborhood walks and other outdoor activities are encouraged.

**Preschool aged children 4-6**

Very young children (toddlers to 5 years of age) should have up to 120 minutes of moderate-to-vigorous physical activity (MVPA) per day, with 60 minutes of it as structured activity and 60 minutes as unstructured or free play.

AAP recommends supervised free play with emphasis on fun, playfulness, exploration and experimentation. Appropriate activities include running, swimming, tumbling, throwing and catching. Preschoolers can begin to walk tolerable distances and reduce sedentary transportation by car and stroller. Limit screen time to fewer than two hours per day.

**Elementary school-age children 6-9**

Older children should perform 60 minutes or more of physical activity each day, and MVPA that is aerobic in nature should make up most of the 60 or more minutes of physical activity. Muscle and bone strengthening activities such as gymnastics, calisthenics (e.g., push-ups, jumping jacks), jumping rope and running should be included at least three days per week as part of the 60 minutes.

Continued free play with more sophisticated movement patterns and fundamental skill acquisition should be encouraged. Organized sports may be initiated but should have flexible rules and short instruction time, with emphasis on enjoyment rather than competition. Co-ed participation is not contraindicated.

**Middle school-aged children 10-12**

Older children should perform 60 minutes or more of physical activity each day, and MVPA that is aerobic in nature should make up most of the 60 or more minutes of physical activity.

Muscle and bone strengthening activities such as gymnastics, calisthenics (e.g., push-ups, jumping jacks), jumping rope and running should be included at least three days per week as part of the 60 minutes.

Focus on enjoyment with family members and friends. Sports employing more complex coordination and strategy such as football, basketball and hockey are more feasible. Weight training may be initiated if supervised, using small free weights with high repetitions.

**Adolescents**

Older children should perform 60 minutes or more of physical activity each day, and MVPA that is aerobic in nature should make up most of the 60 or more minutes of physical activity.

Activities that are of interest, fun and include friends are more likely to engage the adolescent. In addition to competitive sports, encourage personal fitness activities such as dance, yoga, running and weight training to include heavier weights once the individual reaches physical maturity. Household chores may also count for physical activity.
There is wide consensus that decreased physical activity is a major contributing factor to the rising obesity epidemic in the United States. There is also agreement that obesity not only has negative implications in terms of the child's current life e.g., poorer academic performance, poor self-esteem and negative social consequences – but also places the child at significant risk for chronic long-term diseases such as Type 2 diabetes, metabolic syndrome and risk of cardiovascular diseases (Lambourne, 2011 [Reference]).

A strong positive correlation exists between physical inactivity and the prevalence of childhood obesity (Steinbeck, 2001). Physical activity is the largest modifiable component of energy expenditure, accounting for 15 to 30% of total daily energy expenditure (Lambourne, 2011 [Reference]).

 Teens who played on three or more sports teams in the past year were 27% less likely to be overweight and 39% less likely to be obese compared with teens who did not play on any sports team (Rosenkilde, 2012 [Reference]). Active commuting, such as riding a bike or walking to school, was not significantly related to overweight status, but it was associated with a reduced likelihood of obesity. Physical education classes for teens appeared to have little impact on weight status (Rosenkilde, 2012 [Reference]).

The interplay between decreased physical activity, sedentary lifestyle, diet and family/social interaction is complex, and solutions to the problem must integrate all of the components of this complex problem.

Increased screen time (an average of 5.5 hours per day in the form of television, video games and Internet activities) consume more time than all activities save sleeping. Reducing children's television viewing has a positive role in preventing obesity (Robinson, 1999 [Reference]). In addition children often compound this sedentary activity with increased energy expenditure by consuming snacks. On a more promising note, recent studies (Graf, 2009 [Reference]; Lanningham-Foster, 2006 [Reference]) compared physically active video games (Dance Revolution and Wii Sports) to treadmill walking. Both studies demonstrated increased energy expenditure, heart rate, step rate and perceived exertion in children 10-13 years of age comparable to moderate intensity walking.

Decreased time afforded to physical education/recess in schools may also have an effect of childhood obesity. Numerous studies demonstrate physical education's positive effect on cognitive and academic performance. (Castelli, 2007 [Reference]). However, the effect of physical education classes on reducing obesity has been less clear. Evidence presented in the Cochrane review Interventions for Treating Obesity in Children, 2009 Issue 1 found inconclusive evidence that aerobic exercise or moderate to high intensity 155 = 180 minutes/week affected central obesity. Positive effects were noted on increased VO2 max and blood cholesterol levels but no effect of leisure time physical activity rates, blood pressure, BMI or pulse rate.

More recently, attention has been given to incorporating more physical activity into the academic curriculum and short activity breaks in the curriculum. A three-year randomized controlled study by Donnelly concluded that physically active academic lessons improved performance on standardized tests and slowed the rate of BMI gains in students with the greatest exposure to the interventions (Donnelly, 2009 [Reference]).

It is clear that simply increasing PE time in the schools while not addressing home and other societal variables will not have a significant effect on preventing or curing childhood obesity.

Evidence-based recommendations for physical activity was addressed by an expert panel convened under the Divisions of Nutrition and Physical Activity and Adolescent and School Health of the Centers for Disease Control and Prevention and the Constella Group (Strong, 2005 [Moderate Quality Evidence]). In a review of 850 journal articles, the panel evaluated evidence dealing with the effects of regular physical activity on several health and behavioral outcomes, with the goal of developing a recommendation for the amount of physical activity deemed appropriate to yield beneficial health and behavioral outcomes. Positive effects for physical activity were found on musculoskeletal health, several components of cardiovascular health, adiposity in overweight youth and blood pressure in mildly hypertensive adolescents.
Recommendations were based on outcomes derived from activity protocols in the various studies. While there was understandable variation among protocols, most programs used continuous moderate to vigorous activities of 30-45 minutes duration for three to five days per week. As these studies were performed in a controlled experimental environment, the panel recommended 60 minutes or more of moderate to vigorous physical activity on a daily basis to allow for the more intermittent and varied level of activity encountered in a less structured environment.

There is broad consensus that children and adolescents need to be physically active and receive physical, cognitive and social benefits from such activity. There are published recommendations from the CDC, the American Heart Association, and the National Association for Sport and Physical Education (NASPE). The American Academy of Pediatrics Council on Sports Medicine and fitness and the Council on School Health issued "Active Healthy Living: Prevention of Childhood Obesity Through Increased Physical Activity" (Council on Sports Medicine and Fitness, Council on School Health, 2006 [Reference]).

In summary, the origins of childhood and adolescent obesity are multifactorial and complex. No less so are the possible solutions including the role of physical activity. As noted above, numerous studies demonstrate a positive effect on general fitness, academic achievement and general well-being. Children exposed to enjoyable physical activity in life tend to be more active as adults. However, while physical activity contributes to a positive energy balance, it alone does not provide a solution to the childhood obesity problem. The answer will likely incorporate increased physical activity with a program employing behavior modification/counseling for the child and family.

8. Behavior Management

Recommendations:

- Lifestyle interventions should be provided for overweight and obese youth (Strong Recommendation, High Quality Evidence) (Whitlock, 2010; Luttikhuis, 2009; Spear, 2007).
- Clinicians should help establish target behaviors (Strong Recommendation, High Quality Evidence) (Faith, 2012).
- Clinicians should encourage self-monitoring (Strong Recommendation, Moderate Quality Evidence) (Faith, 2012).
- Clinicians should work with the child and/or primary adult caregiver (PAC) to set goals (Strong Recommendation, Moderate Quality Evidence) (Faith, 2012).
- Clinicians should teach children and PACs about stimulus control (Strong Recommendation, Moderate Quality Evidence) (Faith, 2012).
- Clinicians should promote self-management and self-efficacy skills for children and PACs (Strong Recommendation, Moderate Quality Evidence) (Faith, 2012; Barlow, 2007).
- PACs should participate in the treatment process (Strong Recommendation, High Quality Evidence) (Dynamed, 2012; Faith, 2012; Knowlden, 2012; Collins, 2011; Barlow, 2007).
- PACs should be taught about positive parenting practices and contingency management strategies (Strong Recommendation, Moderate Quality Evidence) (Barlow, 2007; Spear, 2007).
• PACs should model healthy living (Strong Recommendation, Moderate Quality Evidence) (Faith, 2012; Spear, 2007).

• Youth can be taught cognitive restructuring (Weak Recommendation, Low Quality Evidence) (Spear, 2007).

• Youth and PACs can be taught problem-solving skills (Weak Recommendation, Low Quality Evidence) (Whitlock, 2010; Spear, 2007).

Lifestyle interventions should be provided for overweight and obese youth. Lifestyle interventions (including behavior therapy, diet and physical activity) have been shown to be effective with youth and have minimal to no adverse side effects (e.g., possible injuries related to exercise) (Lutikhuis, 2009 [High Quality Evidence]; Spear, 2007 [Low Quality Evidence]). In this context, behavior therapy refers to approaches that work at altering thinking and behavior, particularly as it relates to healthy living (Lutikhuis, 2009; High Quality Evidence), "moderate" to "high" intensity interventions, defined as 26-75 or 75 or more hours of intervention, respectively, have been shown to create both short- and long-term weight-loss outcomes. "Very low intensity" interventions, defined as 10 hours or less of intervention, have been shown to produce short-term weight-loss outcomes, but these effects have not been maintained (Whitlock, 2010; Low Quality Evidence).

Clinicians should help establish target behaviors (Faith, 2012 [Moderate Quality Evidence]). Children and families benefit from determining specific target behaviors on which to focus, rather than global aspirations. Target behaviors may be developed with the child or PAC or in collaboration.

Clinicians should encourage self-monitoring (Faith, 2012 [Moderate Quality Evidence]). Self-monitoring for children might include the child, PAC or both recording behavior. The information recorded may vary but will likely include information regarding food and beverage consumption and/or physical activity. In addition to having valuable data from the records, the act of self-monitoring has been shown to create behavior change. Self-monitoring is associated with weight loss for children and adults (Faith, 2012 [Moderate Quality Evidence]). Furthermore, for adults it is associated with weight-loss maintenance (Faith, 2012 [Moderate Quality Evidence]).

Clinicians should work with the child and/or PAC to set goals (Faith, 2012 [Moderate Quality Evidence]). Clinicians should work with youth and families to set realistic, achievable goals. Rather than discussing global aspirations (e.g., lose 20 pounds), the goals should state the specific behaviors that will be targeted, by whom, and when the changes should occur (e.g., the youth will replace one soda with water at least five days this week [parents will have bottled water available at home]). It is important to consider the developmental stage of the youth when setting goals and determining how much PAC support is required.

One model of goal setting is SMART goals. SMART stands for specific, measurable, assignable, realistic and time-based. By setting a SMART goal, the goal will be detailed (specific) and able to be evaluated (measurable). It will be provided to those involved in the behavior change (assignable) and it will be attainable (realistic). It is important to consider the developmental stage of the child when determining if the goal is attainable. There will also be a timeline in which the goal is completed (time-based). Another option for a goal-setting framework is provided with the "My Action Plan" handout; see Appendix F, "Pediatric Weight Management Program – My Action Plan." Notably, similar aspects of setting the goal are included. For example, "My Action Plan" includes specifying how much or how often the behavior should occur (specific and measurable), assigning the task to the person completing the form, identifying barriers and how to overcome them (realistic), and discussing follow-up (time-based).

Clinicians should teach children and PACs about stimulus control (Faith, 2012 [Moderate Quality Evidence]). Stimulus control occurs when particular stimuli cue specific behaviors. To use this principle to promote a healthy lifestyle, individuals are often encouraged to eat only at the table; limit the amount of unhealthy food in the home; remove televisions from bedrooms, kitchens and other eating areas; and use smaller dishes. The
environment can also be altered to increase the availability of healthy food options and access to activities that involve movement (Faith, 2012 [Moderate Quality Evidence]). For children, PACs will likely need to be involved in making these environmental modifications.

Clinicians should promote self-management and self-efficacy skills for children and PACs (Faith, 2012 [Moderate Quality Evidence]; Barlow, 2007). Clinicians should help PACs develop a sense of self-efficacy and management skills, and in turn, PACs can instill these in their youth. PACs should help children learn to self-regulate their meals, as this allows children to learn self-management (Barlow, 2007 [High Quality Evidence]). This may mean encouraging PACs to discontinue the expectation that a child finishes everything he/she was served. Experiencing good self-management can lead to confidence in one's ability to manage behaviors in the future (Faith, 2012 [Moderate Quality Evidence]).

PACs should participate in the treatment process (Dynamed, 2012; Faith, 2012; Knowlden, 2012 [High Quality Evidence]; Collins, 2011; Barlow, 2007). Participation of PACs will vary with age. PAC involvement will likely be more extensive when children are young, and the involvement will decrease or change with age. For young children, some research suggests that intervening with PACs alone can be just as effective as working with children and their PACs (Knowlden, 2012 [High Quality Evidence]). For adolescents, some research promotes providing treatment for both the adolescent and the parent but separate from one another (Faith, 2012). Many intervention approaches use some combination of family and individual therapy. Regardless of the level of involvement, PACs should be part of the process and educated about the intervention strategies. Specific age-based recommendations from the National Heart, Lung, and Blood Institute (NHLBI [High Quality Evidence]) include the following (Dynamed, 2012 [High Quality Evidence]):

- 0-2: no recommendations
- 2-5: education of parents
- 6-11: family-centered behavior change program
- 12-21: family-centered behavior change program with adolescent as change agent

PACs should be taught positive parenting practices and contingency management strategies (Faith, 2012; Barlow, 2007; Spear, 2007 [Moderate Quality Evidence]). PACs should be taught the intervention strategies previously discussed (i.e., specifying target behaviors, self-monitoring, goal setting, stimulus control, self-management and self-efficacy). Additionally, PACs should practice positive parenting strategies, including using positive reinforcement to encourage healthy behaviors. Although specific reinforcers will vary for each child, some examples might include positive statements and interactions or time spent together. Notably, PACs should not rely on food rewards for these youth (Faith, 2012 [Moderate Quality Evidence]; Barlow, 2007). Positive parenting practices also include PACs attending to the positive changes and decreasing attention to difficulties. PACs should reinforce specific steps or behaviors toward healthy living (e.g., choosing a healthy snack) rather than outcomes (e.g., amount of weight loss). It is important that PACs provide consistency in daily routines (e.g., sleep and meal times), yet also learn to be flexible in interactions and conversations with youth, particularly adolescents (Faith, 2012 [Moderate Quality Evidence]).

Contingency management refers to PACs setting out expectations and providing consequences for meeting or not meeting such expectations. Research suggest that youth are more likely to engage in healthy behaviors if they are reinforced (Spear, 2007 [Low Quality Evidence]). Again, the primary focus should be on recognizing and providing reinforcers for positive behaviors (Faith, 2012 [Moderate Quality Evidence]; Barlow, 2007).

PACs should model healthy living (Faith, 2012 [Moderate Quality Evidence]). Modeling includes PACs following healthy diets and engaging in physical activity themselves, as well as engaging in other behaviors similar to those that are expected of their child. PAC modeling is associated with child weight loss (Faith, 2012 [Moderate Quality Evidence]).
Youth can be taught cognitive restructuring (Spear, 2007 [Low Quality Evidence]). Cognitive restructuring is a strategy that is used to alter thought patterns. For children, cognitive strategies can be added to behavioral strategies, but they have not been as effective isolation. The use of cognitive restructuring will likely increase with age.

Youth and PACs can be taught problem-solving skills (Whitlock, 2010; Spear, 2007 [Low Quality Evidence]). Problem-solving includes identifying and planning for potential difficulties that may arise. There is mixed evidence to support teaching problem-solving skills to children and PACs during interventions for weight loss (Spear, 2007 [Low Quality Evidence]).

9. Weight Loss Medications

We suggest weighing the relative risk of adverse events due to medications in children against the long-term potential for obesity-related morbidity and mortality. The long-term effects of these medications on growth and development have not been studied.

Medications may be considered in obese children with comorbidities or those with severe obesity (BMI > 99th percentile) in addition to a lifestyle modification program that includes diet, exercise and behavior modification. We emphasize that pharmacotherapy should be offered only by clinicians who are experienced in the use of anti-obesity agents and are aware of the potential for adverse reactions.

Presently, orlistat is the only medication approved by the Food and Drug Administration (FDA) for treatment of childhood obesity (Dynamed, 2012 [Reference]; Collins, 2011). This drug is approved for children ≥ 12 years of age. No weight-loss medications are approved for use in children < 12 years old.

Orlistat is a reversible lipase inhibitor that binds lipase in the lumen of the stomach, making it unavailable to hydrolyze dietary fat (triglycerides) and cholesterol to free fatty acids and glycerol. Intact triglycerides and cholesterol cannot be absorbed thereby reducing fatty acid absorption by 30%. Side effects include abdominal cramping, flatus, oily bowel movements, and oily spotting on underwear caused by unabsorbed fat in the feces. Patients taking orlistat must take a daily multivitamin supplement as it can interfere with the absorption of fat-soluble vitamins. The weight loss achieved by orlistat is, however, very modest. In a 54-week, double-blind, randomized, control trial of 539 obese adolescents 12 to 16 years of age, those taking orlistat reduced their BMI by 0.55 kg/m², whereas those taking a placebo showed a slight increase in BMI by 0.31 kg/m² (Collins, 2011 [Reference]). Orlistat has undergone two label changes because of reports of liver injury, cholelithiasis and pancreatitis; however, a cause-and-effect relationship of severe liver injury with orlistat use has not been established. Orlistat has been available for over-the-counter use since 2006.

Small short-term studies suggest that metformin may result in slight weight control or weight loss (Faith, 2012 [Moderate Quality Evidence]). Metformin is currently approved for the treatment of T2DM in children at least 10 years of age but does have approval as a weight-loss drug. Metformin may be useful in combating the weight gain observed in children taking atypical antipsychotic medications and other psychotropic medications, e.g., clozapine, olanzapine, risperidone, quetiapine, aripiprazole and valproate (Knowelden, 2012 [High Quality Evidence]; Luttikhuis, 2009 [Reference]). The main adverse effects of metformin are diarrhea, nausea, vomiting and flatulence, which are usually transient and mild to moderate.

Octreotide may be of potential benefit in children with hypothalamic obesity who demonstrate insulin hypersecretion (Michalsky, 2012 [Reference]). However, it should be used in tertiary care centers with adequate expertise in care of severely obese children.

Leptin therapy in patients with mutations of the leptin gene results in extraordinary loss of weight and fat mass along with reduction in hyperphagia, resolution of obesity and induction of puberty. This condition is, however, very rare and is unlikely to be encountered by majority of care clinicians.
Use of phentermine, a stimulant medication and an appetite suppressant, has been FDA approved for adolescents older than 16 years and for adults only for short-term (usually interpreted as "up to 12 weeks") use, while following non-pharmacological approaches to weight loss such as healthy eating and exercise.

10. Bariatric Surgery

There is limited information on the long-term efficacy and safety of bariatric surgery in children and adolescents. Consideration for bariatric surgery should be given only under the following conditions (Faith, 2012 [Reference]; Barlow, 2007):

- The child has a BMI > 40 kg/m² or has BMI above 35 kg/m² and significant, severe comorbidities such as type 2 diabetes mellitus, obstructive sleep apnea or pseudotumor cerebri. It is important to note that there is currently no uniformly accepted consensus on the BMI criteria that would make adolescents candidates for bariatric surgery. While some experts suggest the adult BMI criteria of > 40 or ≥ 35 with comorbidities be used for the adolescent population (Dynamed, 2012; Faith, 2012 [Reference]), others recommend more stringent BMI criteria for the pediatric population: BMI ≥ 50, or ≥ 40 kg/m² in the presence of one or more medical comorbidities (Collins, 2011 [Reference]; Barlow, 2007).
- The child has attained Tanner 4 or 5 pubertal development or has a bone age of ≥ 13 years in girls or ≥ 15 years in boys, thereby suggesting that the child has attained final or near-final adult height.
- Failure of ≥ 6 months of organized attempts at weight management, as determined by the primary care clinician/weight management program.
- The adolescents should have decisional capacity and also demonstrate commitment to comprehensive medical and psychological evaluations both before and after surgery.
- A supportive family environment is extremely crucial and necessitates a complete evaluation of the home environment by trained personnel.

Bariatric surgery should not be performed for preadolescent children, for any patient who has not mastered the principles of healthy dietary and activity habits, and for those with unresolved eating disorder, untreated psychiatric disorder, or Prader-Willi syndrome. Pregnant, breastfeeding adolescents and those planning to become pregnant within two years of surgery should not be considered candidates for bariatric surgery.

Bariatric surgery in adolescents should be performed in regional bariatric centers of excellence with programs equipped to handle the data acquisition, long-term follow-up, and multidisciplinary issues of these difficult patients (Barlow, 2007 [High Quality Evidence]). A multidisciplinary team with medical (including endocrine, gastrointestinal, cardiovascular, pulmonary and otolaryngological expertise), surgical, nutritional and psychological expertise should carefully select adolescents who are well informed and motivated as potential candidates for bariatric surgery and should provide preoperative care and counseling. Patients and families must be well informed as to the risks and complications of bariatric surgery.

Roux-en-Y gastric bypass (RYGB) is the most common type of procedure performed in adolescents (Barlow, 2007) and it involves staples and excluding almost all of the stomach. RYGB is both a restrictive procedure, since a small proximal stomach pouch is created, and a minimal malabsorptive procedure, as the duodenum and a portion of the jejunum are bypassed. RYGB is the well-studied procedure in adolescents with the best outcomes regarding weight loss and resolution of comorbidities. Adolescents lose approximately 50-85% of their excess body weight with nearly complete resolution of comorbidities. Inge, et al. demonstrated complete remission of diabetes mellitus in almost all adolescents after RYGB; levels of fasting glucose, insulin, and Hb A1c associated insulin sensitivity were all improved (Knowlden, 2012 [Reference]). Risks specific to RYBG include anastomotic leak, small bowel obstruction, dumping syndrome (symptoms that may include nausea, bloating, vomiting, cramps, diarrhea and/or other symptoms), protein-calorie malnutrition, and micronutrient deficiency related to malabsorption (Luttikhuis, 2009 [Reference]). Many of these
risks are minimized by close follow-up and providing a vitamin supplement regimen (iron, folate, calcium, vitamin B12 and thiamine) to help prevent nutritional deficiencies.

Laparoscopic adjustable-gastric band (LAGB) procedure, is a purely restrictive bariatric procedure that has the added advantages of being reversible and having the least potential for adverse nutritional consequences. However, the LAGB has not been approved by the FDA for use in people < 18 years of age, because of a lack of both short-term and long-term safety and efficacy data for adolescent patients.

Sleeve gastrectomy (SG), a purely restrictive procedure, is emerging as a potential alternative bariatric procedure in well-selected adolescents. While short-term outcomes look promising, long-term data in adolescents is lacking (Rezvanian, 2010 [Reference]). Possible long-term nutritional risks, sustained weight-loss effectiveness, and durability of resolution of comorbidities in growing children have not been adequately evaluated.

Challenges continue to exist when attempting to track long-term outcomes as a result of lack of insurance benefits and physical barriers such as distance from bariatric center, no job, no car, etc.

11. Follow-Up and Long Term Management

Follow-up and long-term management strategy:

- Obesity is often a chronic condition and may benefit from using the chronic care model that integrates community resources, health care and patient self-management (Barlow, 2007 [High Quality Evidence]).

- Current expert guidelines suggest a stepped-care approach to weight management treatment that increases intensity according to the degree of excess weight, age/maturity, health risks and motivation (Spear, 2007 [Moderate Quality Evidence]).

- A combined dietary, physical activity and behavioral approach to weight management strategy is supported.

- Parental participation in weight loss and maintenance is needed for children < 12 years of age, with progressively less parental oversight with older youth (Barlow, 2007 [High Quality Evidence]).

- Systematic evaluation of body measurements, diet and physical activity should be performed at baseline and at specified intervals (Barlow, 2007 [High Quality Evidence]).

12. Genetics

Epigenetic and genetic considerations for obese children

Research has greatly enhanced our knowledge of epigenetic and genetic factors that contribute or create an environment that predisposes people to obesity in childhood and later in life.

Epigenetic issues are those that relate to cellular changes during intrauterine development that lead to risk factors for the development of obesity. These factors do not directly cause obesity but rather lead to an increased risk when combined with other environmental and other genetic factors.

Infants of diabetic mothers, especially type 2 and gestational diabetes, are at increased risk for obesity. More and more women are diagnosed with type 2 diabetes at a younger age, leading to an increase in the number of infants born to diabetic mothers.

Infants with intrauterine growth restriction are also at increased risk of developing obesity. The mechanism for this is related to insulin resistance created by the IUGR state that continues throughout life. Infants born...
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Prevention and Management of Obesity for Children and Adolescents  
First Edition/July 2013

There are several genetic syndromes that are associated with obesity in childhood that need to be considered when evaluating the obese child. These are listed in the following table. Genetic testing should be considered in severely obese children, especially at a young age, who are also developmentally delayed as developmental delay goes along with many of these syndromes.

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Gene Locus</th>
<th>Clinical Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prader-Willi</td>
<td>15q</td>
<td>Microcephaly, short stature, hypotonia, almond-shaped eyes, high-arched palate, narrow hands and feet, delayed puberty, early failure to thrive with hyperphagia and increased weight gain by 2-3 years, mild to moderate cognitive deficit.</td>
</tr>
<tr>
<td>Pseudohypoparathyroidism type 1a (Albright hereditary osteodystrophy)</td>
<td>20q13</td>
<td>Short stature, short metacarpals and metatarsals, round facies, delayed dentition, +/- hypocalcemia and/or vicarious mineralization, precocious puberty, mild cognitive deficit.</td>
</tr>
<tr>
<td>Alstrom</td>
<td>2p13</td>
<td>Blindness, deafness, acanthosis nigricans, chronic nephropathy, type 2 diabetes, cirrhosis, primary hypogonadisms in males only, normal cognition, obesity develops age 2-5 years.</td>
</tr>
<tr>
<td>Bardet-Biedl</td>
<td>Multiple loci</td>
<td>Mental retardation, hypotonia, retinitis pigmentosa, polydactyly, hypogonadism +/- glucose intolerance, deafness, renal disease.</td>
</tr>
<tr>
<td>Beckwith-Wiedeman</td>
<td>11p15.5</td>
<td>Hyperinsulinemia, hypoglycemia, hemihyptertrophy, intolerance of fasting.</td>
</tr>
<tr>
<td>Carpenter</td>
<td>6p11</td>
<td>Mental retardation, short stature, brachycephaly, polydactyly, syndactyly of feet, cryptorchidism, umbilical hernia, high-arched palate, hypogonadism in males only.</td>
</tr>
<tr>
<td>Cohen</td>
<td>8q22</td>
<td>Mental retardation, microcephaly, small hands and feet, cryptorchidism, hypotonia and failure to thrive in infancy, prominent central incisors, long, thin fingers and toes.</td>
</tr>
</tbody>
</table>

There are also single gene defects that can lead to obesity in childhood referred to as monogenic human obesity syndromes. These are listed in the following table. They are not associated with other syndromic characteristics and for the most part do not change management for the patient as they are not currently treatable in a unique fashion. The one exception is severe leptin deficiency. This is treatable with replacement of leptin by injection, with excellent results in weight loss. It is, however, quite rare as a cause for obesity.

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<tr>
<th>Single-Gene Disorder</th>
<th>Gene Locus</th>
<th>Clinical Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leptin deficiency</td>
<td>7q31.3</td>
<td>Severe, early onset obesity, hypometabolic rate, hyperphagia, pubertal delay, impaired glucose tolerance, hypothalamic hypogonadism.</td>
</tr>
<tr>
<td>POMC deficiency</td>
<td>2p23.3</td>
<td>Severe, early onset obesity, red hair, hyperphagia, adrenal insufficiency, hyperpigmentation.</td>
</tr>
<tr>
<td>Prohormone convertase impairment</td>
<td>5q15-q21</td>
<td>Early onset obesity, abnormal glucose homeostasis, hypogonadotropic hypogonadism, hypocortisolism, elevated plasma proinsulin and POMC.</td>
</tr>
<tr>
<td>Melanocortin receptor 4 haploinsufficiency</td>
<td>18q21.3-q22</td>
<td>Early onset, moderate-severe obesity, early onset hyperphagia, increased bone density.</td>
</tr>
<tr>
<td>Leptin receptor deficiency</td>
<td>1p31-p22</td>
<td>Severe, early onset obesity, hypometabolic rate, hyperphagia, pubertal delay, hypothalamic hypogonadism.</td>
</tr>
</tbody>
</table>

Many genes have been identified as playing a role in the development of obesity. The FTO or fat mass and obesity-associated gene has been studied and associated with obesity. Currently there is little clinical application for these genetic associations, but over time this is likely to improve as we understand more and more about the role genes play in relationship to the environment and the development of the obese state. Obesity is a complex chronic disease without one cause or treatment. To be knowledgeable of these genetic issues may someday help to better identify those patients at risk and who might benefit from more intense counseling, as well as develop new and novel treatment strategies.
The Aims and Measures section is intended to provide protocol users with a menu of measures for multiple purposes that may include the following:

- population health improvement measures,
- quality improvement measures for delivery systems,
- measures from regulatory organizations such as Joint Commission,
- measures that are currently required for public reporting,
- measures that are part of Center for Medicare Services Physician Quality Reporting initiative, and
- other measures from local and national organizations aimed at measuring population health and improvement of care delivery.

This section provides resources, strategies and measurement for use in closing the gap between current clinical practice and the recommendations set forth in the guideline.

The subdivisions of this section are:

- Aims and Measures
- Implementation Recommendations
- Implementation Tools and Resources
- Implementation Tools and Resources Table
Aims and Measures

1. Increase the percentage of patients ages 2 through 17 years who have an annual screening for obesity using body mass index (BMI) and their BMI percentile status is determined. *(Annotation #2)*

   Measures for accomplishing this aim:
   
   a. Percentage of patients who have an annual body mass index (BMI) measured.
   
   b. Percentage of patients with BMI screening whose BMI percentile is between 85 and 94.
   
   c. Percentage of patients with BMI screening whose BMI percentile is $\geq 95$.

2. Increase the percentage of patients ages 2 through 17 years with an annual BMI screening who have received education and counseling regarding weight management strategies. *(Annotations #1, 5, 6, 7, 8)*

   Measures for accomplishing this aim:
   
   a. Percentage of patients with BMI screening who have received education regarding weight management strategies that include nutrition and physical activity.
   
   b. Percentage of patients with BMI screening percentile $\geq 85$ who have cholesterol screening.

3. Increase the percentage of patients ages 2 through 17 years with a BMI screening percentile $\geq 85$ who have improved outcomes within 12 months of screening. *(Annotations #4, 5, 6, 7, 8, 9, 10)*

   Measure for accomplishing this aim:
   
   a. Percentage of patients with BMI screening percentile $\geq 85$ whose BMI percentile decreased within 12 months of screening.

*Return to Table of Contents*
Measurement Specifications

Measurement #1a

Percentage of patients who have an annual body mass index (BMI) measured.

Population Definition

Patients ages 2 through 17 years in the primary care pediatrics panel.

Data of Interest

\[
\frac{\text{# of patients who have an annual body mass index (BMI) measured}}{\text{# of patients in the primary care pediatrics panel}}
\]

Numerator and Denominator Definitions

Numerator: Number of patients ages 2 through 17 years who have an annual BMI measured.

Denominator: Total number of patients ages 2 through 17 years in the clinic's primary care pediatrics panel.

Method/Source of Data Collection

Query electronic medical records for the total number of patients in the clinic's primary care pediatrics panel who were ages 2 through 17 in the last 12 months from the measurement period date. The measurement period can be monthly, quarterly, semi-annually or annually. Determine the number of those patients who had an annual BMI screening done.

Time Frame Pertaining to Data Collection

Monthly, quarterly, semi-annually or annually. Select a time frame that aligns best with your clinic's quality improvement activities.

Notes

This is a process measure, and improvement is noted as an increase in the rate.

Return to Table of Contents
Measurement #1b

Percentage of patients with BMI screening whose BMI percentile is between 85 and 94.

Population Definition

Patients ages 2 through 17 years in the primary care pediatrics panel who had an annual BMI.

Data of Interest

\[
\frac{\text{# of patients whose BMI percentile is between 85 and 94}}{\text{# of patients who had an annual BMI}}
\]

Numerator and Denominator Definitions

Numerator: Number of patients whose BMI percentile is between 85 and 94.

Denominator: Total number of patients ages 2 through 17 years who had an annual BMI measured.

Method/Source of Data Collection

Query electronic medical records for the total number of patients in the clinic's primary care pediatrics panel who were ages 2 through 17 in the last 12 months from the measurement period date. The measurement period can be monthly, quarterly, semi-annually or annually. Determine the number of those patients who had an annual BMI screening done, and of those, determine the number of patients whose BMI percentile is between 85 and 94.

Time Frame Pertaining to Data Collection

Monthly, quarterly, semi-annually or annually. Select a time frame that aligns best with your clinic's quality improvement activities.

Notes

This is an outcome measure, and improvement is noted as an increase in the rate.

Return to Table of Contents
Measurement #1c

Percentage of patients with BMI screening whose BMI percentile is \( \geq 95 \).

Population Definition

Patients ages 2 through 17 years in the primary care pediatrics panel who had an annual BMI screening.

Data of Interest

\[
\frac{\text{# of patients whose BMI percentile is } \geq 95}{\text{# of patients who had an annual BMI screening}}
\]

Numerator and Denominator Definitions

Numerator: Number of patients whose BMI percentile is \( \geq 95 \).

Denominator: Number of patients ages 2 through 17 years who had an annual BMI screening.

Method/Source of Data Collection

Query electronic medical records for the total number of patients in the clinic's primary care pediatrics panel who were ages 2 through 17 in the last 12 months from the measurement period date. The measurement period can be monthly, quarterly, semi-annually or annually. Determine the number of those patients who had an annual BMI screening done and of those, determine the number of patients whose BMI percentile is \( \geq 95 \).

Time Frame Pertaining to Data Collection

Monthly, quarterly, semi-annually or annually. Select a time frame that aligns best with your clinic's quality improvement activities.

Notes

This is an outcome measure, and improvement is noted as an increase in the rate.

Return to Table of Contents
Measurement #2a

Percentage of patients with BMI screening who have received education regarding weight management strategies that include nutrition and physical activity.

Population Definition

Patients ages 2 through 17 years in the primary care pediatrics panel who had an annual BMI screening.

Data of Interest

\[
\frac{\text{# of patients who received education regarding weight management strategies that include nutrition and physical activity}}{\text{# of patients who had an annual BMI screening}}
\]

Numerator and Denominator Definitions

Numerator: Number of patients who received education regarding weight management strategies that include nutrition and physical activity.

Denominator: Number of patients ages 2 through 17 years who had an annual BMI screening.

Method/Source of Data Collection

Query electronic medical records for the total number of patients in the clinic's primary care pediatrics panel who were ages 2 through 17 in the last 12 months from the measurement period date. The measurement period can be monthly, quarterly, semi-annually or annually. Determine the number of those patients who had an annual BMI screening done. Then of those who had an annual BMI screening done, determine the number of patients who received education regarding weight-management strategies that include nutrition and physical activity.

Time Frame Pertaining to Data Collection

Monthly, quarterly, semi-annually or annually. Select a time frame that aligns best with your clinic's quality improvement activities.

Notes

This is a process measure, and improvement is noted as an increase in the rate.

Return to Table of Contents
Measurement #2b
Percentage of patients with BMI screening percentile ≥ 85 who have cholesterol screening.

Population Definition
Patients ages 2 through 17 years in the primary care pediatrics panel who had an annual BMI screening and BMI percentile ≥ 85.

Data of Interest
\[
\frac{\text{# of patients with BMI screening percentile ≥ 85 who have cholesterol screening}}{\text{# of patients who had an annual BMI screening and BMI percentile ≥ 85}}
\]

Numerator and Denominator Definitions
Numerator: Number of patients with BMI screening percentile ≥ 85 who have cholesterol screening.
Denominator: Number of patients ages 2 through 17 years who had an annual BMI screening and BMI percentile ≥ 85.

Method/Source of Data Collection
Query electronic medical records for the total number of patients in the clinic's primary care pediatrics panel who were ages 2 through 17 in the last 12 months from the measurement period date. The measurement period can be monthly, quarterly, semi-annually or annually. Determine the number of those patients who had an annual BMI screening done. Of those who had an annual BMI screening done, determine the number of patients whose BMI percentile ≥ 85, then determine the number of patients who had cholesterol screening done within 12 months of BMI screening.

Time Frame Pertaining to Data Collection
Monthly, quarterly, semi-annually or annually. Select a time frame that aligns best with your clinic's quality improvement activities.

Notes
This is a process measure, and improvement is noted as an increase in the rate.
Measurement #3a

Percentage of patients with BMI screening percentile $\geq 85$ whose BMI percentile decreased within 12 months of screening.

Population Definition

Patients ages 2 through 17 years in the primary care pediatrics panel who had an annual BMI screening and BMI percentile $\geq 85$.

Data of Interest

\[
\frac{\text{# of patients with BMI screening percentile } \geq 85 \text{ whose BMI percentile decreased within 12 months of screening}}{\text{# of patients who had an annual BMI screening and BMI percentile } \geq 85}
\]

Numerator and Denominator Definitions

Numerator: Number of patients with BMI screening percentile $\geq 85$ whose BMI percentile decreased within 12 months of screening.

Denominator: Number of patients ages 2 through 17 years who had an annual BMI screening and BMI percentile $\geq 85$.

Method/Source of Data Collection

Query electronic medical records for the total number of patients in the clinic's primary care pediatrics panel who were ages 2 through 17 in the last 12 months from the measurement period date. The measurement period can be monthly, quarterly, semi-annually or annually. Determine the number of those patients who had an annual BMI screening done. Of those who had an annual BMI screening done, determine the number of patients whose BMI percentile $\geq 85$, then determine the number of patients who had cholesterol screening done within 12 months of BMI screening.

Time Frame Pertaining to Data Collection

Monthly, quarterly, semi-annually or annually. Select a time frame that aligns best with your clinic's quality improvement activities.

Notes

This is an outcome measure, and improvement is noted as an increase in the rate.

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Implementation Recommendations

Prior to implementation, it is important to consider current organizational infrastructure that address the following:

- System and process design
- Training and education
- Culture and the need to shift values, beliefs and behaviors of the organization.

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline:

- Establish a system for using a Patient Readiness Scale to determine if the patient is ready to talk about weight loss and/or would like information.
- Establish a system for staff to efficiently calculate BMI prior to the clinician entering the clinic examination room. The BMI may provide more health risk information than traditional vital signs and should be built into the patient assessment protocol. A BMI chart should be placed by each scale in the clinic. All organizations with electronic medical records should build BMI calculators as a component for immediate calculation and review.
- Develop a tracking system that periodically reviews patient charts to identify patients who are overweight or obese so that clinicians are aware of the need to discuss the issue with the patient.
- Establish a system for staff and clinician training around skills and knowledge in the areas of motivational interviewing; brief, focused advice on nutrition, physical activity and lifestyle changes; and evaluation of evidence of effectiveness of treatment options.
- Establish a system for continuing education on evidence-based obesity management for clinicians, nurses and ancillary clinic staff.
- Remove barriers to referral programs for weight loss by understanding where programs are and what process is required for referrals.
- Develop medical record systems to track status of patients under the clinician's care with the capability to produce an outpatient tracking system for patient follow-up by clinician/staff.
- Use tools such as posters and brochures throughout the facility to assist with identifying and notifying patients about health risk related to obesity. Promote a healthy lifestyle around nutrition and activity while encouraging patient and parent knowledge of his or her BMI.
- Develop patient- and family-centered education and self-management programs, which may include self-monitoring, self-management and skills such as journaling.
- Build systems to track outcomes measures, as well as ongoing process measures. Track the response rate to various treatments/strategies.
- Systems to coordinate care ensure continuity and keep clinicians informed of progress:
  - Develop electronic tracking systems for panel or population management.
  - Educate patients and families to foster awareness and knowledge of BMI for self-monitoring and reporting.
  - Structure follow-up visits with patient per guideline recommendations.
Implementation Tools and Resources

Criteria for Selecting Resources

The following tools and resources specific to the topic of the guideline were selected by the work group. Each item was reviewed thoroughly by at least one work group member. It is expected that users of these tools will establish the proper copyright prior to their use. The types of criteria the work group used are:

- The content supports the clinical and the implementation recommendations.
- Where possible, the content is supported by evidence-based research.
- The author, source and revision dates for the content are included where possible.
- The content is clear about potential biases and when appropriate conflicts of interests and/or disclaimers are noted where appropriate.

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# Implementation Tools and Resources Table

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The subdivisions of this section are:

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- Appendices
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References


Anderson SE, Economos CD, Must A. Active play and screen time in U.S. children aged 4 to 11 years in relation to sociodemographic and weight status characteristics: a nationally representative cross-sectional analysis. *BMC Public Health* 2008;8:366. (Reference)


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References

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National Association for Sport and Physical Education & American Heart Association. In 2010 Shape of the National Report: Status of Physical Education in the USA. Reston, VA: National Association for Sport and Physical Education. (Reference)


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Raub RM, Goldberg SJ. Assessment of metformin as an additional treatment to therapeutic lifestyle changes in pediatric patients with metabolic syndrome. *Cholesterol* 2012:961410. (Reference)


Steinbeck KS. The importance of physical activity in the prevention of overweight and obesity in childhood: a review and an opinion. *Obesity* 2001;2:117-30. (Reference)


USDA Evidence Analysis Library. Is intake of dietary fiber related to adiposity in children? 2012. (Reference)


Appendix A – CDC/WHO Growth Charts

Birth to 24 months: Girls
Head circumference-for-age and
Weight-for-length percentiles

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Published by the Centers for Disease Control and Prevention, November 1, 2009
Appendix A – CDC/WHO Growth Charts

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

Mother’s Stature  Father’s Stature

Date  Age  Weight  Stature  BMI*

*To Calculate BMI: Weight (kg) / Stature (cm) = 0.10000 x Stature (cm) x 10,000

Published May 30, 2000 (modified 11/21/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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Appendix A – CDC/WHO Growth Charts

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

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

Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts
### Weight-for-stature percentiles: Girls

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**SOURCE:** Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

http://www.cdc.gov/growthcharts

*Published May 30, 2000 (modified 10/16/00).*

Prevention and Management of Obesity for Children and Adolescents

First Edition/July 2013

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Birth to 24 months: Boys
Head circumference-for-age and
Weight-for-length percentiles

DATE: _______________________________
WEIGHT: ____________________________
HEIGHT: ____________________________
HEAD CIRCUMFERENCE: ________________

Published by the Centers for Disease Control and Prevention, November 1, 2009
SOURCE: WHO Child Growth Standards (http://www.who.int/childgrowth/en/)

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# 2 to 20 years: Boys

## Body mass index-for-age percentiles

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

---

Published May 30, 2000 (modified 10/16/00).

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

http://www.cdc.gov/growthcharts

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## Appendix B – Blood Pressure

### Blood Pressure Levels for Girls by Age and Height Percentile

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## Blood Pressure Levels for Girls by Age and Height Percentile (Continued)

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BP, blood pressure

* The 90th percentile is 1.28 SD, 95th percentile is 1.645 SD, and the 99th percentile is 2.326 SD over the mean.

For research purposes, the standard deviations in Appendix Table B–1 allow one to compute BP Z-scores and percentiles for girls with height percentiles given in Table 4 (i.e., the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles). These height percentiles must be converted to height Z-scores given by (5% = -1.645; 10% = -1.28; 25% = -0.68; 50% = 0; 75% = 0.68; 90% = 1.28%; 95% = 1.645) and then computed according to the methodology in steps 2–4 described in Appendix B. For children with height percentiles other than these, follow steps 1–4 as described in Appendix B.

Return to Table of Contents
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BP, blood pressure
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Appendix C – Readiness to Change – Motivational Interviewing Sample Scripting for Pediatrics

I. Suggestions for using motivational interviewing to address BMI with children and families

1. Why are healthy choices important?
2. What can we choose for healthy food?
3. How can we move around more?
4. How would we feel different if we made healthy choices?
5. What's one thing we can do together to make a step towards healthy living?
6. When are we going to start? How will we remember to make healthy choices?

II. Sample script for 10-minute motivational interview using 5210 principles:

1. LISTEN: Ask open-ended questions. Exhibit curiosity versus being judgmental (Remember W.A.I.T. = Why am I talking?)
2. ASK PERMISSION: Acknowledge that the right and freedom not to change sometimes makes the change possible.
3. ENGAGE: Take off the expert hat.
4. REFLECT: Clarify you heard correctly.

• ASK:
  - Would it be okay with you if we spend 10 minutes exploring what we know about what keeps kids healthy?

• 1-2 minutes ELICIT:
  - "Tell me what you know about making healthy choices."

• ½ minute REFLECT:
  - "What I hear you say is that eating your veggies can make you feel better…etc."

• 2 minutes PROVIDE:
  - In non-judgemental fashion… "May I show you some information on what else we know about healthy choices we can make?" (Offer principles of 5210.)

• 1-2 minutes ELICIT:
  - "What does this mean to you?"

• 2-3 minutes GOAL:
  - "What would be one small step that you think you might be able to do?"
  - "I heard you say you will eat more veggies. On a scale of 1-10, with a score or 7 or higher indicating success in this goal, how confident do you think you will be able to do this? If a 5 …why not a 2?"

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You said:

(Provider or patient writes goals on a paper that goes home with patient.)

- I will eat two vegetables a day starting tomorrow.
- I will pack this at night after supper and put in the fridge.
- I will leave myself a note on my mirror to remind me.
- I will put a picture of veggies on the fridge.
- I will cut up veggies so I will have them easy to eat.

Clarify: "Is that correct?"

1/2-minute SESSION CLOSE:

"Thank you for your time today. I can hear excitement in your voice about starting on the path to being healthier. I am confident that you will do this!" "In two weeks, I will contact you to follow up and ask some questions about your action goal."
Appendix D – Lipids Table

Acceptable, Borderline-High, and High Plasma Lipid, Lipoprotein and Apolipoprotein Concentrations (mg/dL) for Children and Adolescents*

NOTE: Values given are in mg/dL. To convert to SI units, divide the results for total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and non-HDL-C by 38.6; for triglycerides (TG), divide by 88.6.

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* Values for plasma lipid and lipoprotein levels are from the National Cholesterol Education Program (NCEP) Expert Panel on Cholesterol Levels in Children. Non-HDL-C values from the Bogalusa Heart Study are equivalent to the NCEP Pediatric Panel cut points for LDL-C. Values for plasma apoB and apoA-I are from the National Health and Nutrition Examination Survey III.

+ The cut points for high and borderline high represent approximately the 95th and 75th percentiles, respectively. Low cut points for HDL-C and apoA-I represent approximately the 10th percentile.

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Appendix E – ICSI Shared Decision-Making Model

The technical aspects of Shared Decision-Making are widely discussed and understood.

- **Decisional conflict** occurs when a patient is presented with options where no single option satisfies all the patient’s objectives, where there is an inherent difficulty in making a decision, or where external influencers act to make the choice more difficult.

- **Decision support** clarifies the decision that needs to be made, clarifies the patient’s values and preferences, provides facts and probabilities, guides the deliberation and communication and monitors the progress.

- **Decision aids** are evidence-based tools that outline the benefits, harms, probabilities and scientific uncertainties of specific health care options available to the patient.

However, before decision support and decision aids can be most advantageously utilized, a Collaborative Conversation™ should be undertaken between the provider and the patient to provide a supportive framework for Shared Decision-Making.

**Collaborative Conversation™**

A collaborative approach toward decision-making is a fundamental tenet of Shared Decision-Making (SDM). The Collaborative Conversation™ is an inter-professional approach that nurtures relationships, enhances patients’ knowledge, skills and confidence as vital participants in their health, and encourages them to manage their health care.

Within a Collaborative Conversation™, the perspective is that both the patient and the provider play key roles in the decision-making process. The patient knows which course of action is most consistent with his/her values and preferences, and the provider contributes knowledge of medical evidence and best practices. Use of Collaborative Conversation™ elements and tools is even more necessary to support patient, care provider and team relationships when patients and families are dealing with high stakes or highly charged issues, such as diagnosis of a life-limiting illness.

The overall framework for the Collaborative Conversation™ approach is to create an environment in which the patient, family and care team work collaboratively to reach and carry out a decision that is consistent with the patient’s values and preferences. A rote script or a completed form or checklist does not constitute this approach. Rather it is a set of skills with high stakes or highly charged issues, such as diagnosis of a life-limiting illness.

**Key communication skills** help build the Collaborative Conversation™ approach. These skills include many elements, but in this appendix only the questioning skills will be described. (For complete instruction, see O’Connor, Jacobsen "Decisional Conflict: Supporting People Experiencing Uncertainty about Options Affecting Their Health" [2007], and Bunn H, O’Connor AM, Jacobsen MJ "Analyzing decision support and related communication" [1998, 2003].)

1. **Listening skills:**

   Encourage patient to talk by providing prompts to continue such as "go on, and then?, uh huh," or by repeating the last thing a person said, "It's confusing."
Paraphrase content of messages shared by patient to promote exploration, clarify content and to communicate that the person’s unique perspective has been heard. The provider should use his/her own words rather than just parroting what he/she heard.

Reflection of feelings usually can be done effectively once trust has been established. Until the provider feels that trust has been established, short reflections at the same level of intensity expressed by the patient without omitting any of the message’s meaning are appropriate. Reflection in this manner communicates that the provider understands the patient’s feelings and may work as a catalyst for further problem solving. For example, the provider identifies what the person is feeling and responds back in his/her own words like this: "So, you’re unsure which choice is the best for you."

Summarize the person’s key comments and reflect them back to the patient. The provider should condense several key comments made by the patient and provide a summary of the situation. This assists the patient in gaining a broader understanding of the situations rather than getting mired down in the details. The most effective times to do this are midway through and at the end of the conversation. An example of this is, "You and your family have read the information together, discussed the pros and cons, but are having a hard time making a decision because of the risks."

Perception checks ensure that the provider accurately understands a patient or family member, and may be used as a summary or reflection. They are used to verify that the provider is interpreting the message correctly. The provider can say "So you are saying that you’re not ready to make a decision at this time. Am I understanding you correctly?"

2. Questioning Skills

Open and closed questions are both used, with the emphasis on open questions. Open questions ask for clarification or elaboration and cannot have a yes or no answer. An example would be "What else would influence you to choose this?" Closed questions are appropriate if specific information is required such as "Does your daughter support your decision?"

Other skills such as summarizing, paraphrasing and reflection of feeling can be used in the questioning process so that the patient doesn’t feel pressured by questions.

Verbal tracking, referring back to a topic the patient mentioned earlier, is an important foundational skill (Ivey & Bradford-Ivey). An example of this is the provider saying, "You mentioned earlier…"

3. Information-Giving Skills

Providing information and providing feedback are two methods of information giving. The distinction between providing information and giving advice is important. Information giving allows a provider to supplement the patient’s knowledge and helps to keep the conversation patient centered. Giving advice, on the other hand, takes the attention away from the patient’s unique goals and values, and places it on those of the provider.

Providing information can be sharing facts or responding to questions. An example is "If we look at the evidence, the risk is…” Providing feedback gives the patient the provider’s view of the patient’s reaction. For instance, the provider can say, "You seem to understand the facts and value your daughter’s advice."

Additional Communication Components

Other elements that can impact the effectiveness of a Collaborative Conversation™ include:

- Eye contact
- Body language consistent with message
- Respect

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Self-examination by the provider involved in the Collaborative Conversation™ can be instructive. Some questions to ask oneself include:

- Do I have a clear understanding of the likely outcomes?
- Do I fully understand the patient’s values?
- Have I framed the options in comprehensible ways?
- Have I helped the decision-makers recognize that preferences may change over time?
- Am I willing and able to assist the patient in reaching a decision based on his/her values, even when his/her values and ultimate decision may differ from my values and decisions in similar circumstances?

**When to Initiate a Collaborative Conversation™**

A Collaborative Conversation™ can support decisions that vary widely in complexity. It can range from a straightforward discussion concerning routine immunizations to the morass of navigating care for a life-limiting illness. Table 1 represents one health care event. This event can be simple like a 12-year-old coming to the clinic for routine immunizations, or something much more complex like an individual receiving a diagnosis of congestive heart failure. In either case, the event is the catalyst that starts the process represented in this table. There are cues for providers and patient needs that exert influence on this process. They are described below. The heart of the process is the Collaborative Conversation™. The time the patient spends within this health care event will vary according to the decision complexity and the patient’s readiness to make a decision.

Regardless of the decision complexity there are cues applicable to all situations that indicate an opportune time for a Collaborative Conversation™. These cues can occur singularly or in conjunction with other cues.

**Cues for the Care Team to Initiate a Collaborative Conversation™**

- **Life goal changes**: Patient’s priorities change related to things the patient values such as activities, relationships, possessions, goals and hopes, or things that contribute to the patient’s emotional and spiritual well-being.
Patients and families have a role to play as decision-making partners, as well. The needs and influencers brought to the process by patients and families impact the decision-making process. These are described below.

**Patient and Family Needs within a Collaborative Conversation™**

- **Request for support and information:** Decisional conflict is indicated by, among other things, the patient verbalizing uncertainty or concern about undesired outcomes, expressing concern about choice consistency with personal values and/or exhibiting behavior such as wavering, delay, preoccupation, distress or tension. Generational and cultural influencers may act to inhibit the patient from actively participating in care discussions, often patients need to be given "permission" to participate as partners in making decisions about his/her care.

  Support resources may include health care professionals, family, friends, support groups, clergy and social workers. When the patient expresses a need for information regarding options and his/her potential outcomes, the patient should understand the key facts about options, risks and benefits, and have realistic expectations. The method and pace with which this information is provided to the patient should be appropriate for the patient’s capacity at that moment.

- **Advance Care Planning:** With the diagnosis of a life-limiting illness, conversations around advance care planning open up. This is an opportune time to expand the scope of the conversation to other types of decisions that will need to be made as a consequence of the diagnosis.

- **Consideration of Values:** The personal importance a patient assigns potential outcomes must be respected. If the patient is unclear how to prioritize the preferences, value clarification can be achieved through a Collaborative Conversation™ and by the use of decision aids that detail the benefits and harms of potential outcomes in terms the patient can understand.

- **Trust:** The patient must feel confident that his/her preferences will be communicated and respected by all caregivers.

- **Care Coordination:** Should the patient require care coordination, this is an opportune time to discuss the other types of care-related decisions that need to be made. These decisions will most likely need to be revisited often. Furthermore, the care delivery system must be able to provide coordinated care throughout the continuum of care.

- **Responsive Care System:** The care system needs to support the components of patient- and family-centered care so the patient’s values and preferences are incorporated into the care he/she receives throughout the care continuum.

The Collaborative Conversation™ Map is the heart of this process. The Collaborative Conversation™ Map can be used as a stand-alone tool that is equally applicable to providers and patients as shown in Table 2.
Providers use the map as a clinical workflow. It helps get the Shared Decision-Making process initiated and provides navigation for the process. Care teams can use the Collaborative Conversation™ to document team best practices and to formalize a common lexicon. Organizations can build fields from the Collaborative Conversation™ Map in electronic medical records to encourage process normalization. Patients use the map to prepare for decision-making, to help guide them through the process and to share critical information with their loved ones.

Evaluating the Decision Quality

Adapted from O’Connor, Jacobsen "Decisional Conflict: Supporting People Experiencing Uncertainty about Options Affecting Their Health" [2007].

When the patient and family understand the key facts about the condition and his/her options, a good decision can be made. Additionally, the patient should have realistic expectations about the probable benefits and harms. A good indicator of the decision quality is whether or not the patient follows through with his/her chosen option. There may be implications of the decision on patient’s emotional state such as regret or blame, and there may be utilization consequences.

Decision quality can be determined by the extent to which the patient’s chosen option best matches his/her values and preferences as revealed through the Collaborative Conversation™ process.

Support for this project was provided in part by a grant from the Robert Wood Johnson Foundation.
Appendix F – Pediatric Weight Management Program – My Action Plan

Nutrition Goals:
1. When thirsty, I will drink water, sugar-free drink or diet pop instead of regular pop, fruit drinks or sport drinks every day.
2. I will not have second helpings at dinner for the main course for at least ___ days of the week.
3. I will eat a healthy breakfast at least ___ days of the week.
4. New goal

Physical Activity Goals
1. I will walk at least ___ minutes___ per week.
2. I will play outdoors daily or at least ___ days per week.
3. I will limit my computer, TV and gaming time to ___ hours per day
4. New goal

Family Support Goals
1. My family will have at least five meals together as a family; this could be breakfast, lunch or dinner.
2. I will help my parents prepare a healthy dinner at least once a week.
3. My family will remove high-fat foods from our house so I won’t be tempted to eat these foods.
4. New goal

Commitment to the Pediatric Weight Management Program

We believe that an effective outpatient weight-loss program uses a multidisciplinary team approach and includes the physician, dietician, exercise therapist and behavior health therapist as needed. You as the patient are the most important team member.

To be successful we ask that you:
- Work toward goals established by you and your team members
- Complete daily food and activity logs
- Keep your follow-up appointments
- Commit to a one-year program

Most importantly, celebrate your success!

Three questions to think about before your next appointment:

What do you believe will be the most help to assist you in losing weight?
What is the hardest part about managing your weight?
What are your expectations for this program?

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ICSI has long had a policy of transparency in declaring potential conflicting and competing interests of all individuals who participate in the development, revision and approval of ICSI guidelines and protocols.

In 2010, the ICSI Conflict of Interest Review Committee was established by the Board of Directors to review all disclosures and make recommendations to the board when steps should be taken to mitigate potential conflicts of interest, including recommendations regarding removal of work group members. This committee has adopted the Institute of Medicine Conflict of Interest standards as outlined in the report, Clinical Practice Guidelines We Can Trust (2011).

Where there are work group members with identified potential conflicts, these are disclosed and discussed at the initial work group meeting. These members are expected to recuse themselves from related discussions or authorship of related recommendations, as directed by the Conflict of Interest committee or requested by the work group.

The complete ICSI policy regarding Conflicts of Interest is available at http://bit.ly/ICSICOI.

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ICSI facilitates and coordinates the guideline development and revision process. ICSI, member medical groups and sponsoring health plans review and provide feedback but do not have editorial control over the work group. All recommendations are based on the work group's independent evaluation of the evidence.
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All ICSI documents are available for review during the revision process by member medical groups and sponsors. In addition, all members commit to reviewing specific documents each year. This comprehensive review provides information to the work group for such issues as content update, improving clarity of recommendations, implementation suggestions and more. The specific reviewer comments and the work group responses are available to ICSI members at http://ObesityChild.

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The next revision will be no later than August 2018.

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ICSI Document Development and Revision Process

Overview

Since 1993, the Institute for Clinical Systems Improvement (ICSI) has developed more than 60 evidence-based health care documents that support best practices for the prevention, diagnosis, treatment or management of a given symptom, disease or condition for patients.

Audience and Intended Use

The information contained in this ICSI Health Care Guideline is intended primarily for health professionals and other expert audiences.

This ICSI Health Care Guideline should not be construed as medical advice or medical opinion related to any specific facts or circumstances. Patients and families are urged to consult a health care professional regarding their own situation and any specific medical questions they may have. In addition, they should seek assistance from a health care professional in interpreting this ICSI Health Care Guideline and applying it in their individual case.

This ICSI Health Care Guideline is designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and is not intended either to replace a clinician’s judgment or to establish a protocol for all patients with a particular condition.

Document Development and Revision Process

The development process is based on a number of long-proven approaches and is continually being revised based on changing community standards. The ICSI staff, in consultation with the work group and a medical librarian, conduct a literature search to identify systematic reviews, randomized clinical trials, meta-analysis, other guidelines, regulatory statements and other pertinent literature. This literature is evaluated based on the GRADE methodology by work group members. When needed, an outside methodologist is consulted.

The work group uses this information to develop or revise clinical flows and algorithms, write recommendations, and identify gaps in the literature. The work group gives consideration to the importance of many issues as they develop the guideline. These considerations include the systems of care in our community and how resources vary, the balance between benefits and harms of interventions, patient and community values, the autonomy of clinicians and patients and more. All decisions made by the work group are done using a consensus process.

ICSI’s medical group members and sponsors review each guideline as part of the revision process. They provide comment on the scientific content, recommendations, implementation strategies and barriers to implementation. This feedback is used by and responded to by the work group as part of their revision work. Final review and approval of the guideline is done by ICSI’s Committee on Evidence-Based Practice. This committee is made up of practicing clinicians and nurses, drawn from ICSI member medical groups.

Implementation Recommendations and Measures

These are provided to assist medical groups and others to implement the recommendations in the guidelines. Where possible, implementation strategies are included that have been formally evaluated and tested. Measures are included that may be used for quality improvement as well as for outcome reporting. When available, regulatory or publicly reported measures are included.

Document Revision Cycle

Scientific documents are revised every 12-24 months as indicated by changes in clinical practice and literature. ICSI staff monitors major peer-reviewed journals every month for the guidelines for which they are responsible. Work group members are also asked to provide any pertinent literature through check-ins with the work group midcycle and annually to determine if there have been changes in the evidence significant enough to warrant document revision earlier than scheduled. This process complements the exhaustive literature search that is done on the subject prior to development of the first version of a guideline.

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