



# Pediatric Criteria for Metabolic and Bariatric Surgery



**NATIONWIDE  
CHILDREN'S®**

*When your child needs a hospital, everything matters.*

## When your patient needs specialized care, everything matters.

A national leader in prevention and treatment, the Center for Healthy Weight and Nutrition at Nationwide Children's Hospital offers a comprehensive approach to weight management, with multiple resources for families and physicians and a cross-departmental, integrated approach. This hospital-based center has developed strategies to address all clinical aspects of obesity care, both at the acute and sub-acute levels.



The Metabolic Bariatric Surgery program at Nationwide Children's was the first to receive accreditation as a pediatric focused center, by the American College of Surgeons Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP). This recognition certifies that the highest standards of quality and safety are being met at our

center, and affirms its dedication to providing care to the pediatric and adolescent population.

Nationwide Children's is one of only 25 hospitals nationwide selected to participate in the National Association of Children's Hospitals and Related Institutions (NACHRI) FOCUS Group on Obesity, a task force to identify best practices of hospital-based clinical pediatric weight management programs, by examining and refining successful components of the weight management programs at their collective hospitals.

Nationwide Children's is also one of only five institutions nationwide to participate in Teen-LABS, a multi-institution clinical research study funded by the National Institutes of Health (NIH) to understand the benefits and risks of metabolic bariatric surgery in adolescents.

## Bariatric Surgery Options

- Gastric bypass surgery
- Gastric sleeve surgery

## Free Online Information Session

The Center for Healthy Weight and Nutrition at Nationwide Children's Hospital has a free online information tool about bariatric surgery (weight loss surgery).

If you are struggling with obesity, learn the bariatric surgery process, including the three types of weight loss surgeries available to combat obesity, and the risks, advantages and disadvantages of each.

Adolescents can sign up at **HealthyWeight.NationwideChildrens.org**.

## Coordinated Care

The center involves not only expert physicians and nurse practitioners, but also experts in cardiology, adolescent medicine, and pediatric psychiatry and psychology, as well as registered dietitians, specialized nursing personnel, social worker physical therapists and certified athletic trainers.

## Obesity: Definition and Risks

Severe obesity (class 2 obesity or higher) is associated with much higher rates of co-morbid conditions. Since the 1960's, this class of obesity has increased

from 0.9 percent to nearly 6 percent of the population (1) – much higher among ethnic subpopulations. The rate of severe obesity is even higher (9.1%) among adolescents (2). (Peto et al: Landet, 2009). (3)

## The Bariatric Surgery Team



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- Life span is lessened by 10 years or more in adults with extreme obesity, comparable with those who smoke (Peto et al: Lancet, 2009).
- The cardiovascular state of those with extreme obesity is extraordinary: 60-70 percent show anatomic and/or physiologic changes reflecting a severely stressed cardiovascular system. Fifteen-year-olds may have a cardiovascular system similar to that of a 50- or 60-year-old. Yet, often, referral for clinical help is not sought. Recent data shows mitigation of cardiovascular risk following bariatric surgery in adolescents (4).

## Patient Assessment and Diagnosis

The BMI is an excellent screening tool to predict the percent of excess body fat. Ensure that your examination corroborates the BMI screen (*Tables 1a, 1b*). Muscular subjects can have a falsely high BMI.

The first step in counseling about nutrition and fitness routines include a history, exam, previous growth records, and assessment of family medical history. The patient's and family's diet, activity patterns and their sense of urgency about the child's future health risks, will help you understand their willingness to change.

Overweight children require laboratory evaluation. The primary care office can best assist their patients by focusing on obesity prevention, early identification of rising BMI percentile and counseling. Intervention is described by the American Academy of Pediatrics recommendations as Stage 1 –Prevention Plus and Stage 2 – Structured Weight Management, which may require some outside assistance to help you. Stage 3 and 4 interventions are comprehensive and multidisciplinary and are best handled through referral to a formal program.

### CALCULATE BMI AND CLASSIFY

$$\text{BMI} = \frac{\text{Weight (lb)}}{\text{Height (in)} \times \text{Height (in)}} \times 703$$

PERCENTILE	CLASSIFICATION
5-84%	HEALTHY WEIGHT
85-94%	OVERWEIGHT
95-98%	OBESE
≥99%	EXTREME OBESITY

*Classification Adapted from the Expert Committee Recommendations Summary Report. Refer to BMI percentile growth charts at [www.cdc.gov](http://www.cdc.gov).*

Table 1a

## Assessment, Treatment and Outcomes in the Patient with Severe Obesity

Severe obesity is defined as BMI > 99th percentile, > class 2 obesity, or 120% of the 95th percentile for age and sex (BMI > 35kg/m<sup>2</sup>). over ideal body weight for height for a fully-grown teenager or an adult. In this case, the following steps should be taken:

- Assess Family Health Risk– Family (*parents, siblings, grandparents on both sides*)
  - Assess family history of obesity, diabetes, hypertension, cholesterol, heart disease, heart attacks, early death due to cardiovascular disease, stroke
- Do a thorough history and physical. (*See Table 2*)
- Assess blood pressure (*See Table 3*)
- For the child with extreme obesity, at minimum, the following labs are recommended:
  - Fasting lipid profile, Fasting glucose, AST, ALT
- Discuss the weight issue: use “excess weight” or “extra weight” in place of “overweight, obesity or severe obesity”
- Discuss your concerns about the potential for serious medical problems in the near future and the fact that the child's risk can be managed with quality nutrition and daily activity.
- Assess patient and family attitudes toward weight management for their sense of awareness, urgency and willingness to address the problem.

### BMI PERCENTILE CUT POINTS

Age (years)	85%		95%		99%	
	Boys	Girls	Boys	Girls	Boys	Girls
2	18.2	18	19.3	19.1	–	–
3	17.3	17.2	18.2	18.3	–	–
4	16.9	16.8	17.8	18	–	–
5	16.8	16.8	17.9	19.3	20.1	21.5
6	17	17.1	18.4	18.8	21.6	23
7	17.4	17.6	19.2	19.7	23.6	24.6
8	18	18.3	20.1	20.7	25.6	26.4
9	18.6	19.1	21.1	21.8	27.6	28.2
10	19.4	20	22.2	23	29.3	29.9
11	20.2	20.9	23.2	24.1	30.7	31.5
12	21	21.7	24.2	25.3	31.8	33.1
13	21.9	22.6	25.2	26.3	32.6	34.6
14	22.7	23.3	26	27.3	33.2	36
15	23.5	24	26.8	28.1	33.6	37.5
16	24.2	24.7	27.6	28.9	33.9	39.1
17	24.9	25.2	28.3	29.6	34.4	40.8
18	25.7	25.7	29	30.3	34.4	40.8
19	26.4	26.1	29.7	31	34.4	40.8
20	27	26.5	30.6	31.8	34.4	40.8

Table 1b

Symptoms	Signs
<ul style="list-style-type: none"> <li>Anxiety, school avoidance, social isolation (<i>Depression</i>)</li> <li>Polyuria, polydipsia, weight loss (<i>Type 2 diabetes mellitus</i>)</li> <li>Headaches (<i>Pseudotumor cerebri</i>)</li> <li>Night breathing difficulties (<i>Sleep apnea, hypoventilation syndrome, asthma</i>)</li> <li>Day time sleepiness (<i>Sleep apnea, hypoventilation syndrome, depression</i>)</li> <li>Abdominal pain (<i>Gastroesophageal reflux, gall bladder disease, constipation</i>)</li> <li>Hip or Knee pain (<i>Slipped capital femoral epiphysis</i>)</li> <li>Oligomenorrhea or amenorrhea (<i>Polycystic ovary syndrome</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Poor linear growth (<i>Hypothyroidism, Cushing's, Prader-Willi syndrome</i>)</li> <li>Dysmorphic features (<i>Genetic disorders, including Prader-Willi syndrome</i>)</li> <li>Acanthosis nigricans (<i>NIDDM, insulin resistance</i>)</li> <li>Hirsutism and excessive acne (<i>Polycystic ovary syndrome</i>)</li> <li>Violaceous striae (<i>Cushing's syndrome</i>)</li> <li>Tonsillar hypertrophy (<i>Sleep apnea</i>)</li> <li>Abdominal tenderness (<i>Gall bladder diseases, GERD, NAFLD</i>)</li> <li>Hepatomegaly (<i>Nonalcoholic fatty liver disease (NAFLD)</i>)</li> <li>Undescended testicle (<i>Prader-Willi syndrome</i>)</li> <li>Limited hip range of motion (<i>Slipped capital femoral epiphysis</i>)</li> <li>Lower leg bowing (<i>Blount's disease</i>)</li> </ul>

Adapted from COAN Implementation Guide.

Table 2

## Post-op Care and the Primary Care Physician

Following surgery, primary care physicians can support their patients by doing the following:

1. Ensuring the patient is taking a daily multivitamin with iron and calcium/vitamin D supplement
2. Including protein with all their meals and snacks, with a preference for high quality proteins.
3. Avoid sugar sweetened beverages.

### Boys

#### Ages 3-5

Blood Pressure Levels for Boys by Age and Height Percentile*															
Age by year	BP %	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		← Percentile of Height →							← Percentile of Height →						
		5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>
3	90 <sup>th</sup>	100	101	103	105	107	106	109	59	59	60	61	62	63	63
	95 <sup>th</sup>	104	105	107	109	110	112	113	63	63	64	65	66	67	67
	99 <sup>th</sup>	111	112	114	116	118	119	120	71	71	72	73	74	75	75
4	90 <sup>th</sup>	102	103	105	107	109	110	111	62	63	64	65	66	66	67
	95 <sup>th</sup>	105	107	109	111	112	114	115	66	67	68	69	70	71	71
	99 <sup>th</sup>	113	114	116	118	120	121	122	74	75	76	77	78	78	79
5	90 <sup>th</sup>	104	105	106	106	110	111	112	65	66	67	68	69	69	70
	95 <sup>th</sup>	106	109	110	112	114	115	116	69	70	71	72	73	74	74
	99 <sup>th</sup>	115	116	118	120	121	123	123	77	78	79	80	81	81	82

### Girls

#### Ages 3-5

Blood Pressure Levels for Girls by Age and Height Percentile*															
Age by year	BP %	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		← Percentile of Height →							← Percentile of Height →						
		5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>
3	90 <sup>th</sup>	100	100	102	103	104	106	106	61	62	62	63	64	64	65
	95 <sup>th</sup>	104	104	105	107	108	109	110	65	66	66	67	68	68	69
	99 <sup>th</sup>	111	111	113	114	115	116	117	73	73	74	74	75	76	76
4	90 <sup>th</sup>	101	102	103	104	106	107	108	64	64	65	66	67	67	68
	95 <sup>th</sup>	106	106	107	108	110	111	112	68	68	69	70	71	71	72
	99 <sup>th</sup>	112	113	114	115	117	118	119	76	76	76	77	78	79	79
5	90 <sup>th</sup>	103	103	105	106	107	109	109	66	67	67	68	69	69	70
	95 <sup>th</sup>	107	107	108	110	111	112	113	70	71	71	72	73	73	74
	99 <sup>th</sup>	114	114	116	117	118	120	120	78	78	79	79	80	81	81

Adapted from the Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents

Table 3

## Eligibility of Metabolic Bariatric Surgery

Determination of eligibility for bariatric surgery involves a thoughtful, shared decision-making process between the patient, parent(s) or guardian(s), and medical and surgical providers.

In addition to BMI and comorbidity status, criteria include physiologic, psychological, and developmental maturity: the ability to understand risks and benefits and adhere to lifestyle modifications; decision-making capacity; and robust family and social supports leading up to and after surgery.

Current longitudinal studies evaluating safety and efficacy endpoints do not apply specific age limits for the timing of surgery; thus, there is no evidence to support the application of age-based eligibility limits.

## Outcomes in Metabolic Bariatric Surgery

For the teen with severe obesity, bariatric surgery offers the only proven effective means to achieve lasting reversal of cardio-metabolic complications of obesity.

Research at Nationwide Children's and its collaborating institutions shows reversal of hypertension, dyslipidemias, diabetes and sleep apnea within months of surgery.

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