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# Initial Screening and Referral for Comorbidities in Pediatric Obese Patients

# **Clinical Question**

P (population/problem)	In children age 3 to 19 years, with body mass index $(BMI) \ge 95^{\text{th}}$ percentile
I (intervention)	what initial screening tests and clinical findings
O (outcome)	provide appropriate information to make specialty referrals so that identified comorbid conditions are managed to achieve best medical and quality of life outcomes?

**Target Population** Pediatric patients ages 3 to 19 years with  $BMI \ge 95^{th}$  percentile

Recommendations (See Table of Recommendation Strength following references)

1. It is recommended that the following fasting laboratory studies be obtained at the initial visit:

- insulin
- fasting glucose (August 2008 [5b], Kavey 2006 [5b], Silverstein 2005 [5b])
- HbA1c hemoglobin A1c (American Diabetes Association 2010 [5b], Silverstein 2005 [5b])
- TSH Thyroid-stimulating hormone
- AST aspartate transaminase (*Barlow 2007 [5b]*)
- ALT alanine transaminase (August 2008 [5b], Barlow 2007 [5b])
- GGT gamma glutamyl transpeptidase
- lipid panel (August 2008 [5b], Barlow 2007 [5b], Kavey 2006 [5b])

#### (Local Consensus [5b]).

**Note:** Published clinical practice guidelines recommend not performing routine screening for thyroid disease *(Barlow 2007 [5b])*. Local consensus to conduct routine TSH screening is recommended to avoid additional subsequent phlebotomy and testing is based on demand from patients and families.

- 2. It is recommended that during the office visit a history and physical examination for comorbidities include the following:
  - family history of Type 2 diabetes mellitus (primary relative) (*Barlow 2007 [5b], Kavey 2006 [5b], Silverstein 2005 [5b]*)
  - medications, including antipsychotics
  - clinical findings indicative of Polycystic Ovary Syndrome (PCOS), defined as two or more of the following:
    - irregular periods and at least 2 years post menarche
    - excessive acne
    - hirsuitism
    - evidence of insulin resistance (acanthosis and/or elevated insulin > 20 mg / dL

(August 2008 [5b], Barlow 2007 [5b], Local Consensus [5b])

- blood pressure (August 2008 [5b], Barlow 2007 [5b], Kavey 2006 [5b])
- history of exercise intolerance (Barlow 2007 [5b], Kavey 2006 [5b])
- BMI (August 2008 [5b], Barlow 2007 [5b], Kavey 2006 [5b])
- history of sleep apnea (August 2008 [5b], Barlow 2007 [5b])

(Local Consensus [5b]).

3. It is recommended that appropriate comorbidity referrals be made based upon these screening tests and clinical findings (see algorithm next page) (*Barlow 2007 [5b]*, *Silverstein 2005 [5b]*, *Local Consensus [5b]*).

Note: It is out of scope to deal with follow up screening for normal findings



Note: LVH has been reported in 34% to 38% of children and adolescents with mild, untreated blood pressure elevation (*National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents 2004 [5]*). Details of the association between childhood obesity and cardiovascular outcomes remain largely unknown, however LVH is known to be an independent risk factor for cardiovascular disease morbidity and mortality in adults (*McGovern 2008 [1], Kavey 2006 [5], National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents 2004 [5]*).



<sup>1</sup> Hirsuitism 1 panel: DHEAS; testosterone free, % free testosterone by dialysis, SHBG

Abbreviations:  $1^{\circ}$  = primary; ALT = a liver enzyme; AST = a liver enzyme; BMI = body mass index; DBP = diastolic blood pressure; DHEAS = dehydroepiandrosterone sulfate; DM = diabetes mellitus; ECHO = echocardiogram; FBS = fasting blood sugar; GGT = a liver enzyme; HbA1c = hemoglobin A1c; HDL = high-density lipoprotein; HTN = hypertension; Hx = history; IGT = impaired glucose tolerance; LDL = low-density lipoprotein; LVH = left ventricular hypertrophy; mg/dL = milligrams per deciliter; mo = month; NASH = non-alcoholic steatohepatitis; OGTT = oral glucose tolerance test; PCOS = polycystic ovary syndrome; SBP = systolic blood pressure; SHBG = sex hormone-binding globulin; T2D = Type 2 diabetes; TG = triglyceride; TSH = thyroid stimulating hormone

(American Diabetes Association 2010 [5b], August 2008 [5b], Barlow 2007 [5b], Kavey 2006 [5b], Silverstein 2005 [5b], National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents 2004 [5b], Local Consesus [5b])

# Discussion/summary of evidence

The recommendations are based on synthesized evidence from 6 clinical practice guidelines. Only two of the clinical guidelines focus on the prevention, assessment, and treatment of overweight and obese children and adolescents (*August 2008 [5b], Barlow 2007 [5b]*). These two guidelines are evidence-based where evidence is available but neither guideline describes their literature search. Both guidelines combined limited data and opinion which leads to a low grade for the body of evidence.

Supporting these two guidelines are two diabetes-specific guidelines, the 2005 American Diabetes Association statement regarding Care of Children and Adolescents with Type 1 Diabetes (*Silverstein 2005 [5b]*) and the Standards of Medical Care in Diabetes – 2010 (*American Diabetes Association 2010 [5b]*). The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents (*National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents 2004 [5b]*) and the Cardiovascular Risk Reduction in High-Risk Pediatric Patients (*Kavey 2006 [5b]*) are two additional guidelines that focus on cardiovascular risks and blood pressure recommendations supporting the recommendations of this BESt. Local consensus agrees with these screening and referral processes.

# Health Benefits, Side Effects and Risks

Screening for current medical conditions and risks factors for other conditions lead to earlier interventions. Aggressive management of relative risk factors has been shown to improve outcomes and optimal management can modify one's risks (*Kavey 2006 [5b]*).

When BMI is  $< 85^{\text{th}}$  percentile, body fat levels are likely to pose little risk. BMI of  $85^{\text{th}}$  to the  $94^{\text{th}}$  percentile indicates health risks that vary yet the likelihood increases depending on body composition, BMI trajectory, and family history (*Barlow 2007 [5b]*). The likelihood of obesity-related health risks increases to very likely for children with a BMI above the  $95^{\text{th}}$  percentile influenced by family medical history, current lifestyle habits, BMI trajectory and cardiovascular risk factors (*Barlow 2007 [5b]*).

Adherence to the recommendations poses minimal risks and burden for venipunctures and history and physical, with little potential for additional unnecessary treatment and referrals from false positives. There is a potential burden for both the patient and health system for false positives regarding echocardiograms.

## **References/citations** (evidence grade in [ ]; see Table of Evidence Levels following references)

**Note:** When using the electronic version of this document,  $\mathbf{v}$  indicates a hyperlink to the PubMed abstract. A hyperlink following this symbol goes to the article PDF when the user is within the CCHMC network.

- 1. American Diabetes Association: Standards of medical care in diabetes--2010. Diabetes Care, 33 Suppl 1: S11-61, 2010, [5b]
- August, G. P. et al.: Prevention and treatment of pediatric obesity: an endocrine society clinical practice guideline based on expert opinion. *Journal of Clinical Endocrinology & Metabolism*, 93(12): 4576-99, 2008, [5b] \_\_\_\_\_ \* \_\_\_\_.
- Barlow, S. E., and Expert Committee: Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*, 120(Suppl 4): S164-92., 2007, [5b] \_\_\_\_\_ To \_\_\_\_.
- Kavey, R. E.; Allada, V.; Daniels, S. R.; Hayman, L. L.; McCrindle, B. W.; Newburger, J. W.; Parekh, R. S.; and Steinberger, J.: Cardiovascular risk reduction in high-risk pediatric patients: a scientific statement from the American Heart Association Expert Panel on Population and Prevention Science; the Councils on Cardiovascular Disease in the Young, Epidemiology and Prevention, Nutrition, Physical Activity and Metabolism, High Blood Pressure Research, Cardiovascular Nursing, and the Kidney in Heart Disease; and the Interdisciplinary Working Group on Quality of Care and Outcomes Research: endorsed by the American Academy of Pediatrics. *Circulation*, 114(24): 2710-38, 2006, [5b] \_\_\_\_\_\_\_\_\_\_.
- 5. Local Consensus: During guideline development timeframe. [5b] **\***.
- 6. Local Consesus: During guideline development timeframe. [5b] **•**.
- 7. National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents: The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents.[see comment]. *Pediatrics*, 114(2 Suppl 4th Report): 555-76, 2004, [5b] \_\_\_\_\_\_
- 8. Silverstein, J. et al.: Care of children and adolescents with type 1 diabetes: a statement of the American Diabetes Association. *Diabetes Care*, 28(1): 186-212, 2005, [5b] \_\_\_\_\_\_ .

Note: Full tables of evidence grading system available in separate document:

- Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality (abbreviated table below)
- Grading a Body of Evidence to Answer a Clinical Question
- <u>Judging the Strength of a Recommendation</u> (abbreviated table below)

#### Table of Evidence Levels (see note above)

Quality level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-
	synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	Other: General review, expert opinion, case
	report, consensus report, or guideline

 $\dagger a = good quality study; b = lesser quality study$ 

#### Table of Recommendation Strength (see note above)

Strength	Definition
"Strongly recommended"	There is consensus that benefits clearly outweigh risks and burdens
	(or visa-versa for negative recommendations).
"Recommended"	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.

*Dimensions:* In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.

1. Grade of the Body of Evidence (see note above)

2. Safety / Harm

- 3. Health benefit to patient (direct benefit)
- 4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time)
- 5. Cost-effectiveness to healthcare system (balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis)
- 6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])
- 7. Impact on morbidity/mortality or quality of life

# **Supporting information**

## Introductory/background information

Obesity is defined as having an age- and gender-specific BMI at  $\geq 95^{\text{th}}$  percentile. Overweight is defined as age and gender-specific BMI between  $85^{\text{th}}$  and  $94^{\text{th}}$  percentile (*August 2008 [5b], Barlow 2007 [5b]*). BMI is the cardinal screening indicator that serves as the starting point for classification of health risks (*August 2008 [5b], Barlow 2007 [5b]*). There has been a steady increase in the prevalence of childhood and adolescent obesity from approximately 5% in 1963 to 1970 up to 17% in 2003 to 2004 (*Barlow 2007 [5b]*). The major concern regarding the increased prevalence of obesity is its association with increased risk factors and comorbidities (*August 2008 [5b]*). The higher one's BMI the greater one's risk for more comorbidities and health risks (*August 2008 [5b]*).

## Group/team members

Group/Team Leader Nancy Crimmins, MD, Division of Pediatric Endocrinology Other group/team members Jennifer Hillman, MD, Division of Adolescent Medicine Holly Ippisch, MD Cardiology Clinic Shelley Kirk, PhD, RD, LD, Healthworks Vickie Neyer, RN, Multi Practice Center Bob Siegel, MD Cardiology Clinic Jennifer Sweeney, APN, Healthworks Stavra Xanthakos, MD, Gastroenterology, Hepatology, and Nutrition Clinical Effectiveness Support Personnel: Carla Williams, MSA, Outcomes Manager Anjali Basu, MS, Associate Outcomes Manager Eloise Clark, MPH, MBA, Guidelines Program Administrator, Evidence Facilitator Danette Stanko-Lopp, MA, MPH, Epidemiologist Karen Vonderhaar, MS, RN, Guidelines Program Administrator, Methodologist

# Search strategy

• Databases: MedLine, CINAHL, and Cochrane Database for Systematic Reviews (CDSR)

#### OVID FILTERS

- Publication dates: 1996 to present
- Limits: English language
  - Pediatric Evidence

("all child (0 to 18 years)" or all child <0 to 18 years>) OR

(pediatr\$ or child\$ or infan\$ or adolesc\$ or teen\$).mp. OR

("all infant (birth to 23 months)" or "newborn infant (birth to 1 month)" or "infant (1 to 23 months)" or "preschool child (2 to 5 years)" or "child (6 to 12 years)" or "adolescent (13 to 18 years)")

• Evidence Type: Synthesized evidence

(guideline or meta analysis or practice guidelines or systematic review).pt. or "the cochrane library".jn. or "cochrane database of systematic reviews".jn. OR clinical trial.pt. OR (controlled clinical trial or randomized controlled trial).pt. OR random\$.ti,ab. OR (single blind\$ or double blind\$ or triple blind\$3).ti,ab. OR double blind method/

## • SEARCH TERMS & MeSH TERMS (MedLine & CINAHL)

- Patients/Population: Exp Obesity/ or MM Obesity+
- Additional articles identified by clinicians and reference lists.

# **Applicability issues**

Measures that are planned to be audited include:

- · Percentage of visits for patients with obesity where BMI is documented.
- Percentage of patients with obesity who are assessed for hypertension, diabetes hyperlipidemia, and nonalcoholic steatohepatitis at their initial visit (or prior to the initial visit).

Copies of this Best Evidence Statement (BESt) are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: <u>http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm</u> Examples of approved uses of the BESt include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence-based care;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the BESt may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at <u>HPCEInfo@cchmc.org</u> for any BESt adopted, adapted, implemented or hyperlinked by the organization is appreciated.

For more information about CCHMC Best Evidence Statements and the development process, contact Center for Better Health and Nutrition at CCHMC.

#### Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Reviewed against quality criteria by 2 independent reviewers