

## Overweight and Obesity

Obesity  
[ICD-9-CM 278.01]

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#### Key terms:

- Abdominal Obesity
- Adipose
- Adiposity
- Aerobic Exercise
- Anaerobic Exercise
- Anorexiant
- Appetite Suppressants
- Bariatric Surgery
- BMI
- Body Fat
- Body Mass Index
- Calories
- Central Adiposity
- Diet
- Diet, Hypocaloric
- Diet, Low Calorie
- Diet, Low-Calorie
- Diet, Low-Fat
- Dietary Intake
- Dietary Intervention
- Dose Related Weight Loss
- Dose-Related Weight Loss
- Drug-Induced Weight Gain
- Energy Imbalance
- Excess Abdominal Fat
- Excess Weight
- Exercise Program
- Exercise Programs
- Exercise, Aerobic
- Exercise, Anaerobic
- Extreme Obesity
- Fad Diet
- Fad Diets
- Fat, Body
- Gastric Bypass, Roux-en-Y
- Gastroplasty
- Grossly Obese
- Healthy Diet
- High Calorie
- High-Calorie

High-Fat Foods  
Hypocaloric Diet  
Imbalance, Energy  
Index, Body Mass  
Loss, Weight  
Low-Calorie Diet  
Low-Fat Diet  
Maintenance, Weight  
Nutrition  
Obese Adult Patients  
Obesity  
Obesity, Abdominal  
Obesity, Extreme  
Obesity, Visceral  
Overweight and Obesity  
Patients, Obese  
Physical Activity  
Reduction, Weight  
Roux-en-Y Gastric Bypass  
Sedentary Behavior  
Sleep Apnea, Upper Body Obesity Related  
Sleep Apnea, Upper-Body-Obesity-Related  
Surgery, Bariatric  
Upper Body Obesity Related Sleep Apnea  
Upper-Body-Obesity-Related Sleep Apnea  
VGB  
Vertical Banding Gastroplasty  
Very Low Calorie Diet  
Very-Low Calorie Diet  
Visceral Obesity  
Weight Gain  
Weight Gain, Drug-Induced  
Weight Loss  
Weight Loss Therapy  
Weight Maintenance  
Weight Management  
Weight Reduction  
Weight Regulation  
Weight, Excess  
Weight-Management  
Suppressants, Appetite  
Activity, Physical

## Management Highlights

- **Measure the patient's height and weight and calculate (or look up on a standard table) the body mass index (BMI =weight in kg/height in meters squared). Also measure the patient's waist circumference.**
- **Assess comorbid risk factors and conditions (e.g., hypertension, diabetes, obstructive sleep apnea, or degenerative joint disease).**
- **Assess the patient's readiness to change and decide whether the patient is eligible and motivated for weight reduction treatment.**

- **If therapy is indicated, implement an individually designed program that involves dietary intervention, behavioral modification, and exercise instruction.**
- **Consider pharmacologic treatment - in conjunction with a diet, behavioral, and exercise program - in patients with a BMI >30 kg/m<sup>2</sup>, or in patients with a BMI of 27 kg/m<sup>2</sup> or greater and comorbidities.**
- **Initially, follow patients monthly for weight and pharmacotherapeutic monitoring, and to discuss diet, behavior, and exercise routines. Always use positive reinforcement to support patients' efforts.**
- **Consider recommending surgery for patients with a BMI of 40 kg/m<sup>2</sup> or greater, comorbid condition(s), and failed medical therapy. Of the two widely performed operations (vertical banding gastroplasty [VBG] and Roux-en-Y gastric bypass), the Roux-en-Y gastric bypass has better long-term success rates.**

## Background

### Overview

- **Use this article for information about the diagnosis and management of overweight and obese adult patients in the primary care setting.**

### Etiology/Pathophysiology

Obesity is a chronic, relapsing disease characterized by an excessive accumulation of body fat. The exact pathophysiology of obesity is unknown, although genetic, environmental, metabolic, and behavioral factors are all likely to play important parts in its development.

Obesity can be viewed as a disease of energy imbalance. When energy stored exceeds energy expended, body mass accrues in the form of both fat and non-fat tissues. Current societal pressures expose individuals to high-calorie, high-fat fast foods, while improvements in technology promote sedentary behavior. Thus, modern life fosters the development of obesity.

Above a BMI of 25 (kg/m<sup>2</sup>), morbidity for a number of health conditions increases as BMI increases. Higher morbidity in association with overweight and obesity has been observed for hypertension [1] [2] [3] [4], type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, and specific cancers (endometrial, breast, prostate, colon). Obesity is associated with complications of pregnancy, menstrual irregularities, hirsutism, stress incontinence, and psychological disorders such as depression.

### Demographics/Epidemiology

The United States is experiencing an epidemic of obesity among adults and children. The increasing prevalence of obesity makes it one of our most pervasive public health problems. According to National Health and Nutrition Examination Survey III (NHANES III, 1988 to 1994) data, 55% of the US population aged >19 years were overweight (BMI >25) in 1994. This total of ~100 million people reflects a significant 9% increase in prevalence since NHANES II, 20 years earlier. Overall, in 1994, ~32% of adults were overweight (BMI of 25.0 to 29.9) and ~23% were obese (BMI >30.0).

The significant increase in obesity in the United States is reflected in Centers for Disease Control and Prevention (CDC) data [<http://www.cdc.gov/nchs/nhanes.htm>]. Since 1960, the prevalence rates of overweight have remained essentially unchanged, while the prevalence rates of obesity have dramatically increased for both men and women. Figure 1 shows the relatively constant rates of overweight in both men and women over the four different nutrition examination surveys. Figure 2 shows the significant increase in obesity rates in both men and women during the same periods.

Figure 1: Prevalence of overweight 1960 to 1994

Age-adjusted prevalence of overweight (BMI 25-29.9) in men and women aged 20 to 74 years for NHES (1960-1962), NHANES I (1971-1974), NHANES II (1976-1980), and NHANES III (1988-1994).

NHANES, National Health and Nutrition Examination Survey; NHES, National Health Examination Survey.

Data from Centers for Disease Control and Prevention/National Center for Health Statistics, United States, 1960-1994.

Figure 2: Age-adjusted prevalence of obesity 1960 to 1994

Age-adjusted prevalence of obesity (BMI >30.0) in men and women aged 20 to 74 years for NHES (1960-1962), NHANES I (1971-1974), NHANES II (1976-1980), and NHANES III (1988-1994).

NHANES, National Health and Nutrition Examination Survey; NHES, National Health Examination Survey.

Data from Centers for Disease Control and Prevention/National Center for Health Statistics, United States, 1960-1994.

The increase in overweight and obesity occurred among US adults across all ages, genders, racial, and ethnic groups. NHANES reported that 54.9% of men and 50.7% of women in the US are overweight or obese. The prevalence is much higher in non-Hispanic black women (65.9%) and in Mexican-American men (63.9%) relative to Caucasian women [5].

This increase in obesity rates translates to increased medical care and disability costs - both direct and indirect costs of obesity in the US amounted to an estimated \$99.2 billion in 1995 [6], of which \$51.6 billion were direct medical costs associated with diseases attributable to obesity. These direct costs represent ~5.7% of the total national health expenditure in the US [7]. The ~\$47.6 billion in indirect costs (i.e., the value of lost output caused by morbidity and mortality) may have a greater impact than direct costs at personal and societal levels [7].

## Diagnosis

### History

- **Ask the same type of questions of an obese patient as you would of a patient with a typical chronic disease history [Table 1].**

Focus the history on comorbid conditions related to overweight and obesity. Establish the driving forces for behavior change and the expectations of each patient. This information is crucial to formulating a treatment plan and later to monitor change.

Table 1: Key Findings from History and Physical Examination for Obesity	
Finding	Comments
<b>History of Body Weight-Related Issues</b>	
Chronological history of weight gain	Identify the age at onset, the nature of the weight gain, and the inciting event(s). This information helps to determine how the patient views illness.
Response to previous weight-loss attempts	Ask about previous treatments for weight loss (such as fad diets and pharmacotherapy), including duration of treatment and amount of weight change. This information provides insight about patient commitment and adherence to treatment.
Understanding of body weight regulation	Ask if the patient understands the fundamental premise of all obesity treatment modalities: energy IN must be less than energy OUT for successful weight loss.
Perception of health effects of patient's obesity	Ask questions about the patient's perceptions, including: "How does your body weight affect you?" "Why are you seeking help at this time?" "Is there anything that you cannot do because of your weight?"
Expectations from a weight-management program	Ask about expectations from a program, because unrealistic expectations will result in disappointment and frustration regardless of the outcome. Patient goals are often stated as achieving specific body weights, wearing certain clothes sizes, gaining a more attractive appearance, etc.
<b>Lifestyle History</b>	
Dietary intake	Obtain a diet history, including the patient's habitual diet with meal and snack patterns, the type of foods selected, frequency of intake, and the size of portions. Ask where food is typically eaten, what triggers eating, and whether binge eating occurs.
Physical activity	Ask about the amount of activity typically accumulated in an average day. Ask if the patient routinely performs physical exercise. Ask about specific medical conditions that may limit physical activity, e.g., osteoarthritis or arthralgias.
<b>Social History</b>	
Home/work environment	Ask about eating pressures in both the home and work environments.

Time restraints	Ask about daily schedule flexibility.
Barriers to change/support systems	Ask about potential allies or about those who may undermine a treatment plan for weight loss. Identify both the support systems and barriers to change.
<b>Family History</b>	
Separate family history from environment	Ask if at least one first-degree relative is obese (familial predisposition). Ask about the family history of type 2 diabetes and cardiovascular disease.
<b>Psychiatric/Psychological History</b>	
Emotional triggers	Ask if loneliness, boredom, or stress triggers eating behavior.
Mood disorders	Ask about feelings of low self-esteem, social isolation, and depression. Consider screening for major depression and bipolar disease with screening instruments such as the Beck Depression Index (BDI) or The Primary Care Evaluation of Mental Disorders (PRIME-MD).
Eating disorders	Ask about symptoms of bulimia nervosa, particularly among young females.
<b>Medication History</b>	
Drug-induced weight gain or agents interfering with weight loss	Ask about use of medications that facilitate weight gain: tricyclic antidepressants, lithium, antipsychotics (phenothiazines, butyrophenones, atypicals), anticonvulsants (valproic acid, carbamazepine), steroid hormones (corticosteroid derivatives, megestrol acetate, estrogen), and antidiabetics (insulin, sulfonylureas).
<b>Review of Systems</b>	
In performing the review of systems, maintain a high index of suspicion for diseases related to overweight and obesity. Obesity clinically affects multiple organ systems. The risk and severity of these conditions tend to increase with increasing levels of obesity.	
Cardiovascular	Hypertension Congestive heart failure Atherosclerotic disease Cor pulmonale Varicose veins Pulmonary embolism Coronary heart disease
Psychosocial	Depression Social discrimination Work disability
Endocrine	Reduced insulin sensitivity Glucose intolerance Type 2 (non-insulin-dependent) diabetes mellitus (NIDDM) Dyslipidemia Polycystic ovary syndrome Infertility Amenorrhea Hirsutism

Genitourinary	Urinary stress incontinence Hypogonadism Breast and endometrial cancer Renal cell cancer
Musculoskeletal	Immobility Degenerative arthritis Low back pain Knee pain
Neurological	Stroke Meralgia paresthetica Idiopathic intracranial hypertension Carpal tunnel syndrome
Integumentary	Venous stasis of legs Cellulitis Diminished hygiene Intertrigo, carbuncles Acanthosis nigricans
Gastrointestinal	Gastroesophageal reflux disease Hepatic steatosis Nonalcoholic steatohepatitis Cholelithiasis Hernias Colon cancer
Respiratory	Obstructive sleep apnea Dyspnea and fatigue Hypoventilation (pickwickian) syndrome
<b>Physical examination</b>	
Body mass index (BMI)	Measure the patients weight and height to calculate the BMI. The BMI is equal to the weight in kilograms divided by the height in meters squared ( $\text{kg}/\text{m}^2$ ). Another method to approximate the BMI is to multiply the patient's weight in pounds by 703, and then divide the product by the height in inches squared ( $[\text{lb} \times 703]/\text{in}^2$ ).
Waist circumference	With the patient standing, find the superior border of the iliac crest and measure the waist circumference at the end of normal expiration, keeping the tape parallel to the floor.
<b>Special features in overweight and obese patients</b>	
Hirsutism	Excessive male pattern hair growth in female patients
Acanthosis nigricans around the neck and under the arm	Usually suggests insulin resistance
Ear crease (a line across the lower part of the ear lobe)	Suggests sleep apnea
Lower extremity edema and venous stasis	Poor blood return due to abdominal obesity

## Physical Examination

- **Perform a standard physical examination. Obtain accurate height, body weight, waist circumference, and accurate blood pressure measurements.**

The basic physical examination for an overweight/obese patient is the same as that for any adult patient with a chronic disease.

- **After accurately measuring the height and weight, calculate the body mass index (BMI).**

Weigh patients without shoes; if available, use a wall-mounted stadiometer to measure height. Do not rely on patients' estimates - self-reported height and weight values are inaccurate and generally result in a lower BMI for both women and men. Women in general underestimate their weight; men overestimate their height. The BMI can be calculated using the following formula:  $BMI = \text{Weight (kg)} / [\text{Height (m)}]^2$ .

Alternatively, the BMI can be calculated by multiplying the weight in pounds times 705 and then dividing by the height in inches squared. Simple charts for determining BMI, such as Appendix A of the National Heart, Lung, and Blood Institute's *Practical Guide*, are also available. The BMI should become part of the vital signs in the clinical notes.

- **Measure the waist circumference just above the iliac crest.**

Waist circumferences should be measured with a flexible tape. Waist circumference >35 inches (88 cm) for women or >40 inches (100 cm) for men is an indirect measure of central adiposity, which correlates with visceral fat. Excess abdominal fat is an independent predictor of risk factors and morbidity. Table 2 illustrates the risk of specific diseases (type 2 diabetes, hypertension, and cardiovascular disease) with increasing BMI as it relates to waist circumference.

- **Measure blood pressure with an appropriate-sized cuff.**

It is important to detect hypertension, which is a common comorbidity in obese patients. It is of paramount importance to use the proper cuff size in measuring blood pressure: an inappropriately small cuff will give an artificially high blood pressure, indicating a false diagnosis of hypertension. Conversely, too large a cuff will artificially lower the blood pressure, missing a diagnosis of hypertension. Use a tape measure to record mid-arm circumference - the cuff bladder width should equal ~50% of the mid-arm circumference. However, because blood pressure cuffs are available in only a limited number of sizes, a practical approach to a person with a large arm is to use a large-adult cuff in those with an arm circumference <16 inches; use a thigh cuff in those >16 inches.<sup>1</sup>

Table 2: Classification of Overweight and Obesity by BMI , Waist Circumference, and Associated Disease Risk
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<sup>1</sup> Dr. Korenman: Our medical editor recommended simplifying this paragraph for busy PCPs. The authors agreed but did not suggest any specific changes. Should we leave it as it is, or can you suggest an improvement?



Classification	BMI (kg/m <sup>2</sup> )	Obesity class	Disease risk <sup>a</sup> (relative to normal weight and waist circumference)	
			<b>Men <math>\leq</math> 40 inches (<math>\leq</math> 102 cm)</b> <b>Women <math>\leq</math> 35 inches (<math>\leq</math> 88 cm)</b>	<b>Men <math>&gt;</math> 40 inches (<math>&gt;</math>102 cm)</b> <b>women <math>&gt;</math>35 inches (<math>&gt;</math>88 cm)</b>
Underweight	$<$ 18.5		N/A	N/A
Normal <sup>b</sup>	18.5-24.9		N/A	N/A
Overweight	25.0-29.9		Increased	High
Obesity	30.0-34.9	I	High	Very high
	35.0-39.0	II	Very high	Very high
Extreme obesity	$\geq$ 40	III	Extremely high	Extremely high

<sup>a</sup> Disease risk for type 2 diabetes, hypertension, and CVD.

<sup>b</sup> Increased waist circumference can also be a marker for increased risk even in persons of normal weight.

BMI, body mass index; N/A, not applicable.

From NHLBI [8].

## Testing

Office and Laboratory

- **Obtain a fasting lipid panel - including total cholesterol, HDL cholesterol, calculated LDL cholesterol, and triglycerides - and blood glucose level for all patients [Table 3].**

Laboratory testing and diagnostic evaluation should be based on clinical presentation and index of suspicion. For example, identifying hypertension in an obese patient warrants a workup that includes urinalysis, complete blood count (CBC), blood chemistry panel, and an electrocardiogram (ECG). Identifying diabetes in an obese patient warrants a glycosylated hemoglobin measurement and determination of microalbuminuria.

- **Pay special attention to patients with symptoms that suggest upper-body-obesity-related sleep apnea, such as daytime sleepiness; loud snoring, gasping, or choking episodes during sleep; and headaches upon awakening. If your index of suspicion is high enough, request a polysomnography sleep study.**

Most patients with obstructive or mixed sleep apnea are obese and complain of excessive daytime somnolence, morning sluggishness and headaches, daytime fatigue, cognitive impairment, recent weight gain, or impotence. Bed partners usually report that the patient has loud, cyclical snoring, breath cessation, restlessness, or frequent thrashing movements of the extremities during sleep. Close acquaintances and family members may note that the patient has experienced personality changes, poor judgment, work-related problems, and intellectual deterioration (memory impairment, inability to concentrate).

If you suspect sleep apnea in an obese patient, request an endoscopic ear, nose, and throat (ENT) examination to help identify or rule out upper airway obstruction. The patient may appear sleepy or fall asleep during the evaluation. The oropharyngeal examination frequently reveals excessive soft tissue-related narrowing, a large tonsil, a pendulous uvula, or a prominent tongue.

Radiologic

- **Order an ultrasound study of the gallbladder if you suspect gallstones.**

Obesity is a risk factor for gallstones, especially in women; rapid weight loss, particularly in obese persons, increases the risk of symptomatic gallstones. Monitor patients with rapid weight loss for possible gallstone formation. Conversely, a low-carbohydrate diet and physical activity may help prevent gallstone formation [9].

Table 3: Tests to Consider for Obese Patients		
Test	Indications	Interpretation
<b>Laboratory</b>		
Fasting lipid panel (total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides)	Routinely perform	Dyslipidemia
Fasting blood glucose	Routinely perform	Diabetes, fasting glucose intolerance
CBC, blood gases, ECG	Suspected alveolar hypoventilation (pickwickian) syndrome	CBC to check for polycythemia, blood gases to check for elevated CO <sub>2</sub> levels, and ECG to check for right-heart strain
Liver function tests	Hepatomegaly	Rule out asymptomatic hepatic steatosis and NASH
Serum TSH	Suspected hypothyroidism	Elevated TSH (eg, >5 mcU/mL) indicates hypothyroidism; check serum free T4
Insulin and C-peptide	Suspected hypoglycemic episodes	Insulinoma suggested by elevated levels of insulin and C-peptide, in the absence of sulfonylureas
LH/FSH ratio	Oligomenorrhea, hirsutism, enlarged ovaries on palpation	LH/FSH ratio typically >2.5 in polycystic ovarian syndrome (PCOS)
24-hr urine free cortisol and serum cortisol	Suspected Cushing's syndrome	24-hr urine free cortisol of >150 mcg being abnormal. Perform overnight dexamethasone suppression test with 1 mg PO at 11 p.m. Draw serum cortisol at 8 a.m. the next day: <5 mcg/ml indicates normal suppression and axis function.

Serum uric acid	Monoarticular arthritis	Help rule in or out gout
<b>Radiologic</b>		
Ultrasonography	Epigastric or right upper quadrant pain, nausea, vomiting, fever, Murphy's sign	Help rule in or out acute or chronic cholecystitis from gallstone
<b>Invasive</b>		
Endoscopic ENT examination	Suspected sleep apnea	Help rule in or out upper airway obstruction causing sleep apnea
CBC, complete blood count; ECG, electrocardiogram; ENT, ear, nose, and throat; FSH, follicle-stimulating hormone; HDL, high-density lipoprotein; LH, luteinizing hormone; NASH, nonalcoholic steatohepatitis; PCOS, polycystic ovarian syndrome; PO, orally; TSH, thyroid-stimulating hormone.		

Invasive

- **Not applicable.**

### Differential Diagnosis

- **Most obesity is the result of a common genetic-environmental interaction, but rarely obesity can result from endocrine abnormalities.**

Hypothyroidism is a rare cause of obesity, despite its reputation for causing obesity. Hypopituitarism can also result in development of obesity, as can iatrogenic Cushing's syndrome due to prescription steroids in pharmacological doses.

- **Treatment with tricyclic antidepressants (TCAs) and antipsychotic medications has commonly resulted in weight gain.**

### Diagnostic Criteria

- **Use the BMI as the primary diagnostic criteria for overweight or obesity.**

The BMI is highly correlated with body fat: a BMI of 25 to 29.9 kg/m<sup>2</sup> is considered overweight; a BMI of 30 kg/m<sup>2</sup> or more, obesity; and a BMI of 40 kg/m<sup>2</sup> or more, clinically severe obesity [Table 2].

- **Use clinical judgment in interpreting BMI when factors such as edema, muscle wasting, high muscularity, or short stature may affect the determination of total body fat [8].**

The National Heart, Lung, and Blood Institute reports that the amount of body fat indicated by a given BMI can vary with age, gender, and possibly ethnicity, because of differences in the composition of lean tissue, sitting height, and hydration state. These factors do not significantly affect the accuracy of BMI measurements for classifying patients into broad categories of overweight and obesity [8].

### Treatment

#### Acute Care/Hospitalization

- **Not applicable.**

## Lifestyle Measures

- **Consider lifestyle modification to be the primary therapeutic modality in the management of overweight and obese person.**

For optimal success with your patients in weight loss, combine low-calorie dieting, increased physical activity, and behavior therapy. Use this combination for approximately 6 months before considering pharmacotherapy.

- **Recognize that the general goals of weight loss and management are to reduce body weight by about 10% initially, and then to maintain a lower body weight over the long term (see Follow-up).**

If this is not possible, at a minimum the therapeutic goal is to prevent further weight gain. The rationale for this initial goal is that moderate weight loss of 10% of the initial body weight can significantly decrease the severity of obesity-associated risk factors. It also can set the stage for further weight loss. Clinical studies have shown that an average weight loss of ~8% of the initial body weight can be achieved in 6 months.

However, at about that point the body adjusts to the lower caloric intake, and patients find it increasingly difficult to continue losing weight on the same diet and exercise regimen. Generally, after losing 10% of his or her body weight the patient will reach a plateau and stop losing weight, probably due to the body's defense mechanisms that protect against starvation. When motivated patients stop losing weight, they should be encouraged to start the maintenance phase and try to avoid gaining weight. Otherwise, if patients expect to continue to lose weight and fail, frustration and a sense of failure are likely to lead to relapse and weight gain. Health wise, it is better to maintain a moderate weight loss over a prolonged period than to regain after a marked weight loss. Further weight loss can be considered after this initial goal is achieved and maintained for 6 months.

- **Initiate treatment with a weight reduction phase during which patients follow a diet that provides 500 to 1,000 calories/day less than their estimated normal maintenance requirement.**

A 500 to 1,000 kcal/day energy deficit typically results in a loss of 1 to 2 pounds per week. For most women, such a diet contains 1,000 to 1,200 kcal/day; for most men, 1,200 to 1,600 kcal/day. Patients should also be taught how to change their eating behaviors permanently. Especially in grossly obese, sedentary patients, non-weight-bearing exercise such as bicycling and swimming should be considered before weight-bearing exercise. If indicated, recommend precautions for injury prevention, or refer patients to physical therapy for management of low back and knee pain. Walking is a good weight-bearing exercise.

- **If the patient is sufficiently motivated and the resources are available, employ a multidisciplinary approach to weight loss.**

Optimally, such an approach includes a hypocaloric diet, behavior modification to change eating behaviors, both aerobic and anaerobic exercise, and social support.

- **Except for the greater limitation on total daily caloric intake, recommend the same diet that you would for healthy people who are not obese: a low-fat, high-complex-carbohydrate, high-fiber diet.**

Emphasize intake of a wide variety of predominantly “unprocessed” foods. Encourage patients to limit foods that provide large amounts of calories without other nutrients, such as fat, sucrose, and alcohol. There is no proven advantage to special diets that restrict carbohydrates, advocate large amounts of protein or fats, or recommend ingestion of foods one at a time.

Consider prescribing a low-calorie diet for patients who are severely obese (class III) [Table 2].

Very low-calorie diets (defined as <800 kcal/day) often result in rapid weight loss and significant improvement in obesity-related metabolic complications. Patients commonly are maintained on these programs for 4 to 6 months and lose an average of 2 to 4 pounds (1 to 2 kg)/week. Long-term weight maintenance is less predictable and requires concurrent behavior modification and exercise. Although weight loss is achieved more rapidly with very low-calorie diets as compared with traditional diets, long-term outcomes are equivalent. These diets require close supervision by a physician and dietitian, because the patients are at increased risk for cardiac arrhythmia and nutritional deficiencies, such as a negative nitrogen balance with loss of muscle tissue. High dropout rates are also discouraging.

- **Encourage a regular program of aerobic and anaerobic exercise.**

An increase in physical activity is an important component of weight loss therapy because it leads to increased expenditure of energy. Increased physical activity also may inhibit food intake in overweight patients. Physical activity can be helpful in maintaining a desirable weight. Exercise also reduces the risk of coronary heart disease.

Aerobic exercise directly increases the daily energy expenditure and is particularly useful for long-term weight maintenance. Anaerobic exercise preserves lean body mass and buffers the decrease in basal energy expenditure seen with caloric restriction.

Increased physical activity alone can create a caloric deficit and can contribute to weight loss. However, efforts to achieve weight loss through physical activity alone generally produce an average of a 2% to 3% decrease in body weight or BMI. Even so, increased physical activity is a useful adjunct to low-calorie diets in promoting weight reduction.

- **Use behavior therapy techniques to alter the eating and activity habits of an obese patient.**

Various behavior therapy techniques can be used to assist patients in modifying their life habits [Table 4]. Like diet and exercise therapy, behavior therapy should be tailored to the individual patient. The aim is to change eating and physical activity behaviors over the long term.

Table 4. Behavior Therapy Techniques in the Treatment of Obesity	
Self-monitoring	Help patients gain insight into their personal behaviors by teaching them to record eating habits (types, amounts, calories, nutrients) and physical activities (frequency, intensity, type).
Stress management	Teach patients to employ stress management techniques (e.g., coping strategies, relaxation techniques, meditation) to defuse stressful situations that lead to overeating.

Stimulus control	Encourage patients to identify social and environmental cues that may trigger overeating and to avoid or modify those cues.
Problem solving	Encourage patients to generate and implement healthy solutions to weight-related problems and to reevaluate and learn from setbacks instead of punishing themselves.
Contingency management	Reward patients for specific desirable actions and encourage them to reward themselves.
Cognitive restructuring	Help to dispel false beliefs and modify unrealistic goals that sabotage patients' efforts to lose weight.
Social support	Reinforce behavioral change and prevent social isolation through continued close contact with the patient. Involvement with family or with a peer group proves very efficacious for weight loss.  Ask overweight and obese patients about family members who are also heavy in an effort to encourage group activity. Encourage parents and children to work together to build healthy eating and exercise habits.
Adapted from NHLBI [8].	

### Medical Therapy

- **Consider FDA-approved weight loss drugs for long-term use [Table 5] as an adjunct to diet and physical activity for patients with a BMI of >30, and for patients with a BMI of >27 with concomitant obesity-related risk factors or disease.**

Most drugs used to promote weight loss are anorexiant (appetite suppressants). The three classes of anorexiant drugs all affect neurotransmitters in the brain: catecholamines or serotonin. These drugs either stimulate the secretion or inhibit the reuptake of neurotransmitters (dopamine, serotonin, and norepinephrine). The best medication for a patient is the one he or she can tolerate and that has a good weight loss effect.

Agent	Trade name	Dosage (daily)
<b>Schedule II</b>		
Amphetamine	Biphentamine	10-15 mg
Phenmetrazine	Preludin	75 mg

**3** Dr. Korenman: Can you recommend the best way to arrange this section? I think the bullet point is misleading as to the content of the table. The medical editor wrote to the authors: To keep this section short and practical, I suggest describing as groups the prescription drugs that are not FDA approved for long-term treatment of obesity and the OTC drugs, and then focusing on the only two approved drugs (sibutramine and orlistat).

<b>Schedule III</b>		
Benzphetamine HCl	Didrex	25-150 mg
Phendimetrazine	Bontril, Prelu-2, Plegine	105 mg
<b>Schedule IV</b>		
Diethylpropion	Tenuate	25-75 mg
Mazindol	Sanorex, Mazanor	1-3 mg
Phentermine HCl	Adipex-P, Obenix	37.5 mg
	Fastin, Zantryl	30 mg
Phentermine HCl resin	Ionamin	30 mg
Sibutramine HCl	Meridia	5-15 mg
<b>Nonschedule</b>		
Orlistat	Xenical	120 mg
<b>Over-the-Counter</b>		
Phenylpropanolamine HCl	Dexatrim, Acutrim	75 mg

### Invasive Approaches

- **Consider surgical therapy only after diet, exercise and medication therapies have failed.**

Two operations are recommended by the 1991 NIH Consensus Meeting: the vertical banding gastroplasty (VBG) and Roux-en-Y gastric bypass surgery. Generally, only highly motivated patients with a BMI of 40 kg/m<sup>2</sup> or higher, or a BMI of 35 kg/m<sup>2</sup> or higher with high-risk comorbid conditions, who have failed medical management are surgical candidates. Patients who have undergone Roux-en-Y gastric bypass surgery on the average maintained a lower body mass than those who have undergone VBG. This is likely due to Roux-en-Y surgery-related interruptions of brain-gut neuroendocrine control. Patients with Roux-en-Y gastric bypass require vitamin B<sub>12</sub>, iron, and calcium supplementation. Dietary, behavioral, and exercise programs remain important for continual success even after surgery.

Although both gastric procedures result in significant weight loss, the literature tends to favor gastric bypass procedures.

Patients may ask about liposuction, a cosmetic procedure that at most can remove 5 pounds (2.25 kg) of fat from the body. It has no role in the treatment of obesity, a serious medical condition with many comorbid conditions.

### Complementary Medicine

- **Inform your patients that there is little evidence supporting the effectiveness of various complementary and alternative approaches.**

See Evidence Highlights below.

### Complications

- **Be aware that the complications of obesity include increased risk of diabetes, atherosclerotic heart disease, obstructive sleep apnea, degenerative joint disease, infertility, polycystic ovarian syndrome, gallstones, and gallbladder disease.**

- **Be aware that the risk of breast and ovarian cancer, prostate cancer, and colon cancer is increased in the obese population.**

### Special Circumstances

- **Advise patients who are trying to quit smoking to exercise regularly and to adopt a healthy diet, including plenty of fruits, vegetables, and grains.**

Smoking cessation commonly is associated with mild weight gain. The etiology is unknown, although it is likely to be due to the alteration of neurotransmitters associated with nicotine. Nicotine has a comforting effect on smokers, who may turn to food as a replacement for nicotine when they quit smoking. The increased caloric intake leads to weight gain. Regular exercise and a healthy diet, however, can prevent weight gain in patients who stop smoking.

### When to Consult or Refer

- **Refer only morbidly obese patients who have failed conservative management to specialty clinics or surgeons for consideration of bariatric surgery.**

We are encountering an epidemic of obesity in the U.S., with more than half of our population overweight and obese. Primary care physicians should take the initiative to start to treat obesity and its associated medical conditions.

### Prognosis

- **While a BMI >30 kg/m<sup>2</sup> has been linked to increased mortality [Figure 3], weight loss has been shown to be directly related to a reduction in mortality [Figure 4].**

Also see Table 6 for health benefits achieved through modest (10%) weight loss.

Figure 3. Obesity and Mortality Risk. American Cancer Society Study of 740,000 Men and Women  
From Gray [10].

Figure 4. International Weight Loss and Reduction in Mortality  
From Williamson [11].

Table 6. Health Benefits of Modest (10%) Weight Loss
Decreased blood glucose and insulin levels
Decreased blood pressure
Decreased LDL and triglycerides, increased HDL
Decrease in severity of sleep apnea
Reduced symptoms of degenerative joint disease
Improvement in gynecologic conditions
From NHLBI [12].



## Patient Education

### General Advice

- **Discuss the proposed course of treatment and describe necessary behaviors, such as keeping diaries of food intake and physical exercise.**

One of the most important aspects of the initial evaluation is to prepare patients for treatment. Reviewing patients' past attempts at weight loss and explaining how the new treatment plan will be different can encourage patients and provide hope for successful weight loss.

- **Evaluate various Internet sites to assess their potential value for patient education.**

There is a vast amount of useful information about weight control available on the Internet. However, it varies in quality, sophistication, and intent (e.g., commercial vs. noncommercial). Good places to start include <http://www.nhlbi.nih.gov/health/index.htm>, <http://www.drkoop.com/>, and [www.WebMD.com](http://www.WebMD.com)].

- **Explain that in general, over-the-counter weight loss aides do not work in the long term.**

### Self-care Instructions

- **Eat more than five servings of fruits and vegetables each day.**
- **Increase your intake of high-fiber products, such as cereals and grains.**
- **Exercise for 30 minutes, four times per week.**
- **Do not smoke, and keep alcohol use at a moderate level.**

### Follow-up

- **Especially during the critical weight loss phase, see and weigh the patient monthly.**

Close provider-patient contact is key for the successful treatment of overweight and obesity, whatever the given treatment regimen. Frequent monitoring of weight is also important. During the weight loss phase, patients should ideally be seen monthly to discuss issues regarding diet, eating behavior, and exercise routine. Adverse side effects from pharmacotherapy should be monitored. Positive reinforcement should be given to support their efforts. During the weight maintenance phase, patients can be seen every 3 months to review strategies for weight maintenance and prevention of weight gain.

- **If the initial target of a 10% decrease in body weight is achieved and maintained for 6 months, give consideration to further weight loss.**

See Lifestyle Measures above.

### Prevention and Screening

- **Targeting children and adolescents for prevention of weight gain may ultimately be an important strategy for prevention of adult obesity.**

Currently, there are no clinical studies to examine effective prevention strategies for obesity. It will require collaborative efforts from the food industries, pharmaceutical companies, policy makers, and public education to tackle the problem of obesity in the US.

- **Be aware that obesity and related health problems are more prevalent in some populations, and that socially disadvantaged patients are likely to have less access than the more advantaged to preventive health services, as well as fewer options for healthy lifestyle changes.**

Obesity is more prevalent among women in lower socioeconomic groups and among women, and sometimes men, in many racial or ethnic minority populations [8].

- **Remember that the BMI is the best screening tool for obesity. Make an effort to include BMI among the vital signs recorded for every patient.**

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Goroll AH, Mulley Jr AG: **Evaluation of overweight and obesity.** In: *Primary Care Medicine, edn 4.* Edited by: Goroll AH, Mulley Jr AG. Philadelphia: Lippincott Williams & Wilkins;2000:51-7.

National Heart, Lung, and Blood Institute: **Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults.** Bethesda, Maryland: National Institutes of Health;1998. [<http://www.nhlbi.nih.gov/guidelines/obesity>]

This 228-page evidence-based guideline is the current “gold standard.”

National Heart, Lung, and Blood Institute: **Practical guideline to the identification, evaluation, and treatment of overweight and obesity in adults.** Bethesda, Maryland: National Institutes of Health;2000. [<http://www.nhlbi.nih.gov/guidelines/obesity>]

This 80-page guideline translates information from the evidence-based “Clinical guidelines” into practical information for the healthcare practitioner. The first half of the guideline includes an executive summary and treatment guidelines; the second half includes various clinically useful appendices, tables, and figures, some of which are specifically designed to be copied for patient education and distribution.

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## Evidence Highlights

### Lifestyle Measures

- **Low-calorie and low-fat diets were effective for weight loss.**

**COMMENT:** The evidence review underpinning the 1998 National Heart Lung and Blood Institute Guidelines on Overweight and Obesity graded the following diet-related statements as well supported by randomized controlled trials (RCTs) [1]: low-calorie diets (LCDs) can reduce total body weight by an average of 8% over 3 to 12 months and decrease abdominal fat; very low-calorie diets (VLCDs) produce greater initial weight loss than LCDs, but reductions are similar after 1 year; and lower-fat diets coupled with total caloric reduction produce greater weight loss than lower-fat diets alone. This last conclusion is supported by a recent meta-analysis that found low-fat diets effective in overweight patients (and, by extrapolation, in obese patients) [2].

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- **Systematic reviews suggested that advice on diet and exercise, supported by behavior therapy, is probably effective in obesity treatment.**

**COMMENT:** In their section on “Changing Behaviour” in *Clinical Evidence* [1], Thorogood et al. note that "Systematic reviews found a combination of advice on diet and exercise supported by behaviour therapy was probably more effective than either diet or exercise advice alone in the treatment of obesity, and might lead to sustained weight loss." This conclusion is based on three systematic reviews [2] [3] [4] and several subsequent RCTs. One review [2], together with several subsequent RCTs, showed that various maintenance strategies were effective after weight reduction, particularly when they involved direct contact with a therapist, family support, multiple approaches, and were weight focused (rather than exercise focused).

A Cochrane Review [5] examining interventions to improve health professionals' management of overweight and obese patients (e.g., via reminders and training) concluded that the current state of evidence is such that improving services must be based on the evidence concerning specific patient interventions in combination with clinical judgment.

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### Medical Therapy

- **RCTs did not provide compelling data on optimal use of pharmacotherapy in obesity treatment.**

**COMMENT:** In their section on drug treatment of adult obesity in *Clinical Evidence*, Noel et al. list no interventions as "beneficial" or "likely to be beneficial." [1]. Several agents, including sibutramine and orlistat, are listed under "trade offs between benefits and harms." Of two studies they found comparing fluoxetine 60 mg/day to placebo [2] [3], only the smaller one (including 19 obese diabetics) found the active treatment effective [3], leading them to categorize fluoxetine as "unlikely to be beneficial."

The evidence statement on pharmacotherapy in the systematic review underlying the NHLBI obesity guidelines was rated "Evidence Category B," meaning that the available RCTs did not report consistent findings from a large number of trials and patients over a long period of time.

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### Complementary Medicine

- **Little evidence supported (and, in some cases, evidence refuted) the effectiveness of various complementary and alternative approaches.**

**COMMENT:** In his systematic review of placebo/sham-controlled clinical trials on acupuncture and acupressure for obesity [1], Ernst found four studies, each with significant methodological flaws. The results were contradictory, but the two more rigorous trials show no effect on body weight. A meta-analysis examining the addition of hypnosis to cognitive-behavioral psychotherapy for obesity found six trials together suggesting benefit, but a re-analysis of the data by other authors called this conclusion into question [2]. Yet another re-analysis by the original author supported the original conclusions [3]. A meta-analysis of 14 RCTs examining the effects of human chorionic gonadotropin (hCG) by means of the Simeons therapy on obesity treatment found no greater weight loss than with diet alone or placebo [4].

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## DRUGS TO CONSIDER

### Anorexiant/CNS stimulants

Amphetamine (Biphphetamine)  
Benzphetamine HCl (Didrex)  
Diethylpropion (Tenuate)  
Mazindol (Sanorex, Mazanor)  
Phendimetrazine (Bontril, Prelu-2, Plegine)  
Phenmetrazine (Preludin)  
Phentermine HCl (Adipex-P, Obenix, Fastin, Zantryl)  
Phentermine HCl resin (Ionamin)  
Phenylpropanolamine HCl (Dexatrim, Acutrim)  
Sibutramine HCl (Meridia)

### Lipase inhibitors

Xenical (Orlistat 120 mg)

### Over the Counter

Alli (orlistat 60 mg)