

WEIGHT MANAGEMENT ALGORITHM FOR OVERWEIGHT CHILDREN AND ADOLESCENTS¹



Obtain Accurate Height (Ht) & Weight (Wt)
Calculate Body Mass Index (BMI-see page 3)
(Refer to gender-specific BMI Chart on page 4)

$$\text{BMI} = \frac{\text{Wt in kg}}{(\text{Ht in m})^2}$$

$$= \frac{\text{Wt in lb} \times 703}{(\text{Ht in inches})^2}$$

Normal²
<85thile BMI
for Age & Gender

Reinforce Healthy Lifestyle,
Diet, and Exercise;
Watch for Rapid Wt Gain²

At Risk for Overweight²
85th–95thile BMI for
Age & Gender; Rapid Wt Gain²

Overweight²
>95thile BMI for Age & Gender

Assess for Comorbidities³
Sleep Apnea; Pseudotumor Cerebri; Dyslipidemia (Elevated LDL-C and/or TG; Low HDL-C); HTN;
NAFLD; GERD; Wt-bearing Joint Pain; PCOS/Hyperandrogenism; AN; Psychological Adjustment Disorders; T2DM (FPG ≥ 126 mg/dL;
Post Challenge PG ≥ 200 mg/dL)

Assess for Risk Factors and/or Contributing Factors
Medications⁴; Hypothyroidism; Cushing Syndrome; Prader-Willi Syndrome; SGA; Low Birth Wt; Post Malignancy Treatment

Initial Wt Loss Targets⁵ (1st 6 Months)

- >95thile BMI for Age & Gender
- >85thile BMI with Comorbidities

Pubertal: =10% Body Wt Loss
Pre-pubertal: ≥age 7 = 1–2 lbs per Month Wt Loss
<age 7 = Wt Maintenance or Modest Wt Loss

Degree of Wt Loss will Depend on the Severity of the Comorbidity

Offer Medically Supervised Wt Management Intervention

Pt/Family Motivated ↓

Education; Lifestyle Changes²; Nutrition; Increased Physical Activity; Behavior Modification; Nutrition/Family Counseling.

Pt/Family Not Motivated → Educate Patient and Family; Manage Comorbidities and Risk Factors; Reassess Readiness Periodically

Pt/Family Motivated ↓

≥6 months → **Targets Not Met**

Pt/Family Not Motivated → Educate Patient and Family; Manage Comorbidities and Risk Factors; Reassess Readiness Periodically

Pt/Family Motivated ↓

Maintain Healthy Lifestyle, Diet and Exercise;
Reinforce Education; Monitor Wt Weekly for Life with Periodic Follow-up by HCP

Consider Bariatric Surgery⁸ for adolescents who meet criteria. (See page 2)

Wt Loss Maintenance ← **Targets Met**

Targets Met ← ≥6 months

Targets Maintained ← Targets Met

Motivated & Targets Not Met → Consider Bariatric Surgery⁸ for adolescents who meet criteria. (See page 2)

Consider Obesity Pharmacologic Monotherapy as Adjunct to Lifestyle Changes if BMI ≥ 27 with Comorbidities or if BMI ≥ 30

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|--|--|
| <p>Appetite Suppressant Sibutramine⁶ Contraindicated in: Uncontrolled HTN; Glaucoma (Narrow-angle) Arrhythmia; CVA; CVD; CHF; Concurrent SSRI; MAOI Therapy; Pregnancy; Bulimia/Anorexia Nervosa Hx</p> | <p>Lipase Inhibitor Orlistat⁷ Contraindicated in: Chronic Malabsorption Cholestasis; Orlistat Hypersensitivity; Concurrent Cyclosporin Therapy; Pregnancy</p> |
|--|--|

ABBREVIATIONS

AN: Acanthosis Nigricans
CHF: Congestive Heart Failure
CVA: Cerebrovascular Accident
CVD: Cardiovascular Disease
FPG: Fasting Plasma Glucose
GERD: Gastro-esophageal Reflux Disease
HCP: Health Care Professional
HDL-C: High-density Lipoprotein Cholesterol
HTN: Hypertension (>95thile Blood Pressure for Age & Gender & Ht)
LDL-C: Low-density Lipoprotein Cholesterol
MAOI: Monoamine Oxidase Inhibitors
NAFLD: Non-alcoholic Fatty Liver Disease
PCOS: Polycystic Ovary Syndrome
SGA: Small for Gestational Age
SSRI: Selective Serotonin Reuptake Inhibitors
T2DM: Type 2 Diabetes Mellitus
TG: Triglycerides

Criteria for Bariatric Surgery⁸

Adolescents being considered for bariatric surgery should:

- Have failed 6 months of organized attempts at wt management, as determined by their primary care provider
- Have attained or nearly attained physiologic maturity
- Be severely obese (BMI ≥ 40) with serious obesity-related comorbidities or BMI ≥ 50 with less severe comorbidities
- Demonstrate commitment to comprehensive medical and psychologic evaluations both before and after surgery
- Agree to avoid pregnancy for at least 1 yr postoperatively
- Be capable of and willing to adhere to nutritional guidelines postoperatively
- Provide informed consent to surgical treatment
- Demonstrate decisional capacity
- Have a supportive family environment

FOOTNOTES

1. Adapted from the Texas Diabetes Council's *Weight Loss Algorithm for Overweight and Obese Adults*
2. Barlow SE, Dietz WH. Obesity evaluation and treatment: Expert Committee recommendations. The Maternal and Child Health Bureau, Health Resources and Services Administration and the Department of Health and Human Services. *Pediatrics*. 1998;102(3):E29
3. Barlow SE, Dietz WH. Obesity evaluation and treatment: Expert Committee recommendations. The Maternal and Child Health Bureau, Health Resources and Services Administration and the Department of Health and Human Services. *Pediatrics*. 1998;102(3):E29; and American Diabetes Association. Type 2 diabetes in children and adolescents. *Pediatrics*. 2000;105(3 Pt 1):671-80; Refer to appropriate Texas Diabetes Council algorithms
4. Medications that affect insulin sensitivity:

| | |
|--|--|
| Inhaled steroids: | <u>Medications known to cause wt gain:</u> |
| 1000 mcg/day fluticasone (Flovent) | Risperidone (Risperdal) |
| 2000 mcg/day of all others | Olanzapine (Zyprexa) |
| Oral Steroids: | Clozapine (Clozaril) |
| 20 days in previous year, or any within 60 days of screening | Quetiapine (Seroquel) |
| L- asparaginase | Ziprasidone (Geodon) |
| FK506 (Tacrolimus) | Carbamazepine (Tegretol) |
| Cyclosporine (Neoral/Sandimmune) | Valproic acid (Depakote/Depakene/Depacon) |
| Niacin | Tricyclic Antidepressants |
| | Lithium |
| | Insulin/Insulin Analogs |
| | Sulfonylureas |
| | Cyproheptadine |
| | Estrogens/Progestins |
5. No evidence-based outcomes data are yet available for weight loss targets
6. Berkowitz RI, Wadden TA, Tershakovec AM, et al. Behavior therapy and sibutramine for the treatment of adolescent obesity: a randomized controlled trial. *JAMA*. 2003;289(14):1805-12; sibutramine is FDA-approved for ages ≥ 16 yr
7. McDuffie JR, Calis KA, Uwaifo GI, et al. Efficacy of orlistat as an adjunct to behavioral treatment in overweight African American and Caucasian adolescents with obesity-related co-morbid conditions. *J Pediatr Endocrinol Metab*. 2004;17(3):307-19; orlistat is FDA-approved for ages ≥ 12 yr
8. Inge TH, Krebs NF, Garcia VF, et al. Bariatric surgery for severely overweight adolescents: concerns and recommendations. *Pediatrics*. 2004;114(1):217-23
9. Rosner B, Prineas R, Loggie J, et al. Percentiles for body mass index in U.S. children 5 to 17 years of age. *J Pediatr*. 1998;132(2):211-22.

Additional References

Bobo N, Evert A, Gallivan J, et al. An update on type 2 diabetes in youth from the National Diabetes Education Program. *Pediatrics*. 2004;114(1):259-63
Garcia VF, Langford L, Inge TH. Application of laparoscopy for bariatric surgery in adolescents. *Curr Opin Pediatr*. 2003;15(3):248-55
Krebs NF, Jacobson MS; American Academy of Pediatrics Committee on Nutrition. Prevention of pediatric overweight and obesity. *Pediatrics*. 2003;112(2):424-30

APPENDIX. Weight (lb) for different combinations of height (inch) and BMI (kg/m²)⁹

| Height (in) | Weight (lb) | | | | | | | | | | | | | | | | | |
|-----------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 36 | 24 | 26 | 28 | 29 | 31 | 33 | 35 | 37 | 39 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 53 | 55 |
| 37 | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 41 | 43 | 45 | 47 | 49 | 51 | 52 | 54 | 56 | 58 |
| 38 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 41 | 43 | 45 | 47 | 49 | 51 | 53 | 55 | 57 | 59 | 61 |
| 39 | 28 | 30 | 32 | 35 | 37 | 39 | 41 | 43 | 45 | 47 | 50 | 52 | 54 | 56 | 58 | 60 | 63 | 65 |
| 40 | 30 | 32 | 34 | 36 | 39 | 41 | 43 | 45 | 48 | 50 | 52 | 55 | 57 | 59 | 61 | 64 | 66 | 68 |
| 41 | 31 | 33 | 36 | 38 | 41 | 43 | 45 | 48 | 50 | 52 | 55 | 57 | 60 | 62 | 64 | 67 | 69 | 72 |
| 42 | 33 | 35 | 38 | 40 | 43 | 45 | 48 | 50 | 53 | 55 | 58 | 60 | 63 | 65 | 68 | 70 | 73 | 75 |
| 43 | 34 | 37 | 39 | 42 | 45 | 47 | 50 | 52 | 55 | 58 | 60 | 63 | 66 | 68 | 71 | 73 | 76 | 79 |
| 44 | 36 | 38 | 41 | 44 | 47 | 49 | 52 | 55 | 58 | 60 | 63 | 66 | 69 | 71 | 74 | 77 | 80 | 82 |
| 45 | 37 | 40 | 43 | 46 | 49 | 52 | 55 | 57 | 60 | 63 | 66 | 69 | 72 | 75 | 78 | 80 | 83 | 86 |
| 46 | 39 | 42 | 45 | 48 | 51 | 54 | 57 | 60 | 63 | 66 | 69 | 72 | 75 | 78 | 81 | 84 | 87 | 90 |
| 47 | 41 | 44 | 47 | 50 | 53 | 56 | 60 | 63 | 66 | 69 | 72 | 75 | 78 | 82 | 85 | 88 | 91 | 94 |
| 48 | 43 | 46 | 49 | 52 | 56 | 59 | 62 | 65 | 69 | 72 | 75 | 78 | 82 | 85 | 88 | 92 | 95 | 98 |
| 49 | 44 | 48 | 51 | 55 | 58 | 61 | 65 | 68 | 72 | 75 | 78 | 82 | 85 | 89 | 92 | 95 | 99 | 102 |
| 50 | 46 | 50 | 53 | 57 | 60 | 64 | 67 | 71 | 75 | 78 | 82 | 85 | 89 | 92 | 96 | 99 | 103 | 106 |
| 51 | 48 | 52 | 55 | 59 | 63 | 66 | 70 | 74 | 78 | 81 | 85 | 89 | 92 | 96 | 100 | 103 | 107 | 111 |
| 52 | 50 | 54 | 58 | 61 | 65 | 69 | 73 | 77 | 81 | 84 | 88 | 92 | 96 | 100 | 104 | 107 | 111 | 115 |
| 53 | 52 | 56 | 60 | 64 | 68 | 72 | 76 | 80 | 84 | 88 | 92 | 96 | 100 | 104 | 108 | 112 | 116 | 120 |
| 54 | 54 | 58 | 62 | 66 | 70 | 74 | 79 | 83 | 87 | 91 | 95 | 99 | 103 | 108 | 112 | 116 | 120 | 124 |
| 55 | 56 | 60 | 64 | 69 | 73 | 77 | 82 | 86 | 90 | 94 | 99 | 103 | 107 | 112 | 116 | 120 | 125 | 129 |
| 56 | 58 | 62 | 67 | 71 | 76 | 80 | 85 | 89 | 93 | 98 | 102 | 107 | 111 | 116 | 120 | 125 | 129 | 134 |
| 57 | 60 | 65 | 69 | 74 | 78 | 83 | 88 | 92 | 97 | 101 | 106 | 111 | 115 | 120 | 125 | 129 | 134 | 138 |
| 58 | 62 | 67 | 72 | 76 | 81 | 86 | 91 | 95 | 100 | 105 | 110 | 115 | 119 | 124 | 129 | 134 | 138 | 143 |
| 59 | 64 | 69 | 74 | 79 | 84 | 89 | 94 | 99 | 104 | 109 | 114 | 119 | 124 | 128 | 133 | 138 | 143 | 148 |
| 60 | 66 | 72 | 77 | 82 | 87 | 92 | 97 | 102 | 107 | 112 | 118 | 123 | 128 | 133 | 138 | 143 | 148 | 153 |
| 61 | 69 | 74 | 79 | 85 | 90 | 95 | 100 | 106 | 111 | 116 | 121 | 127 | 132 | 137 | 143 | 148 | 153 | 158 |
| 62 | 71 | 76 | 82 | 87 | 93 | 98 | 104 | 109 | 115 | 120 | 125 | 131 | 136 | 142 | 147 | 153 | 158 | 164 |
| 63 | 73 | 79 | 85 | 90 | 96 | 101 | 107 | 113 | 118 | 124 | 130 | 135 | 141 | 146 | 152 | 158 | 163 | 169 |
| 64 | 76 | 81 | 87 | 93 | 99 | 105 | 110 | 116 | 122 | 128 | 134 | 140 | 145 | 151 | 157 | 163 | 169 | 174 |
| 65 | 78 | 84 | 90 | 96 | 102 | 108 | 114 | 120 | 126 | 132 | 138 | 144 | 150 | 156 | 162 | 168 | 174 | 180 |
| 66 | 80 | 87 | 93 | 99 | 105 | 111 | 117 | 124 | 130 | 136 | 142 | 148 | 155 | 161 | 167 | 173 | 179 | 185 |
| 67 | 83 | 89 | 96 | 102 | 108 | 115 | 121 | 127 | 134 | 140 | 147 | 153 | 159 | 166 | 172 | 178 | 185 | 191 |
| 68 | 85 | 92 | 98 | 105 | 112 | 118 | 125 | 131 | 138 | 144 | 151 | 158 | 164 | 171 | 177 | 184 | 190 | 197 |
| 69 | 88 | 95 | 101 | 108 | 115 | 122 | 128 | 135 | 142 | 149 | 155 | 162 | 169 | 176 | 182 | 189 | 196 | 203 |
| 70 | 90 | 97 | 104 | 111 | 118 | 125 | 132 | 139 | 146 | 153 | 160 | 167 | 174 | 181 | 188 | 195 | 202 | 209 |
| 71 | 93 | 100 | 107 | 114 | 122 | 129 | 136 | 143 | 150 | 157 | 165 | 172 | 179 | 186 | 193 | 200 | 207 | 215 |
| 72 | 96 | 103 | 110 | 118 | 125 | 132 | 140 | 147 | 155 | 162 | 169 | 177 | 184 | 191 | 199 | 206 | 213 | 221 |
| 73 | 98 | 106 | 113 | 121 | 129 | 136 | 144 | 151 | 159 | 166 | 174 | 182 | 189 | 197 | 204 | 212 | 219 | 227 |
| 74 | 101 | 109 | 117 | 124 | 132 | 140 | 148 | 155 | 163 | 171 | 179 | 187 | 194 | 202 | 210 | 218 | 225 | 233 |
| 75 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 |
| 76 | 107 | 115 | 125 | 131 | 139 | 148 | 156 | 164 | 172 | 180 | 189 | 197 | 205 | 213 | 221 | 230 | 238 | 246 |
| 77 | 109 | 118 | 126 | 135 | 143 | 151 | 160 | 168 | 177 | 185 | 194 | 202 | 210 | 219 | 227 | 236 | 244 | 252 |
| 78 | 112 | 121 | 130 | 138 | 147 | 155 | 164 | 173 | 181 | 190 | 199 | 207 | 216 | 225 | 233 | 242 | 250 | 259 |
| BMI (kg/m ²) | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

