



BRIGHAM AND
WOMEN'S HOSPITAL

MARY HERRIGAN CONNORS
CENTER FOR WOMEN'S HEALTH

OBESITY IN WOMEN

A Guide to Assessment and Management[®]



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The goal of this guide is to provide physicians with clear clinical pathways to identify and treat obesity. The recommendations presented in this guide are designed to provide women with optimal and personalized care. They are based on a comprehensive review of recent medical literature and reflect the expertise of leading clinicians at Brigham and Women's Hospital.

This guide is not intended to convey rigid standards, but instead, provide the primary care physician an algorithm for thinking through the identification and management of women with overweight and obesity problems. Treatment should be tailored to the needs of the individual woman.

For physicians within the Partners system, the Women's Health Guidelines are available on Partners' Handbook (Partners applications/Clinical References/Partners Handbook/Guidelines). Please consult Partners Handbook for revisions of this and other Women's Health Guidelines. For physicians outside of the Partners system, the guidelines can be accessed through the web: <http://www.brighamandwomens.org/medical/guidelines.asp>.

Medical Impact of Overweight and Obesity

The prevalence of overweight and obesity is on the rise. In 2000, 31 percent of US adults were obese, and 64 percent were overweight or obese. There is an increased prevalence of obesity in certain racial and ethnic groups with 29 percent of African Americans and 23 percent of Hispanic Americans meeting criteria for obesity. Obesity is also more common in individuals with less than a high school education.

There are serious medical and economic consequences of overweight and obesity. The all-cause mortality increases 50-100 percent at a body mass index (BMI) ≥ 30 compared to BMI's of 20-25. Overweight and obese patients also have a higher risk of morbidity from hypertension, type 2 diabetes mellitus, coronary heart disease, stroke, lipid disorders, osteoarthritis, sleep apnea, and cancer of the endometrium, breast, and colon. Overweight or obesity can be a contributing cause for more than 50 percent of all-cause mortality among American adults aged 20-74. The economic impact of these disorders is staggering, with \$99.2 billion spent on medical care and disability annually in the United States, which amounts to three to seven percent of total health care costs.

Table 1. Cost of Obesity in the US

Disease	Cost (in billions of dollars)
Diabetes	32.4
Coronary heart disease	7.0
Osteoarthritis	4.3
Hypertension	3.2
Gallbladder disease	2.6
Colon cancer	1.0
Breast cancer	0.84
Endometrial cancer	0.29

The good news is that there is strong evidence that even a modest five to 10 percent weight-loss can reduce the risk of cardiovascular disease. Benefits include declines in blood pressure, declines in blood glucose, reduced risk of diabetes mellitus and improved lipid profiles. Primary care physicians can play an important role in reducing the morbidity and mortality associated with obesity by educating patients about the condition, treating the co-morbid conditions, helping to enroll patients in weight loss programs, encouraging regular physical activity and healthy diet, and offering medical or surgical treatment options for obesity when indicated.

This guideline outlines:

- Assessment strategies
- Risks associated with obesity
- Treatment options
- Weight maintenance recommendations
- Prevention through diet and exercise

Risk Assessment

Body Mass Index (BMI)

The body mass index (BMI) is the recommended approach for assessing body size in the clinical setting, providing a more accurate measure of body size than weight alone. However, it can overestimate body fat in people who are very muscular, very short, or who have edema and it underestimates it in people who have lost muscle mass, such as the elderly.

$$\text{BMI} = \frac{\text{weight kg}}{(\text{height in meters})^2} \quad \text{or} \quad \frac{\text{weight in lbs} \times 703}{(\text{height in inches})^2}$$

Using the BMI, we can classify patients into one of five categories.

Table 2. Overweight and Obesity Classification by Body Mass Index (BMI)

National Heart, Lung, and Blood Institute Classification	BMI (kg/m ²)
Normal	18.5-24.9
Overweight	25.0-29.9
Obesity class 1	30.0-34.9
Obesity class 2	35.0-39.9
Obesity class 3	≥40.0

Table 3. Body Mass Index: Finding the BMI using height (inches) and weight in pounds

BMI	Height (Inches)																		
	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
19	91	94	97	100	104	107	110	114	118	121	125	128	132	136	140	144	148	152	156
20	96	99	102	106	109	113	116	120	124	127	131	135	139	143	147	151	155	160	164
21	100	104	107	111	115	118	122	126	130	134	138	142	146	150	154	159	163	168	172
22	105	109	112	116	120	124	128	132	136	140	144	149	153	157	162	166	171	176	180
23	110	114	118	122	126	130	134	138	142	146	151	155	160	165	169	174	179	184	189
24	115	119	123	127	131	135	140	144	148	153	158	162	167	172	177	182	186	192	197
25	119	124	128	132	136	141	145	150	155	159	164	169	174	179	184	189	194	200	205
26	124	128	133	137	142	146	151	156	161	166	171	176	181	186	191	197	202	208	213
27	129	133	138	143	147	152	157	162	167	172	177	182	188	193	199	204	210	216	221
28	134	138	143	148	153	158	163	168	173	178	184	189	195	200	206	212	218	224	230
29	138	143	148	153	158	163	169	174	179	185	190	196	202	208	213	219	225	232	238
30	143	148	153	158	164	169	174	180	186	191	197	203	209	215	221	227	233	240	246
31	148	153	158	164	169	175	180	186	192	198	203	209	216	222	228	235	241	248	254
32	153	158	163	169	175	180	186	192	198	204	210	216	222	229	235	242	249	256	263
33	158	163	168	174	180	186	192	198	204	211	216	223	229	236	242	250	256	264	271
34	162	168	174	180	186	191	197	204	210	217	223	230	236	243	250	257	264	272	279
35	167	173	179	185	191	197	204	210	216	223	230	236	243	250	258	265	272	279	287
36	172	178	184	190	196	203	209	216	223	230	236	243	250	257	265	272	280	287	295
37	177	183	189	195	202	208	215	222	229	236	243	250	257	265	272	280	287	295	304
38	181	188	194	201	207	214	221	228	235	242	249	257	264	272	279	288	295	303	312
39	186	193	199	206	213	220	227	234	241	249	256	263	271	279	287	295	303	311	320
40	191	198	204	211	218	225	232	240	247	255	262	270	278	286	294	302	311	319	328
41	196	203	209	217	224	231	238	246	253	261	269	277	285	293	302	310	319	327	336
42	201	208	215	222	229	237	244	252	260	268	276	284	292	301	309	318	326	335	344
43	205	212	220	227	235	242	250	258	266	274	282	291	299	308	316	325	334	343	353
44	210	217	225	232	240	248	256	264	272	280	289	297	306	315	324	333	342	351	361
45	215	222	230	238	246	254	262	270	278	287	295	304	313	322	331	340	350	359	369
46	220	227	235	243	251	259	267	276	284	293	302	311	320	329	338	348	358	367	377
47	224	232	240	248	256	265	273	282	291	299	308	318	327	338	346	355	365	375	385
48	229	237	245	254	262	270	279	288	297	306	315	324	334	343	353	363	373	383	394
49	234	242	250	259	267	278	285	294	303	312	322	331	341	351	361	371	381	391	402
50	239	247	255	264	273	282	291	300	309	319	328	338	348	358	368	378	389	399	410
51	244	252	261	269	278	287	296	306	315	325	335	345	355	365	375	386	396	407	418

Waist circumference

Excess abdominal fat carries particularly elevated health risks. Waist circumference is the most practical marker of abdominal fat. (Many patients understand this concept as an “apple” vs. “pear” shaped.) A waist circumference >88 cm (>35 in) raises cardiovascular disease risk in women (see Table 4).

Ethnic and age-related variations in distribution of body fat affect the predictive value of waist circumference. Waist circumference may be a better indicator of risk than BMI for estimating obesity-related disease risk among certain populations, such as Asian-Americans and older people. Waist cutoffs designed for the general population may not apply to very short women (under five feet).

To measure the waist circumference, locate the top of the iliac crest and place a measuring tape horizontally (parallel to the floor) around the abdomen, making the measurement at the end of a normal expiration.

Table 4. Disease Risk Associated with BMI and Waist Circumference in Women

BMI	Obesity classification	Relative risk* status for waist circumference ≤88cm (≤35 in)	Relative risk* status for waist circumference >88cm (>35 in)
18.5-24.9	Normal	—	—
25.0-29.9	Overweight	Increased	High
30.0-34.9	Obesity I	High	Very High
35.0-39.9	Obesity II	Very High	Very High
≥40	Obesity III	Extremely High	Extremely High

* Relative risk compared to normal weight.

The higher a patient’s BMI, waist circumference, and number of concomitant cardiovascular disease risk factors or comorbidities, the greater is the need for aggressive treatment of obesity-related diseases.

Health Risks of Overweight and Obesity

There are many health risks associated with obesity, and these risks increase with increasing degrees of overweight and obesity.

- **High blood pressure**

The prevalence of hypertension in women increases with increasing BMI—with a prevalence of 32 percent for women with BMIs > 30, compared with 18 percent for women with BMIs < 25.

- **Type 2 diabetes**

Studies investigating weight and relative risk for diabetes have found a 25 percent increase per unit beyond BMI 22 in women. Abdominal obesity is a major risk factor for type 2 diabetes.

- **Coronary heart disease (CHD)**

Cardiovascular risk factors include high levels of total cholesterol, LDL, triglycerides, blood pressure, fibrinogen, and insulin and low levels of HDL. Overweight, obesity, and abdominal fat are directly related to these risk factors and associated with higher CHD morbidity and mortality. Note: The Nurses' Health Study at Brigham and Women's Hospital associated even modest weight gain, 10-15 pounds, after age 18 with a higher incidence of CHD among women within BMI 18.0-25.0—the "normal" range.

- **Dyslipidemia**

The prevalence of elevated total and LDL cholesterol increases with increasing BMI, with elevations greater in women than in men for each BMI level. Prevalence of elevated total cholesterol increases from 16.2 percent in women with a BMI < 25 to 32.2 percent in women with a BMI > 30, while prevalence of elevated LDL cholesterol increases from 16.5 percent to 41.5 percent in women with BMIs of < 25 and > 30, respectively. Women with obesity, especially abdominal obesity, have higher concentrations of triglycerides, and lower HDL cholesterol levels. High concentrations of triglycerides increase the risk of coronary heart disease about three-fold. The constellation of abdominal obesity, elevated triglycerides, low HDL levels, and elevated insulin levels is called metabolic syndrome, and is associated with an elevated risk of coronary heart disease.

- **Stroke**

Recent studies have shown that ischemic stroke risk is 75 percent higher in women with BMI > 27 and 137 percent higher in women with BMI > 32, compared with women having a BMI < 21.

- **Osteoarthritis**

The association between overweight and obesity and the risk of osteoarthritis of the knee is greater in women than in men. The risk of developing osteoarthritis increases by nine to 13 percent for every kg increase in weight. Similarly, randomized trials have shown that women who lose weight decrease analgesic use for knee osteoarthritis.

- **Sleep Apnea**

Upper body obesity is a risk factor for sleep apnea, and in general, increases in severity with increases in weight. Individuals with sleep apnea usually have BMIs > 30, and a large neck girth. Women with neck girths greater than 16 inches are at higher risk for this disorder. Pathophysiologically, the consequences of sleep apnea include hypoxemia, frequent arousals from sleep, pulmonary and systemic hypertension, and cardiac arrhythmias. A 10 percent weight loss can reduce severity of apnea more than 50 percent.

- **Cancer**

Data from the Nurses' Health Study show that twice as many women with a BMI of > 29 had distal colon cancer compared with women with a BMI < 21. Epidemiologic studies indicate that obesity is directly related to mortality from breast cancer, and data from the Nurses' Health Study indicate that adult weight gain is associated with an increased risk of postmenopausal breast cancer. The risk of endometrial cancer is also three times higher in women with BMI > 30 compared with women of normal weight.

- **Mortality**

The mortality of women with a BMI \geq 30 is increased by 50 to 100 percent above that of women with BMIs of 20-25.

Table 5. Prevalence of Hypertension, Type 2 Diabetes, and Coronary Heart Disease in Women by Obesity Classification

BMI	Obesity classification	Hypertension	Type 2 Diabetes	Coronary Heart Disease
18.5-24.9	Normal	23.3%	2.4%	6.9%
25.0-29.9	Overweight	38.8%	7.1%	11.1%
30.0-34.9	Obese I	48.0%	7.2%	12.6%
35.0-39.9	Obese II	54.5%	13.1%	12.6%
\geq 40	Obese III	63.1%	19.9%	19.2%

Specific factors—such as race, ethnicity, age, general and social conditions—may also increase or decrease an individual's health risks at different ranges of overweight or obesity.

Treatment of Overweight and Obesity

Treatment of overweight and obesity can be achieved through a variety of modalities, including dietary therapy, physical activity, behavior therapy, pharmacotherapy, and surgery (see Table 8). Different treatments are appropriate for different BMI levels. Patients not motivated or unable to lose weight should be urged to avoid further weight gain. Clinicians should consider risk factors when deciding upon treatment.

Overall goals for weight loss management:

- Reduce body weight—a 10 percent loss of the initial body weight is the primary target, since this would result in significant risk reduction.
- Maintain lower weight over the long-term. It is better to maintain a moderate loss over the long-term than it is to achieve a greater weight loss that cannot be maintained.
- Prevent further weight gain.

Additional considerations:

- Consider substituting medications that may contribute to weight gain (see sidebar, page 12).
- If a weight loss program is successful, after six months institute a weight maintenance regimen or set another goal for weight reduction. Change diet and exercise prescriptions as needed to surmount the tendency to plateau.
- Certain weight loss therapies may be inappropriate for:
 - Women with illnesses that might be exacerbated by caloric restriction.
 - Women with a serious, acute psychiatric illness.
 - Pregnant or lactating women.

Table 6. Treatment Approach

BMI-Associated Health Risk	Stepped Treatment
25.0-26.9 (Low to moderate risk)	<ul style="list-style-type: none"> • Regular physical activity • Healthful eating and/or calorie deficit diet • Behavior therapy
27.0-29.9 (Moderate to high risk)	<ul style="list-style-type: none"> • All of the above, but replace dietary strategy with low-calorie diet (lifestyle therapy) • Consider adding drug therapy if patient has at least two concomitant obesity-related risk factors or diseases, and if above strategies fail to produce recommended weight loss of a pound per week after six months.
30.0-34.9 (High to very high risk)	<ul style="list-style-type: none"> • Lifestyle therapy plus consideration of drug therapy or very low calorie diet (VLCD). VLCD and drug therapy are not approved for use together.
35.0-39.9 (Very high to extremely high risk)	<ul style="list-style-type: none"> • Lifestyle therapy, VLCD or drug therapy (VLCD and drug therapy are not approved for use together). • Consider surgery if less invasive methods have failed, comorbid conditions are present, AND a high risk of obesity-related morbidity and mortality exists.
>40.0	<ul style="list-style-type: none"> • All of the above, plus consideration of surgical intervention

Tailoring weight-loss strategies

- Identify potential triggers for weight gain (e.g., medications, injury or physical condition that makes exercise difficult, medical conditions, stopping smoking, behavioral, cultural or economic issues that affect food choices and exercise options).
- Psychiatric and nutrition referrals if diet history reveals binge eating or bulimia.
- Discuss realistic goals that include improvements in related medical conditions and reassess periodically.
- Frequent follow-up visits to monitor progress.

Recommended Caloric Intake

For Weight Maintenance:

$$[\text{Weight (lbs)} \times 10] + [\text{weight (lbs)} \times \begin{matrix} 3 & (\text{if inactive}) \\ 5 & (\text{if moderately active}) \\ 10 & (\text{if extremely active}) \end{matrix}]$$

For Weight Loss:

- Calorie deficit = Weight maintenance calories - (calories consumed - calories burned)
- For 0.5-1 lb. weight loss/week a caloric deficit of 300-500 calories/day is required.
 - For a 1 lb.-2 lb. weight loss/week a caloric deficit of 500-1000 calories/day is required.
 - Calorie deficit may be achieved by dietary restrictions or increased exercise (see Table 11).

Caring for the Obese and Overweight Patient

There is often a sense of shame and failure associated with being overweight or obese. Clinicians can play an important role in the care of obese and overweight patients by acknowledging that losing weight and maintaining a healthier body weight is challenging, and that it often takes many attempts before success can be achieved.

Making the office environment a place that is user-friendly for obese and overweight patients is critical to making patients feel comfortable, and increases the chance that they will return for follow-up care.

Adapting the Office Environment for Obese and Overweight Patients*

- Waiting rooms should have several sturdy armless chairs.
- Any sofas in the waiting area or in consultation rooms should be firm and high enough to ensure patients can easily rise.
- Display publications that depict a variety of body shapes.
- The weighing of patients should be done in a private area.
- Weight should be recorded silently without commentary (positive or negative).
- Have patients who are resistant to being weighed stand on the scale backwards so they do not have to look at the results.
- Extra large examining gowns should be available to accommodate patients.
- Examining tables should be wide and bolted to the floor or wall, so that the table does not tip forward.
- Provide a sturdy stool for large patients to assist them in getting on the examination table.
- Several sizes of blood pressure cuffs should be available. Using too small a cuff can result in false readings.
- Longer needles and tourniquets should be available.

Developing a Treatment Plan

There is a large popular literature on weight-loss, and many patients prefer to try popular weight loss methods before considering medical approaches. Many of the popular diets have claims that are not supported by data. It is important for physicians to be aware of the specific recommendations of these popular diets (*see table 7*), and to be open-minded and flexible about them. Short-interval follow-up appointments should be made to assess the success on each attempt. If patient-initiated diets and programs do not result in significant weight loss, a stepped approach can be taken (*see Table 6*), based on BMI and risk.

*Courtesy of Centers for Obesity Research and Education

Popular Diets: A Partial Listing

Table 7

Meal Replacement	<ul style="list-style-type: none"> • Examples: Slim-Fast and Boost. • Involves intake of two shakes a day (250 calories/shake), along with a sensible meal and snacks. • Safe, economical approach for overweight patients who are not candidates for VLCD treatment.
<p>Low Carbohydrate Diets (non-medically supervised)</p>	
Atkins Diet The Zone Scarsdale Diet Protein Power South Beach Diet	<ul style="list-style-type: none"> • High protein (meat, cheese, eggs), low carbohydrate and low fiber. • Severe restriction of carbohydrates (<100g daily) in this diet results in ketosis. • Side effects of the diet may include dehydration, electrolyte loss, calcium depletion, weakness, vitamin/mineral deficiencies, and gout. • Recommendations run counter to those of the American Heart Association, the National Cholesterol Education Program and the American Cancer Society, which endorse a diet that is 50-60% carbohydrate, 10-20% protein, and 20-30% fat, with less than 10% of that fat being saturated. • Recent studies show that the low-carbohydrate diet produced greater weight loss than conventional diet for the first six months, but that the difference was not significant at one year. Improvements in triglyceride and HDL levels were significantly better in the low-carbohydrate group, and persisted at 12 months. Decreased insulin resistance has also been noted with this diet.
<p>Low Sugar Diets (non-medically supervised)</p>	
Suzanne Somers	<ul style="list-style-type: none"> • Avoidance of sugar; refined flour bread, potatoes, white rice. • Emphasis on timing of foods, fruits are eaten separately from other carbohydrates, protein and fat; protein and fats are eaten separately from starches.
Sugar Busters	<ul style="list-style-type: none"> • Restriction of foods with a high glycemic index (such as potatoes, corn, white rice, refined flour bread, carrots, refined sugar, molasses, honey). The glycemic index is a measure of the increase in blood sugar after ingestion of the food substance. Avoidance of these foods is purported to result in lower insulin levels, and therefore, weight loss. • Average caloric intake is 1200 kcal/day, and is more likely explanation for weight loss.
<p>Other Approaches</p>	
The 5 Day Miracle Diet	<ul style="list-style-type: none"> • Authors purport that most people have low blood sugar, which causes them to crave high glycemic foods. • Recommends eating low glycemic foods every two hours for five days, which should result in diminished of cravings and increased energy.
Cabbage Soup Diet	<ul style="list-style-type: none"> • Recommends eating nothing but soup made of cabbage, onions, peppers, tomatoes and celery every day for one week. • Cabbage has no fat burning powers, but the soup is filling and acts as an appetite suppressant. Rapid weight loss occurs mostly as a result of water loss, not a reduction in body fat. • Common side effects include gas, nausea, and light-headedness.
Grapefruit Diet	<ul style="list-style-type: none"> • This diet recommends eating a few vegetables, some protein, and a lot of grapefruit, totaling about 800 calories per day. Diet is deficient in calcium and iron. • Grapefruit is purported to contain a fat-burning enzyme, although there is no scientific evidence to support this.
Eat Right for Your Type Peter J. D'Adamo, N.D.	<ul style="list-style-type: none"> • This diet recommends that individuals with type "O" blood should consume a diet high in protein and low in carbohydrate; those with type "A" blood should be vegetarians; and those with type "B" should eat predominantly dairy products. • The diet is based on the premise that dietary lectins play a major role in food metabolism, and that lectins affect agglutination of blood cells. There is no scientific basis to these claims, since lectins are destroyed in cooking and by digestion.
Jumpstart Your Metabolism: How to Lose Weight by Changing the Way you Breathe	<ul style="list-style-type: none"> • This diet claims that "deep breathing will bring in more oxygen than you need, which gives you extra energy and extra fuel to burn fat." There is also a claim that deep breathing can reduce binge eating and promote exercise. There are no scientific data to support these claims.
The New Beverly Hills Diet	<ul style="list-style-type: none"> • This diet advocates separating foods so the body will completely digest each nutrient from every food that is eaten. • The foods allowed on the diet are divided into three categories (protein, carbohydrate and fruit) and are quite limited in selection. Weight loss occurs on this diet due to the extremely small amount of calories ingested, not by the facilitation of enzyme digestion.
Marilu Henner's Total Health Makeover Marilu Henner	<ul style="list-style-type: none"> • This diet recommends consuming foods based on their degree of yin and yang. • By combining these yin and yang balanced foods in the correct order the ability of your intestinal enzymes to fully digest food improves. • Although there is no evidence that certain food combinations affects nutrient absorption, the diet does focus on reducing consumption of processed foods, choosing low-fat proteins, and consuming a preponderance of fruits and vegetables.

Table 8. Treatment

Intervention	Changes in Dietary Composition	Low-calorie Diet (LCD)	Very Low-calorie Diet (VLCD) ¹
Description	Reducing fat and/or increasing fiber without restricting calories	<ul style="list-style-type: none"> • 1,000-1,200 kcal/day of conventional food, for women. • Balanced calorie meal plan (carbohydrates 45-65 percent, protein 10-35 percent, fats 20-35 percent, and fiber 20-25 g/day). 	<ul style="list-style-type: none"> • 525-800 kcal/day with vitamin and mineral, supplementation. • Usually liquid form.
Efficacy	<p><i>Low fat:</i> weight loss of 2-3 kg/yr. <i>High fiber:</i> 5.5 kg loss in 6 months compared to 3 kg loss with placebo.</p>	<ul style="list-style-type: none"> • 8 percent weight loss in 25 studies \geq 6 months. • 4 percent weight loss overall in four studies extending 3.5-4 years. • Average loss is 0.4-0.5 kg/week. 	<ul style="list-style-type: none"> • VLCDs initially lead to greater weight loss than with LCDs; however, long-term weight loss at \geq 1 year does not differ. • 800 kcal/day leads to 15-25 kg weight loss over 12-16 weeks. • 525 kcal/day leads to 13-23 kg weight loss over 12-16 weeks. • Average loss is 1.5-2 kg/week in women.
Advantages	Easier to tolerate than other diet regimens. Decreased fat may lower rates of breast cancer and heart disease. Increased fiber can improve blood pressure.	<ul style="list-style-type: none"> • Nutritionally balanced, inexpensive. • Decreases abdominal fat. • Success increases with behavior modification and exercise. 	<ul style="list-style-type: none"> • Rapid, weight loss for severely obese patients is safe when medically supervised. • Rapid improvements in comorbid conditions, such as hypertension, diabetes, hyperlipidemia, sleep apnea.
Disadvantages	<ul style="list-style-type: none"> • Weight loss modest. • High-fiber diets can cause bloating, abdominal discomfort. 	Rate of weight loss often unacceptably slow for very obese people.	<ul style="list-style-type: none"> • Fatigue, weakness, constipation, gallstones. • Pregnancy, systemic infection, renal, and hepatic disease are absolute contraindications.

¹ VLCD diets should only be administered by practitioners who are experienced in their use and in the setting of a comprehensive weight loss program with medical follow-up.

Physical Activity	Behavior Therapy ²	Drug Therapy (BMI ≥ 27 with comorbidities or BMI ≥ 30)	Surgery ³ BMI ≥ 35 with comorbidities or BMI ≥ 40
<p>CDC recommends ≥ 30 minutes of accumulated moderate activity on most, or all, days. Gradual approach to goal is best.</p>	<p>Tools for overcoming resistance to modifying diet and increasing activity levels. Strategies include recording daily eating habits and physical activity; cognitive behavior therapy techniques; identifying and restricting behavior associated with excessive eating; stress management; non-food reward system; and group support.</p>	<p><i>Appetite suppressants:</i> Phentermine. Approved for short-term use (three months). There is a small potential for abuse.</p> <hr/> <p><i>Serotonergic agonists:</i> Sibutramine. Approved for one year of use. (Other drugs in this category, fenfluramine and dexfenfluramine, are no longer available in the U.S.) Low abuse potential.</p> <hr/> <p><i>Fat malabsorption agents:</i> Orlistat. Approved for one year of use. Dose-dependent weight loss. No abuse potential.</p>	<p>Gastric bypass (GBP), vertical banded gastroplasty (VBG), or laparoscopic banding (LB).</p>
<ul style="list-style-type: none"> • Modest weight loss averaging a 2 percent-3 percent decline or less in body weight. Greater weight loss requires dietary restriction, too. • Independent of weight loss, increases cardiorespiratory fitness, improves blood pressure, lipids, glucose tolerance and may decrease cardiovascular risk. 	<p>Studies report supporting change in diet and exercise in obese patients results in 10 percent weight loss over four months to one year. No single behavior therapy appears superior for weight loss. Combined strategies and more intense therapy (more contacts, longer duration) appear to work best.</p>	<p>All above listed drugs have been shown to induce weight loss compared to placebo. Losses range from 2-15 kg over 6-52 weeks. Must be combined with low-calorie diet, physical activity, and behavior therapy</p>	<p>Percent excess weight loss at three years:</p> <ul style="list-style-type: none"> • GBP 68-72 percent • VBG 40-63 percent • LB 40-50 percent
<ul style="list-style-type: none"> • Increased success when coupled with dietary restriction and behavior therapy. • Improves functional abilities; suppresses appetite. • May help maintain weight loss. Decreases insulin resistance and incidence of diabetes and coronary disease. • Over time, can increase lean tissue and metabolism. 	<p>Rate of weight regain for some people may be lower than with other methods. Useful adjunct to treatment for weight loss and weight maintenance.</p>	<p>May be effective as a weight maintenance tool.</p>	<p>Long-term improvements in hypertension, diabetes mellitus, hyperlipidemia, sleep apnea, and congestive heart failure.</p>
<p>Few disadvantages. Can exacerbate osteoarthritis or precipitate cardiac event if program starts precipitously.</p>	<p>After behavior therapy ends, many patients return to baseline weight, emphasizing importance of maintenance program. Usually these techniques alone are insufficient for the severely obese.</p>	<ul style="list-style-type: none"> • Continual assessment for efficacy and safety needed. • If patient does not lose four pounds over four weeks, a different treatment should be sought. • See Table 9 for side effects. 	<ul style="list-style-type: none"> • Only indicated for clinically severe obesity after less invasive methods have failed and when there is a high risk of obesity-related morbidity and mortality. • About 25 percent of patients experience nausea and vomiting for two weeks post-operatively. See Table 10 for other complications.

²To be successful, behavior techniques and physical activity should be incorporated into any weight loss regimen.

³Covered by all major insurance companies in Massachusetts, including Blue Cross, Harvard Pilgrim, Tufts, and MassHealth.

Table 9. Weight Loss Drugs

Generic Name	Trade Name and Dosage Forms	Dosing	Comments	Cost per 30 Days MCD*	Medications that may contribute to weight gain
Phentermine Norepinephrine Reuptake Inhibitors	Standard release: 15, 18.75, 37.5, 30 mg tablets or capsules • Adipex-P® • Fastin® • Obenix® • Oby-Cap® • Oby-Trim • Zantryl® Slow release: 15, 30 • Lonamin®	15-37.5 mg/day before breakfast or 10-14 hours before retiring	Schedule IV. Approved only for short-term use (12 weeks). Delays onset of meals and causes earlier satiety. Contraindicated in patients with CHD, moderate to severe, hyperthyroidism, glaucoma, agitated states, or history of drug abuse. Also, use is contraindicated during or within 14 days following MAO inhibitor therapy. Should be used with caution in patients with bipolar or psychotic disorders, diabetes mellitus, seizure disorders, insomnia, or mild hypertension. Pregnancy category C (not recommended), and not approved for use in children.	\$42 (37.5 mg/day)	<ul style="list-style-type: none"> • Steroids • Antidepressants • Antihypertensive medications <ul style="list-style-type: none"> propranolol prazosin minoxidil terazosin • Antiseizure medications <ul style="list-style-type: none"> carbamazepine gabapentin valproic acid • Reproductive agents <ul style="list-style-type: none"> estrogens progestins oral contraceptives leuprolide clomiphene • Diabetes agents <ul style="list-style-type: none"> Insulin oral hypoglycemics insulin sensitizers • Immune system medications <ul style="list-style-type: none"> interleukin-4 infliximab
Sibutramine Serotonin-Norepinephrine Reuptake Inhibitors	• Meridia®	- Initial dose: 10 mg/d -Maximum dose: 15mg/d	Approved for long term use (1 year). In a one year trial of sibutramine, 30% of those taking 10 to 15 mg of the drug lost >10% of their initial body weight. Reduces triglycerides and LDL levels. Side effects include dry mouth, insomnia. Increases in pulse rate and systolic and diastolic BPs in hypertensive subjects have been noted. Should not be given to patients with a history of CHD, CHF, arrhythmia, or stroke. Drug interactions with MAO inhibitors, SSRIs, erythromycin, ketoconazole, and dextromethorphan. Pregnancy category C (not recommended), and not approved for use in children.	\$94 (10 mg/ day) \$122 (15 mg/ day)	(Continued from previous row)
Orlistat Pancreatic Lipase Inhibitor	• Xenical®	-Maximum dose: 120 mg TID, before each meal	Increases fecal fat excretion. Patients need nutritional counseling to reduce fat intake to <30% of total calories, otherwise they stop drug because of symptoms due to steatorrhea. Weight loss at one year is 8.5-12% in randomized controlled trials. Improvements in glycemic control, BP, total and LDL cholesterol have been reported. Contraindicated for use in cholestasis and malabsorption. Side effects include flatus, fecal incontinence, oily spotting. Decreased absorption of vitamins A, E, and beta-carotene—thus Orlistat therapy should be accompanied by multivitamin use. Pregnancy category B. Not approved for use in children. Approved for long-term use (1 year).	\$119 (120 mg TID)	(Continued from previous row)

*Most Common Dose

Table 10. Complications of Obesity Surgery

Complication	Gastric Bypass (GBP) (%)	Laposcopic Banding (LB) (%)	Vertical Banded Gastroplasty (VBG) (%)
Mortality	0-1	—	0-2.5
Leak/Sepsis	0-1	2	0-2.5
Outlet stenosis	4-20	8	3.5-22
Peptic ulceration	1.8	—	2.2-11
Anemia	—	—	30-39
Iron deficiency	—	—	28-56
Folate deficiency	—	—	1.8-14
B12 deficiency	17	—	22-37
Staple disruption	1.7-4.8	—	1.6-8
Surgical revision	41-45	—	1-10
Band slippage, pouch dilation	—	11	—

Maintenance Recommendations

If weight loss is to be maintained, a weight management program combining dietary therapy, physical activity, and behavior therapy must continue indefinitely. Studies suggest more frequent and long-term contacts with health professionals work best to help patients maintain weight.

Most common strategies used in successful weight loss maintainers are:

- A low fat, high carbohydrate diet
- Frequent self-monitoring (self-weighing and food records)
- Regular physical activity

Baseline characteristics that increase the risk of weight regain include:

- Recent weight loss (fewer than 2 years)
- Larger weight losses (>30% of maximum weight)
- Higher levels of depression, disinhibition, and binge eating

Prevention of Obesity

What constitutes a healthy diet for women?

- A variety of vegetables and fruits (five to nine servings a day).
- A variety of whole grains and whole-grain products versus refined grains. USDA recommendations allow six to 11 servings a day; some research and many diets recommend cutting down on carbohydrate foods, specifically those that are refined, white rice, pasta, sweets, and white potatoes. This will avoid too-frequent spikes and dips in blood sugar that may stimulate appetite and can contribute to insulin resistance over time.
- Two to three servings of protein a day from lean meat, poultry, fish, eggs, nuts, or legumes.
- About 20-35 percent of total calories from fat. Epidemiological evidence suggests that trans fats (processed fats used commercially, such as hydrogenated oils) should be avoided. Saturated fats (found in meat and dairy products and palm and coconut oils) should be limited and replaced with monounsaturated fats (e.g., olive, peanut, canola oils, and most nuts) and polyunsaturated fats (e.g., corn, safflower, and soybean oils, flaxseed oil, fatty fish).
- Low sugar and sodium intakes.
- At least eight glasses of fluid (mostly water) a day. Limit intake of juice and soda.
- A multivitamin.
- Diet should contain 400 IU of vitamin D and 1000 mg of elemental calcium for premenopausal women (1200 mg for postmenopausal women). If dietary intake of calcium and vitamin D is less than these recommended guidelines, calcium and vitamin D supplementation is necessary.

Exercise Recommendations

The CDC recommends **≥ 30 minutes of accumulated, moderate exercise on most or all days of the week.**

- Depending on patient’s age, symptoms, and risk factors, consider an exercise test for cardiopulmonary disease.
- Simple exercise that can be gradually stepped up—such as slow walking or swimming—is best for most obese people (see Tables 11 and 12). Stress consistency and frequency over duration and intensity. Example: 10 minutes of walking, three days a week. Extra time added in five-minute increments slowly builds the regimen to 30-45 minutes, three days a week. Eventually, expand to most or all days.
- Lifestyle activities (stair climbing, gardening, housecleaning, and parking further away from destination) count toward goal.
- Encourage more strenuous activities as patient progresses (e.g., faster walking, bicycling, rowing, aerobic dance, cross-country skiing, and weight lifting).
- High impact activities—jogging, certain aerobic classes, competitive sports—are enjoyable for some, but increase the risk of injury. Exercise supervised by a well-qualified physical trainer may be recommended.

Table 11. Physical Activity Calories Per Minute

	Low Intensity	Medium Intensity	High Intensity	Very High Intensity
Weight	Raking, active gardening, recreational sports, e.g. softball, volleyball, golf (no cart)	Walking, mowing, tennis, weight lifting, biking, light aerobics, in-line skating, calisthenics	Moderate jogging, stair machine, racquetball, swimming	Fast jogging, stair climbing, cross-country skiing (outdoor or machine), jumping rope
120	1 cal/min	4 cal/min	8 cal/min	13 cal/min
140	1 cal/min	5 cal/min	9 cal/min	15 cal/min
160	2 cal/min	5 cal/min	11 cal/min	18 cal/min
180	2 cal/min	6 cal/min	12 cal/min	20 cal/min
200	2 cal/min	7 cal/min	13 cal/min	22 cal/min
220	2 cal/min	7 cal/min	15 cal/min	24 cal/min
240	3 cal/min	8 cal/min	16 cal/min	27 cal/min
260	3 cal/min	9 cal/min	17 cal/min	29 cal/min
280	3 cal/min	9 cal/min	19 cal/min	31 cal/min
300	3 cal/min	10 cal/min	20 cal/min	33 cal/min
320	4 cal/min	11 cal/min	21 cal/min	35 cal/min
340	4 cal/min	11 cal/min	23 cal/min	37 cal/min
360	4 cal/min	12 cal/min	24 cal/min	40 cal/min
380	4 cal/min	13 cal/min	25 cal/min	42 cal/min
400	4 cal/min	13 cal/min	26 cal/min	44 cal/min

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Table 12.
Calories Burned with Walking

Weight (lbs)	Time (minutes)						
	5	10	15	20	30	45	60
140	24	47	71	94	141	212	282
145	24	49	74	98	147	221	294
150	25	50	75	100	150	225	300
155	26	52	78	104	156	234	312
160	27	54	81	108	162	243	324
165	28	55	83	110	165	248	330
170	29	57	86	114	171	257	342
175	30	59	89	118	177	266	354
180	30	60	90	120	180	270	360
185	31	62	93	124	186	279	372
190	32	64	96	128	192	288	384
195	33	65	98	130	195	293	390
200	34	67	101	134	201	302	402
205	35	69	104	138	207	311	414
210	35	70	105	140	210	315	420
215	36	72	108	144	216	324	432
220	37	74	111	148	222	333	444
225	38	75	113	150	225	338	450
230	39	77	116	154	231	347	462
235	40	79	119	158	237	356	474
240	40	80	120	160	240	360	480
245	41	82	123	164	246	369	492
250	42	84	126	168	252	378	504
255	43	85	128	170	255	383	510
260	44	87	131	174	261	392	522
265	45	89	134	178	267	401	534
270	45	90	135	180	270	405	540
275	46	92	138	184	276	414	552
280	47	94	141	188	282	423	564
285	48	95	143	190	285	428	570
290	49	97	146	194	291	437	582
295	50	99	149	198	297	446	594
300	50	100	150	200	300	450	600
320	55	107	161	214	321	482	642
340	57	114	171	228	342	513	684
360	60	120	180	240	360	540	720
380	64	127	191	254	381	572	762
400	67	134	201	268	402	603	804

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