Diagnosing and Treating Overweight and Obese Patients

HOW TO RECEIVE CREDIT

- Read the enclosed course.
- Complete the questions at the end of the course.
- Return your completed Evaluation to CME Resource by mail or fax, or complete online at www.NetCE.com. (If you are a physician, behavioral health professional, or Florida nurse, please return the included Answer Sheet.) Your postmark or facsimile date will be used as your completion date.
- Receive your Certificate(s) of Completion by mail, fax, or email.

Faculty

John J. Whyte, MD, MPH, is vice president for continuing medical education at Discovery Health Channel. In this role, Dr. Whyte develops, designs and delivers medical education programming for Discovery Health Channel, the leading health channel in more than 64 million homes. Dr. Whyte creates courses, products and services on important clinical topics that appeal to both a medical and lay audience. This includes television shows, online content and DVDs. (A complete biography appears at the end of this course.)

Faculty Disclosure

Contributing faculty, John J. Whyte, MD, MPH, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

Audience

This course is designed for all physicians, nurses, and social work/counseling groups involved in the care of patients who are overweight or obese.

Accreditation

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This course meets the qualifications for 5 hours of continuing education credit for MFTs and/or LCSWs as required by the California Board of Behavioral Sciences.

A complete Works Cited list begins on page 22.

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Special Approval

This activity is designed to comply with the requirements of California Assembly Bill 1195, Cultural and Linguistic Competency.

About the Sponsor

The purpose of CME Resource is to provide challenging curricula to assist healthcare professionals to raise their levels of expertise while fulfilling their continuing education requirements, thereby improving the quality of healthcare.

Our contributing faculty members have taken care to ensure that the information and recommendations are accurate and compatible with the standards generally accepted at the time of publication. The publisher disclaims any liability, loss or damage incurred as a consequence, directly or indirectly, of the use and application of any of the contents. Participants are cautioned about the potential risk of using limited knowledge when integrating new techniques into practice.

Disclosure Statement

It is the policy of CME Resource not to accept commercial support.

Course Objective

Obesity is an epidemic in the United States. As statistics indicate that the problem is growing, the purpose of this course is to educate healthcare professionals about the epidemiology and treatment of overweight and obese patients. Clinical management, presentation, diagnosis, and behavioral and medical management will be reviewed to assist healthcare professionals in encouraging their patients to lose weight and prevent obesity-related comorbidities.

Learning Objectives

Upon completion of this course, you should be able to:

1. Discuss the clinical background of obesity, noting the various definitions.
2. Discuss the epidemiology of overweight and obese individuals in the U.S., based on age, race, and socioeconomic status.
3. Describe the pathophysiology of obesity, including genetic and environmental factors.
4. Identify the risks and comorbidities of obesity.
5. Explain the various treatment modalities for overweight/obese patients.
6. Describe dietary and physical activity recommendations.
7. Discuss available pharmacological agents, including indications and adverse reactions, used to treat obese/overweight patients.
8. Discuss surgical options, including restriction and bypass operations.
9. Explain the reimbursement climate for overweight/obesity treatments.
10. Outline considerations necessary when caring for patients for whom English is a second language.

Sections marked with this symbol include evidence-based practice recommendations. The level of evidence and/or strength of recommendation, as provided by the evidence-based source, are also included so you may determine the validity or relevance of the information. These sections may be used in conjunction with the course material for better application to your daily practice.

INTRODUCTION

Obesity is an epidemic in the United States. Estimates show that about 33% of the adult population is overweight and another 33% is obese [1]. This represents an increase of about 18% from just ten years ago [2]. Reasons include an increased sedentary lifestyle, with about 25% of the population engaging in no leisure time physical activity and about one-half failing to get enough exercise to provide health benefits [3; 4]. Americans are also not making ideal nutritional choices. In 2005, only about one-fourth of adults met nutritional guidelines for fruit and vegetable consumption [4]. Each year, obesity results in between 100,000 and 300,000 premature deaths and as much as $139 billion in associated costs [5; 6; 7; 8]. Although obesity has been shown to be a risk factor for numerous diseases, such as diabetes, coronary artery disease, and sleep apnea, most overweight and obese people do not consider themselves at higher risk for medical problems or premature death. News stories on various diets have caused confusion among many patients and health providers, leading to frustration and subsequent inaction.

Numerous treatments for obesity exist. The cornerstone of any treatment regimen includes behavioral modification, focusing on diet changes and exercise regimens. Additional therapies include pharmaceuticals, which can help sustain weight loss, as well as surgical therapies for those patients whose weight is causing significant health problems. Physicians and other healthcare professionals should recognize that recidivism and failure is quite high with all of these therapies, and successful treatment will require a concerted effort on the part of physicians and other providers.

The following case study will be referenced throughout the text to illustrate the challenges of treating overweight/obese patients:

Mrs. B is a white female, 52 years of age, with a history of Type 2 diabetes mellitus, arthritis, hypertension, and hyperlipidemia who presents to your office for a new patient evaluation. She is 5'2" and weighs 150 lbs. She is currently taking metformin, simvastatin, lisinopril, and celecoxib. On exam, her blood pressure is 150/92 mm Hg, heart rate 84, respiration 16. Laboratory analysis demonstrates blood sugar 140, glycosylated hemoglobin 9.5%, cholesterol 205, LDL 115, HDL 52, and triglycerides 190. She asks you for help in trying to lose weight. She has struggled with her weight since adolescence, and has repeatedly cycled up and down with various fad diets and exercise programs. She states that she does not presently exercise because of arthritis in her knees, and she is confused about what she should or should not be eating. She wants to know if her weight really matters, since she knows plenty of people who are heavier than she, and they seem to be fine. If it does matter, she wants to know what she should be doing.

CLINICAL BACKGROUND

DEFINITION OF OVERWEIGHT AND OBESITY

Body Mass Index

The definition of obesity has been evolving over the past few decades. Historically, obesity has been defined simply as an excess of body fat [9]. Today, however, measurement of body weight and height is most often utilized as a measure of obesity.

Initially, weight-for-height tables were used to determine the normal weight range for a given height. These tables were replaced with other indices when they were found to be of limited value due to their general estimates of frame size and bias toward the white population [10]. These tables were replaced with the Body Mass Index (BMI), which is calculated by weight in kg / height in meters^2 or [weight (lbs) / height (inches)^2] x 703. In most people, BMI correlates well with the proportion of body fat.

BMI Calculation:

[Weight (lbs) / Height (inches)^2] x 703

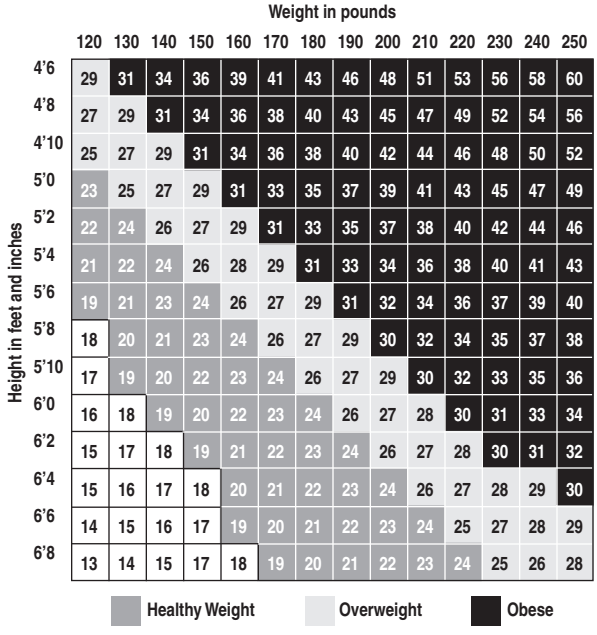
or

Weight (kg) / Height (meters)^2

BMI is now considered the general standard for defining obesity ***(Figure 1)***. An online BMI calculator is available at http://nhlbisupport.com/bmi.

ADULT BODY MASS INDEX

$$BMI = \left\{\frac{\text{WEIGHT (pounds)}}{\text{HEIGHT (inches)}^2}\right\} \times 703$$



Source: [6] *Figure 1*

In 1990, the U.S. Department of Health and Human Services' *Dietary Guidelines for Americans* defined overweight as a BMI of at least 27 and obesity as a BMI of at least 30. Eight years later, the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) released guidelines that lowered the cutoff for overweight to a BMI of 25, but maintained the definition of obesity as a BMI of at least 30 [11]. (Note: Roughly, a BMI >25 corresponds to about 10% over one's ideal weight; a BMI >30 typically is an excess of 30 lbs for most people. These are rough estimates.) The term morbid obesity refers to obesity with a BMI greater than or equal to 40. These final definitions are consistent with definitions used by other national and international organizations, such as the World Health Organization (WHO). ***Table 1*** illustrates the similarities in the classifications used by the WHO and NHLBI.

These definitions are based on epidemiological evidence that suggests health risks are greater at or above a BMI of 25, compared to those below 25. The risk of death from all causes rises with increasing BMI, with a significant increase at BMI >30. In a large cohort study published in the *New England Journal of Medicine* in 2006, persons with a BMI >30 had mortality rates two to three times that of persons with BMI between 20 and 25 [12].

BODY MASS INDEX CLASSIFICATION

WHO Classification	BMI (kg/m^2)	NHLBI Classification
Underweight	<18.5	Underweight
Normal	18.5–24.9	Normal
Preobese	25.0–29.9	Overweight
Obese Class I	30.0–34.9	Obesity Class I
Obese Class II	35.0–39.9	Obesity Class II
Obese Class III	≥40.0	Obesity Class III

The additional classification of obesity (Class I–III) was used to determine if the prevalence rate for co-morbidities vary with class range. In addition, the BMI classification used 5 BMI unit intervals to classify obesity rather than using a single cut-off value.

Source: [68] *Table 1*

BMI does have limitations as a measurement of overweight and obesity. Although BMI provides a more accurate measure of total body fat compared with body weight alone, it can be misinterpreted in some circumstances. For instance, a muscled athlete would be considered overweight if BMI were used alone, despite his/her very low fat content. BMI can also underestimate body fat in persons who have lost muscle mass, such as elderly patients. Therefore, using other estimates, such as the triceps skinfold test, in addition to BMI may provide a better estimate of a patient's weight-related health status, especially in some atypical patients. (Note: There are various anatomical sites around the body that may be used for the triceps skinfold test, other than the triceps. The tester pinches the skin, raising only a double layer of skin and the underlying adipose tissue. The calipers are then applied 1 cm below and perpendicular to the pinch. Three readings are taken and then averaged to produce a final reading that is used in an equation to provide a more accurate estimate of body fat.) As a general reference, the U.S. Army states that for persons 40 years of age and older, maximum allowable percent body fat is 26% for males, 36% for females [13].

EVIDENCE-BASED PRACTICE RECOMMENDATION

The United States Preventive Services Task Force (USPSTF) recommends that clinicians screen all adult patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults.

(http://www.guidelines.gov/summary/summary.aspx?doc_id=4118.
Last accessed January 28, 2008.)

Strength of Recommendation: B (The USPSTF strongly recommends that clinicians routinely screen eligible patients. The USPSTF found good evidence that obesity screening improves important health outcomes and concludes that benefits substantially outweigh harms.)

Waist Circumference

In defining obesity, NIH also identified excess fat in the abdomen out of proportion to total body fat as an independent predictor of risk factors and morbidity [11]. The gender-specific cutoffs for waist circumference are as follows:

- Men: >40 inches (102 cm)
- Women: >35 inches (88 cm)

These are of value only for those with a BMI between 25.5 and 34.9. It is not useful to measure waist circumference in individuals with BMI >35, as such patients are already at increased risk.

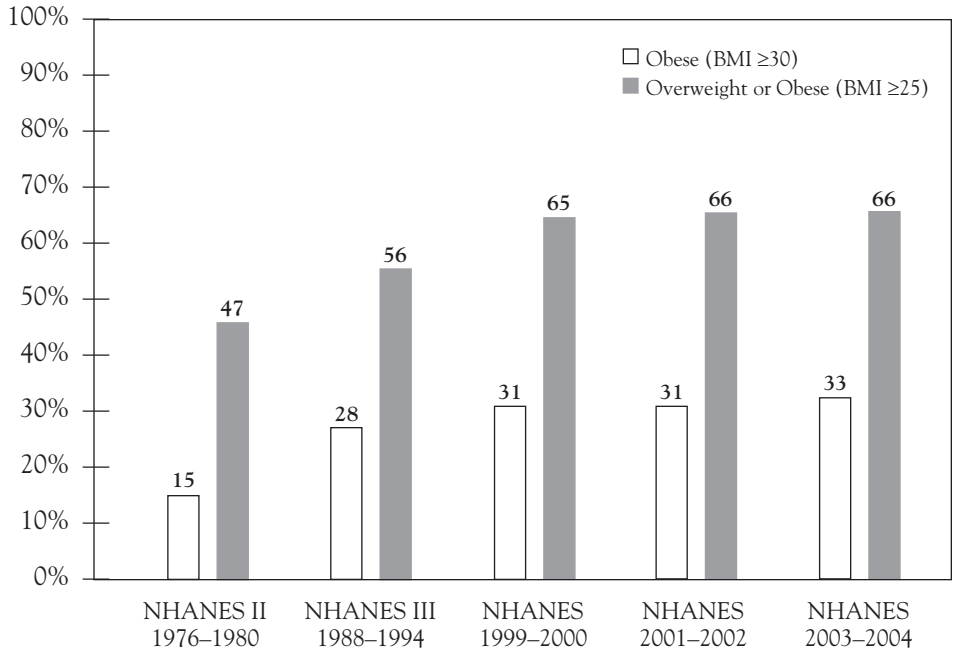
In this example, Mrs. B's BMI is 27. Her waist circumference is 35.5 inches. Both of these measurements place her at increased risk for morbidity and death. Intervention should be made.

EPIDEMIOLOGY OF OBESITY

Within the past few decades, the prevalence of obesity has increased dramatically. In 1998, the National Health and Nutrition Examination Surveys (NHANES) conducted by the Centers for Disease Control and Prevention (CDC) published general trend data indicating the prevalence patterns of major disease, nutritional disorders, and potential risk factors ***(Figure 2)***. Of the 33,199 people sampled, the NHANES study noted that the percentage of obese persons increased from 14.5% in 1980 to 23% in 1994 [14]. Other estimates published the same year indicated that approximately 25% of all adult females and 20% of all adult men were clinically obese. In 1999, the CDC began to conduct the NHANES continuously. Data collected in 2003–2004 indicate that approximately 66% of the adult population are either overweight or obese, and 33% are obese [1]. The prevalence of obesity among persons who are 60 years of age or older is estimated to be 31% [15]. Approximately 2.8% of men and 6.9% of women are morbidly obese [15].

The prevalence of overweight and obesity is generally higher for women than for men and is also greater in minority populations. One exception is Asian Americans, in whom the prevalence is lower than the general population. There is also a correlation, stronger in women than men, that the lower the socioeconomic status, the greater the

OVERWEIGHT AND OBESITY TRENDS
(U.S. ADULTS, AGES 20–74)



Source: Compiled by Author

Figure 2

prevalence of obesity and overweight. Of particular concern is the increase in the number of children who are overweight. Presently, over 17% of children 2 to 19 years of age are overweight [15]. Childhood obesity predicts adult obesity, with one-third of obese adults having been obese as children.

There has been some controversy regarding the number of preventable deaths attributed to obesity. In 1999, research indicated that over 300,000 deaths in the United States annually were associated with obesity. In 2005, another study found that approximately 112,000 preventable deaths could be linked to obesity. Differences in research methodology or improved public health and medical care may account for the large discrepancy in these statistics [7; 8]. It is clear, however, that the impact of obesity on mortality and general health is noteworthy. The economic costs are significant as well. Estimates place annual direct medical expenditures at about $75 billion and indirect costs at $64 billion. This means that the total annual cost of obesity may now be as high as $139 billion [16].

Although the impact of obesity on general health has become highly publicized, most overweight Americans do not consider themselves at higher risk for medical problems or premature death. According to the results of a survey conducted by Shape Up America (a non-profit organization established by the former U.S. Surgeon General C. Everett Koop, MD), 7 out of 10 overweight respondents said that their excess pounds were not a health concern. However, the survey results indicated that approximately 33% of the respondents had already developed a "weight-related medical condition" [17]. Despite the evidence linking obesity and poor health, many Americans still consider excess weight to be merely a cosmetic issue.

The increase in obesity has become so concerning that the Surgeon General developed a *Call to Action (CTA) to Prevent and Decrease Overweight and Obesity*, which urges the community to help tackle this issue by adopting a healthier lifestyle.

The intent of CTA is to "create a multifaceted public health approach capable of delivering long-term reductions in the prevalence of overweight and obesity" [6]. Issued in December 2001, the CTA identifies areas where collaborative work can address the national epidemic of overweight and obesity. In addition, the CTA serves as an impetus for the creation of partnerships that will improve the nation's health [6].

More information on the Surgeon General's Report can be found at http://www.surgeongeneral.gov/topics/obesity/calltoaction/toc.htm.

PATHOPHYSIOLOGY

One of the most common, but oversimplified, explanations for obesity is that it is merely the result of sustained caloric imbalance. Caloric imbalance can be caused by either excessive intake of energy or decreased energy expenditure. With the increased availability of foods with poor nutrition content and decreasing desire for an active lifestyle, the resulting obesity is unsurprising. The cultural evolutionary explanation of obesity argues that our species evolved in an environment where food was often scarce, so our bodies developed an "evolutionary predisposition to store energy in the form of fat" in preparation for those shortages [18].

Though the scientific community has been unable to identify a single etiological agent for obesity, there have been clinical advances in the past decade. Obesity is known to be associated with certain exogenous causes. Genetic factors gained national attention after the discovery of leptin in 1995 by positional cloning in the leptin-deficient mouse model of obesity [19]. Leptin (derived from the Greek word *leptos,* which means "thin") is a 16-kilodalton adipocyte-derived hormone from the *ob* gene and has been the focus of many genetic investigations to elucidate the pathophysiology of obesity. Though this finding is relatively recent, its existence was suspected twenty years ago. In 1978, Coleman proposed that a circulating factor in the plasma of the db mouse strain, which is both diabetic and obese, could reduce the obesity of the ob mouse (a strain of mice with mutations in leptin) [20]. The db mice were found to have mutations in the leptin receptor and were subsequently resistant to the leptin, unlike the ob mice who possessed a mutated leptin gene but functional leptin receptors. Further investigations revealed that injections of leptin in ob mice could cure obesity and diabetes. After locating the human homologues to the leptin gene and its receptor in 1999, the chromosomal locus containing the leptin gene was determined to be genetically related to human body weight [21]. However, only a few people with mutated leptin genes have been identified, while the majority of obese patients have fully functional leptin genes and receptors.

Other genetic diseases that have been associated with obesity include Schinzel Syndrome, Bardet-Biedel Syndrome, Albright Hereditary Osteodystrophy, and Prader-Willi Syndrome. Many of these genetic disorders present with dysmorphic features, developmental delay, and obesity in addition to changes seen specifically with each disorder [22]. For instance, young males with Prader-Willi Syndrome present with the features described above as well as with linear growth defects and undescended testicles.

Overall, the relationship between genetics and obesity cannot be fully determined at this time. Evidence suggests a link between the two, implying that genetics is one of the complex factors involved in the development of this prevalent condition. Although many argue that "obesity genes" cannot be responsible for the epidemic, because the gene pool in the United States has not changed significantly between 1980 and 1994, the etiology of obesity is most likely multifactorial [23]. Further research is needed to clarify the influence of genetics.

Biological factors must also be considered. Proteins and receptors appear to have a role in weight control. For example, orexin A and B are located in the lateral hypothalamus, an area which may regulate body weight. Ongoing research may help determine the role of orexin in obesity.

Environmental factors seem to play a significant role as well. Data from a longitudinal twin-family study and co-twin control studies combined with population-based data on patterns of dietary intake and physical activity provide some evidence that environment can contribute to obesity.

Occasionally, obesity is due to endocrinological origins from hypothyroidism or Cushing's Syndrome. However, both of these conditions, along with other diseases associated with obesity, present with additional signs and symptoms. Moreover, they typically have appropriate treatment regimens that address the underlying cause of the obesity.

Given the influence of genetic and environmental factors, the issue of obesity cannot be simplified to sustained caloric imbalance. There are complex metabolic, psychological, endocrinological, social, and cultural influences regulating energy intake and energy expenditure, which indicates that obesity is more than a lack of self-control when presented with food.

RISK FACTORS AND COMORBIDITIES

Obesity is a risk factor for numerous other diseases. These include [24]:

- Sleep apnea
- Stroke
- Coronary heart disease
- Type II diabetes
- Osteoarthritis
- Colon, breast, endometrial, and possibly other cancers
- Gallstones
- Stress incontinence
- Amenorrhea/menorrhagia
- Elevated serum triglycerides (200 mg/dL)

In the Nurses' Health Study (a large prospective cohort study involving over 100,000 women), women older than 35 with a BMI greater than 27 were found to have an increased risk for cancer, heart disease, and other diseases. For instance, women gaining more than 20 pounds (9 kg) between 18 and 35 years of age doubled their risk for breast cancer compared with women who maintained their weight [25]. Additionally, the age and smoking-adjusted relative risk of non-fatal myocardial infarction and fatal coronary disease for women with BMI 25–29 was 1.8; for women with BMI >29, it was 3.3.

Left ventricular hypertrophy (LVH) is often seen in obese patients and correlates to the resulting systemic hypertension [26]. The risk for Type 2 diabetes has been reported to be twofold in the mildly obese, fivefold in moderately obese, and tenfold in severely obese persons [27].

Cancer mortality is also increased in obese patients. In one study, individuals with a BMI of at least 30 had an elevated risk of pancreatic cancer compared to those with a BMI of less than 23 [28]. In general, obese patients showed an increased risk of 5.4 times that of non-obese patients for endometrial cancer, 3.6 times for gallbladder cancer, 2.4 times for cervical cancer, 1.6 times for ovarian cancer, 1.5 times for breast cancer, 1.7 times for colorectal cancer, and 1.3 times for prostate cancer [29].

The term "metabolic syndrome" has been used when three or more of the following risk factors are present:

- Abdominal obesity: waist circumference >40 inches in men or >35 inches in women
- BMI >25
- Triglycerides >150 mg/dl
- HDL <40 mg/dl in men, <50 mg/dl in women
- BP >130 / >85 mm Hg
- Fasting glucose >110 mg/dl or 2-hour post glucose challenge >140

The development of this metabolic disorder is promoted by excess body fat and physical inactivity. It is believed to predispose patients to heart disease, cerebrovascular disease, and diabetes due to the associated dyslipidemia, hypertension, glucose intolerance, and hypercoagulability.

One can stratify overweight and obese patients to determine their absolute risk by incorporating the presence of comorbidities and cardiovascular disease risk factors. Patients with coronary heart disease, other atherosclerotic diseases, Type 2 diabetes, and sleep apnea are at "very high risk" for death; in comparison, those with three or more cardiovascular risk factors are at the "highest absolute risk." (Note: These risk factors include hypertension, hypercholesterolemia, smoking, family history of early heart disease, and age [male >45 years, female >55 years].)

Conditions that are associated with obesity usually worsen as the degree of obesity increases. Moreover, they typically improve as the obesity is successfully treated. In addition, overweight and obese patients often suffer from emotional distress and face discrimination in their personal and professional lives. Many overweight patients suffer from social stigmatization and isolation, which subsequently increases morbidity and mortality. In one study, 13% of women reported delaying or canceling a doctor's appointment because of concerns about their weight [30].

Mrs. B has several comorbidities, including diabetes, dyslipidemia, hypertension, and osteoarthritis. She is at "very high risk" for premature death. Most of these conditions would improve if her weight were reduced.

TREATMENT

The goal of therapy is to reduce body weight as well as body fat and maintain a lower body weight for the long term. The rate of weight loss should be 1–2 lbs per week, with a goal of 10% weight loss over 6 months. It is important to note that weight loss as modest as 10 lbs reduces the risk factors for several diseases. Such weight loss can lower blood pressure, lower blood sugar, reduce inflammation, and improve lipid levels. Unfortunately, most patients believe a weight loss of 30–40 lbs is necessary to medically benefit and become discouraged when they do not see such results [31]. Patients should set realistic expectations from the start, with the idea that small losses of 10 lbs can be considered successes. Moreover, physicians must emphasize the importance of long-term weight management and weight loss rather than short-term extreme weight reduction.

Of note, weight reduction treatment is not recommended for pregnant women or for patients with unstable mental or medical conditions. Patients with terminal illness may also be excluded from treatment.

Before any treatment plan is attempted, one must assess the patient's willingness and motivation. If a patient is not willing to attempt weight loss, despite the risks as well as existence of current medical problems, treatment will be unsuccessful. Patients cannot be forced to lose weight, nor can they be berated or shamed into doing it. A productive dialogue focusing on the patient's goals and the health risks of being overweight will be the most successful.

Mrs. B clearly is seeking guidance. She is interested in a treatment plan and illustrates this by seeking additional information despite her failure at past attempts. She must realize that her weight really does matter and indeed is already contributing to her morbidity. Her medical conditions are stable. She is eligible and ready for treatment.

TEN STEPS TO TREATING OVERWEIGHT AND OBESITY IN THE PRIMARY CARE SETTING

1.	Measure height and weight. Calculate BMI.
2.	Measure waist circumference.
3.	Assess comorbidities.
4.	Determine if patient should be treated.
5.	Determine if patient is ready and motivated.
6.	Recommend and review diet.
7.	Discuss physical activity and goal.
8.	Review weekly food and activity report.
9.	Consider medications/surgery.
10.	Re-evaluate.

Source: [69] *Table 2*

The 10-step approach, as shown in ***Table 2***, is recommended by the National Institutes of Health (NIH) in developing an assessment and treatment plan.

The treatment of obesity includes three types of therapies:

- Behavioral
- Pharmacologic
- Surgical

BEHAVIORAL

Behavioral therapy includes a combination of diet and exercise and is the cornerstone of any weight reduction treatment. Diet and exercise remain a significant challenge for most adults, as evidenced by the number of overweight and obese people. Most adults do not eat nutritiously and do not exercise regularly. According to 2006 BRFSS data, 22.6% of adults reported engaging in no physical activity at all in the past month. NHIS data shows 62% of adults engaging in no vigorous physical activity during leisure time and only 24% getting regular exercise three or more times a week [32].

DIET

Reviewing and modifying diet is one of the most important steps in helping patients lose weight. As a simple rule of thumb, caloric intake should be reduced by 500–1000 calories per day from a patient's current level. Patients with a BMI of 27–35 should reduce total calories by 300–500 daily; patients with BMI >35 should reduce total calories by 500–1000 daily. This reduction will produce the recommended weight loss of 1–2 lbs per week in most patients. The recommended number of total calories will vary depending upon activity level: 1600 calories for most sedentary women, 2200 calories for sedentary men or active women, 2600 calories for active men. To calculate specific caloric requirements, the following approach is useful:

1. First calculate Resting Energy Expenditure (REE).

   For men: (10 x weight (kg)) + (6.25 x height (cm)) – (5 x age + 5)

   For women: (10 x weight (kg)) + (6.25 x height (cm)) – (5 x age – 161)

2. Multiply REE by Activity Factor (AF).

   For light activity, AF is 1.5 for women, 1.6 for men.

   For high activity, AF is 1.6 for women, 1.7 for men.

In terms of diet specifics, conflicting information exists. Many newspapers and magazines offer detailed articles addressing the successes of individual patients on the Atkins diet, the Ornish plan, the Zone diet, the Body-for-Life program, and others ***(Table 3)***. Differences among these diets leave patients confused and discouraged. The Internet compounds the confusion by providing unfiltered information and a lack of emphasis on current research and evidence-based medicine.

There has been some progress in assessing these various diets, but without strong evidence in favor of any particular one. In 2003, a study conducted at the University of Pennsylvania, supported by the NIH, concluded that the Atkins diet resulted in greater weight loss (approximately 4%) at the end of one year, as well as an improvement in some cardiovascular risk factors [33]. In 2005, researchers at Tufts University compared the Atkins, Ornish, Weight Watchers and Zone diets, with weight reduction and cardiovascular disease reduction as outcomes. (The Atkins diet restricts carbohydrates, the Zone diet involves balancing macronutrient intake, the Ornish diet restricts fat, and the Weight Watchers diet restricts calories.) After one year, all diets produced moderate weight loss and improvement in HDL, C-reactive protein, and insulin levels. Increased adherence to each diet was associated with increased weight loss, but overall adherence was low [34]. In 2007, researchers reported on a randomized trial of the Zone, Atkins, Ornish, and LEARN diets in 311 overweight or obese non-diabetic, premenopausal women. (The LEARN diet is based on national nutrition guidelines.) Again, all diets provided modest weight loss at one year. The Atkins diet produced the most weight loss, with improvements in cardiovascular risk factors

VARIOUS POPULAR DIETS					
Diet Plan	**Atkins**	**Ornish**	**Zone**	**Body-for-Life**	**Weight Watchers**
Breakdown	High fat (55% to 65%) Low carbs (<100 g/day)	High complex carbs Low fat (<10%) Vegetarian	40% carbs 30% protein 30% fat	High protein, moderate carbs, low fat all eaten at same time, with small, frequent meals.	Calorie reduction, using either a "points" system or a list of acceptable foods focusing on choices with low energy density.
Mechanism of Action	Reducing carbohydrates causes ketosis, which induces use of excess body fat for fuel	Reduction in total calories and total fat	Reduction in total calories causes weight loss	More steady release of insulin causes less fat deposition.	Reduction in total calories, with flexible choices to enhance adherence.

Source: Compiled by Author *Table 3*

that were comparable to or better than the other diets. However, weight loss trajectories had not stabilized at the end of the study, suggesting that longer observation might produce different outcomes [35]. For each diet plan, larger and longer studies are necessary to assess long-term benefits and risks.

It is important that any diet contain food from all food groups, so that it remains nutritionally adequate. "Fad diets" typically have nutritional deficiencies, and this is one reason why they are potentially dangerous. For example, high-fat, low-carbohydrate diets are low in vitamins E and A, thiamin, folate, calcium, magnesium, and zinc. Low-fat diets are typically deficient in vitamin B12.

Instead of recommending a specific type of diet, physicians should encourage patients to focus on well-balanced meals from the various food groups. Recommendations from the Institute of Medicine provide a useful framework, as do the *Dietary Guidelines for Americans*.

Institute of Medicine (IOM) Dietary Reference Intakes

In 2005, the IOM issued its first volume in a series of reports that suggest dietary reference values for intake of nutrients. This project was released by the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes (the DRI committee) of the Food and Nutrition Board from the Institute of Medicine, a division of the National Academies. The report establishes the Dietary Reference Intakes (DRIs) for energy and macronutrients: carbohydrates, fiber, fat, fatty acids, cholesterol, protein, and amino acids. A synopsis of the main findings follows. The full report, with the detailed rationale used to establish each guideline/recommendation, can be accessed online at http://www.nap.edu/books/0309085373/html.

The following ranges are recommended for percentage of daily caloric intake [36]:

- Carbohydrates: 45% to 65%
- Sugars: 25%
- Fats: 20% to 35%
- Protein: 10% to 35%
  (dietary protein should be 0.8 g/kg/day)
- Fiber:

  Men <50 years of age,
  38 grams per day

  Women <50 years of age,
  25 grams per day

  Men >50 years of age,
  30 grams per day

  Women >50 years of age,
  21 grams per day

The report distinguishes the different types of fat. Saturated fat and trans fatty acids typically raise the amount of LDL in the bloodstream. Because this type of fat has little value, there is no recommended intake requirement, and people should be advised to keep consumption as low as possible. Sources include meat, poultry, baked goods, and dairy products, as well as some vegetable sources, such as coconut and palm oils.

In contrast to saturated fat, monounsaturated and polyunsaturated fat reduce blood cholesterol levels. As much as possible, one should replace saturated fat with unsaturated fat. Two types of polyunsaturated fat are critical elements of a healthy diet because they are not synthesized in the body. These are omega-3 and omega-6. Omega-3, or alpha-linolenic acid, consumption should be 1.6 g for men and 1.1 g for women; omega-6, or linoleic acid, consumption should be 17 g for men and 12 g for women daily. Sources of monounsaturated fat include plants, peanuts, avocado, and canola oil. Sources of polyunsaturated fat include safflower, sunflower, corn, and soybean oils. Omega-3 fatty acids are found in oily fish and flaxseed.

Dietary Guidelines for Americans, 2005

The 2005 *Dietary Guidelines for Americans* recommend consuming "a variety of nutrient-dense foods and beverages within and among the basic food groups while choosing foods that limit the intake of saturated and *trans* fats, cholesterol, added sugars, salt, and alcohol" [70]. Decreased caloric intake with increased exercise is suggested for people who need to lose weight, with the goal of slow and steady weight loss over time.

Specific recommendations for adults, based on a "reference diet" of 2,000 calories per day, include [70]:

- Two cups of fruit and 2½ cups of vegetables per day, with an emphasis on high-fiber choices; weekly recommendations are 3 cups/week of dark green vegetables, 2 cups/week of orange vegetables, 3 cups/week of legumes (dry beans), 3 cups/week of starchy vegetables, and 6½ cups/week of other vegetables
- 3 or more ounce-equivalents of whole-grain products per day, with at least half of all grain products consumed coming from whole grains
- 3 cups per day of fat-free or low-fat milk or equivalent milk products
- Less than 10% of calories from saturated fats, with as few trans fats as possible and total fat intake between 20 and 35% of calories
- Less than 300 mg/day of cholesterol per day
- Less than 2,300 mg (approximately 1 tsp of salt) of sodium per day

The guidelines also emphasize choosing lean, low-fat, or fat-free meats and foods with minimal added sugars or caloric sweeteners.

The USDA's MyPyramid plan and the DASH diet both fulfill the Guidelines' recommendations. MyPyramid is an individualized guide for healthy eating based on age, sex, height, and weight. Patients can create their own MyPyramid plans at http://www.mypyramid.gov. The DASH diet (Dietary Approaches to Stop Hypertension) was originally developed as a method to prevent and treat hypertension, but it provides a balanced diet that is appropriate for most adults. Patient-friendly information about the DASH diet is available at http://www.nhlbi.nih.gov/health/public/heart/hbp/dash.

PHYSICAL ACTIVITY

Patients must keep in mind that as they change their diet and begin to lose body weight, body fat and lean body mass also decrease. The optimal goal of therapy is to maximize loss of body fat and minimize loss of lean body mass.

Exercise increases energy expenditure, and regular physical exercise is an important predictor of long-term weight maintenance. It is as important as diet, and patients should understand this point. Several studies have shown that patients who diet and exercise regularly are much more likely to maintain weight loss than those who simply change their diet. Multiple studies have demonstrated that a program of diet and exercise can reduce the number of persons who progress from impaired glucose

tolerance to frank diabetes by 50% or more [37; 38; 39; 40].

As noted earlier, approximately 25% of American adults rarely exercise. There are numerous reasons for this, including lack of interest, competing demands for leisure time, lack of knowledge of proper technique, and fear of injury. Compounding this problem, in a 2001 survey, it was found that only 28% of subjects reported receiving advice from their physicians to increase their physical activity [41]. Of the individuals who received advice, only 38% (or 11% total group) received help formulating a specific activity plan, and 42% received follow-up support.

IOM Physical Activity Recommendations

According to the IOM Report, adults should set a long-term goal of at least 60 minutes of moderate-intensity physical activity (e.g., brisk walking) or shorter periods of more intense activity daily [36]. This is an increase from the 30 minutes of "activity" on most days of the week recommended by the U.S. Surgeon General [42].

U.S. Health and Human Services Physical Activity Recommendations

The 2005 *Dietary Guidelines for Americans* include recommendations for physical activity. To reduce the risk of chronic disease, adults are advised to engage in 30 minutes of moderate-intensity physical activity, above their usual daily activities at work or around the house, on most days of the week. To help manage body weight and prevent weight gain, the recommendation is for 60 minutes of moderate-to-vigorous activity. And to sustain weight loss, 60 to 90 minutes of moderate-intensity activity is recommended [70].

American Heart Association Physical Activity Recommendations

In 2007, the American Heart Association released new guidelines for physical activity, in partnership with the American College of Sports Medicine (ACSM) [43]. The new guidelines are intended to clarify recommendations originally released in 1995 by the ACSM and the CDC. For healthy adults 18 to 65 years of age, the AHA and ACSM recommend:

- Moderate-intensity aerobic activity on 5 days per week for 30 minutes or more, or vigorous-intensity aerobic activity on 3 days per week for 20 minutes or more.
- Resistance or strength training, or activity that improves strength and endurance, at least twice a week.

Vigorous- and moderate-intensity activity can be combined to meet the goals. For example, a brisk half-hour walk twice a week plus a 20-minute jog twice a week fulfills the recommendations. Moderate-intensity bouts of exercise lasting at least ten minutes can be added together over the course of a day. Activities of daily living, such as household chores, do not count toward the goals.

Strength training should include 8 to 10 exercises using the major muscle groups on two or more non-consecutive days. Weights should allow 8 to 12 repetitions before fatigue.

The AHA and ACSM also offer specific recommendations for older adults [44]. Aerobic and strength training goals are the same, although the guidelines note that the same exercise may be "moderate" for some older adults and "vigorous" for others, depending on baseline fitness level. Additional recommendations include:

- Exercises to promote flexibility, for at least 10 minutes two days a week.
- Balance-improving exercises for adults at risk of falls.
- Integration of preventive and therapeutic recommendations, so as to accommodate illness or restrictions on movement while avoiding a sedentary lifestyle.

Encouraging Physical Activity

The key is to make physical activity a part of everyday life by encouraging patients to choose activities of interest. Exercise should not be a chore, but rather an enjoyable activity that people look forward to. This may be light jogging, dancing, vigorous walking, or perhaps swimming for patients with arthritis. Patients should be encouraged to surround themselves with people supportive of exercise, who may join them in this activity. Patients should also

consider varying their routine so they do not get bored. One study demonstrated that women older than 50 years of age who spent approximately 2.5 hours per week walking briskly reduced their risk of cardiovascular disease by 30% [45]. For patients with chronic renal insufficiency, resistance training has been shown to be effective against the catabolism of a low-protein diet and uremia [46].

It is also recommended that patients self-monitor. This entails keeping a diary of caloric intake and physical activity. Such a log encourages adherence, and most patients can see some success by noting their daily progress over time. They should bring this log to each visit, which should be 1 to 2 times per month early on. Physicians should review this diary with patients to ensure that they are properly following a structured program. Some patients will need closer monitoring, depending on cardiac risk and the presence of other medical conditions.

Although behavioral strategies can be effective, weight regain is common. Patients typically regain weight after leaving a structured program. Patients must understand that these changes must become their daily lives. They should change slowly, choosing foods and activities they can enjoy. They need to understand that occasional setbacks may occur, and that instead of becoming frustrated they should try to remain focused on long-term goals. Permanent lifestyle changes remain one of the most difficult interventions to implement. Patients need support, positive feedback, continual encouragement, and reinforcement.

Mrs. B should be counseled to adopt a diet and exercise regimen. She needs to decrease her calories by 500 calories a day and distribute her calories to 45% to 65% carbohydrates, 25% sugar, 20% to 35% fat, and 10% to 35% protein. She should choose an exercise program she enjoys — perhaps swimming, which would not only cause less stress on her joints but may also improve her arthritis. She should start slowly, 10 to 20 minutes several times a week, gradually building up to one hour, five or more times a week.

PHARMACOLOGICAL AGENTS

Pharmacotherapy should only be used as an adjunct to behavioral interventions. It should not be used as a primary treatment option or by people who are unwilling to make behavioral changes. Rather, if lifestyle changes do not promote weight loss after 6 months, drugs should be considered.

The American College of Physicians (ACP) asserts that pharmacologic therapy can be offered to obese patients who have failed to achieve their weight loss goals through diet and exercise alone. However, the ACP recommends that there be a doctor-patient discussion of the drugs' side effects, the lack of long-term safety data, and the temporary nature of the weight loss achieved with medications before initiating therapy.

(http://www.guidelines.gov/summary/summary.aspx?doc_id=7036.
Last accessed January 28, 2008.)

Level of Evidence: Data from randomized controlled trials and meta-analyses

Most current agents include drugs that suppress appetite or block pancreatic lipase. Presently, only one drug is approved by the U.S. Food and Drug Administration (FDA) for long-term weight loss: orlistat. Orlistat is available by prescription (brand name Xenical) or over-the-counter (brand name Alli).

Orlistat is a pancreatic lipase inhibitor. It causes weight loss by blocking absorption of up to one-third of ingested fat. It is typically used with a reduced calorie diet with about 30% of calories from fat. Because absorption of fat-soluble vitamins can be affected, patients are advised to take a multivitamin daily. Several clinical studies have shown that when orlistat is combined with a low-calorie, low-fat diet, it increases weight loss compared with a placebo and low-calorie, low-fat diet. For example, in a randomized controlled trial (RCT) conducted in Europe, patients using orlistat and eating a low-fat diet experienced a weight loss of 10.2% compared to 6.1% in the control group at one year [47]. In this study, total cholesterol, LDL, LDL/HDL ratio,

and glucose showed a significant reduction. At year two, patients who continued with orlistat regained half as much weight as those patients who switched to placebo. In another RCT, patients using orlistat with a low-calorie diet experienced a loss of 8.5% of their initial body weight, compared with 5.4% in the placebo group [48]. Moreover, 35% of patients using orlistat lost at least 5% of body weight, compared with 21% in the placebo group; 28% lost 10% of body weight compared with 17% in control group. In an RCT conducted in the U.S., patients treated with orlistat lost an average of 15 lbs versus 8 lbs in the control group [49]. More patients in the experimental group lost 5% of initial weight than those in the control group, and 34% of patients using orlistat sustained the weight loss at 2 years versus 24% in the control group.

Orlistat is contraindicated in patients with chronic malabsorption syndrome or cholestasis, and it should be used with caution in patients taking cyclosporine. Side effects of orlistat include, but are not limited to, increased fecal fat loss, incontinence, and diarrhea. Dietary supplementation with fat-soluble vitamins is recommended. Rarely, patients taking orlistat have developed severe liver injury, and this risk should be weighed against potential benefits [71].

Until October 2010, another drug, sibutramine, was approved by the FDA for use in the long-term management of weight. Randomized controlled trials supported the efficacy of sibutramine for short-term weight loss, with associated improvements in glycemic control, triglyceride levels, and HDL [50; 51]. However, there was some concern regarding the cardiovascular risk profile associated with the medication [52]. Postmarketing data indicated that patients with existing cardiovascular disease on long-term sibutramine therapy had an increased risk of nonfatal myocardial infarction and stroke [53]. As a result, the manufacturer (Abbott Laboratories) responded to an FDA request by voluntarily removing the agent from the U.S. market in 2010 [72].

When pharmacotherapy is effective, weight loss should exceed 2 kg (4.4 lbs) during the first month and weight should decrease by about 5% of baseline within six months. Pharmacotherapy should be discontinued if weight loss is not achieved. When it is successful, pharmacotherapy with orlistat may be continued past one year; data is currently available to four years with orlistat. Patients should keep in mind that weight loss typically stabilizes after 6 months of treatment, and weight gain can occur when pharmacological therapy is discontinued.

Several drugs are approved for short-term use. These include sympathomimetic agents such as amphetamine, methamphetamine, phentermine, phendimetrazine, and diethylpropion. Data on long-term safety has not been demonstrated. Given that weight loss therapy is focused on long-term success, use of these drugs is rarely recommended.

Additional drugs with potential for obesity treatment include bupropion, leptin, and topirimate. Bupropion appears to have some efficacy for weight loss, but requires more extensive trials. Although topirimate appears to produce weight loss, its side effect profile makes it a relatively poor choice for obesity treatment [54]. Leptin resistance may be a contributing factor to obesity in some cases; leptin is being explored as a possible treatment.

The cannabinoid receptor antagonist rimonabant, which acts as an appetite suppressant, has shown promise for weight loss. It is currently available in Europe. However, the FDA declined to approve this drug for use in the U.S., citing concerns about the risk-benefit profile and the need for more data. In the future, rimonabant or similar drugs may become available in the U.S.

Previous drug therapy included dexfenfluramine and fenfluramine. Both have been withdrawn from the market due to either increased risk of pulmonary arterial hypertension or valvular heart disease.

SURGICAL OPTIONS

Bariatric surgery has become increasingly common over the past decade. There were 13,386 procedures in 1998 and 121,055 in 2004 [55]. Surgical procedures for overweight and obese patients include:

- Gastric banding
- Vertical banded gastroplasty
- Gastric bypass
- Intestinal bypass

According to the American College of Physicians, bariatric surgery should be reserved for patients with morbid obesity (BMI ≥40) who have "instituted but failed an adequate exercise and diet program" and who have obesity-related comorbid conditions (e.g., hypertension, impaired glucose tolerance or diabetes, hyperlipidemia, or obstructive sleep apnea) [56]. The Society of American Gastrointestinal Endoscopic Surgeons states that surgery is indicated for those patients with a BMI ≥40 or ≥35 with significant comorbid conditions, and who can demonstrate that dietary attempts at weight loss have failed [57]. Patients should be thoroughly screened for a willingness to make lifestyle changes, as well as for any psychological disorders that would impair a successful postoperative course. Surgical treatment is not a cosmetic procedure. It does not involve the removal of adipose tissue by suction or excisions; rather, it involves reducing the size of the stomach, with or without a degree of malabsorption.

Research supports the effectiveness of bariatric surgery for weight loss. In the Swedish Obese Subjects (SOS) study, a large, prospective, controlled trial of bariatric surgery (fixed or variable banding, vertical banded gastroplasty, or gastric bypass), average weight loss in surgical patients was 16% at ten years compared to a 1.6% weight gain in controls [58]. A 2005 Cochrane Review, which included earlier SOS results as well as multiple other studies, noted that evidence was limited (largely due to study design), but that surgery appeared to be more effective than conventional treatment [59]. A meta-analysis published in 2004 in *JAMA* concluded that mean excess weight loss was 61.2% for bariatric surgery patients, with some variation among types of surgery [60].

It also appears that weight loss following bariatric surgery may be more sustainable than weight loss by conventional means. While weight regain often occurs within a few months to years after behavioral or pharmacologic treatment, studies show that weight loss can be sustained for many years after surgery [55].

Although bariatric surgery is not without risk, there is evidence that it can reduce overall morbidity and mortality in obese patients. In a cohort study comparing 1,035 bariatric surgery patients with 5,746 age- and gender-matched controls, the surgery patients had significant reductions in the risk of cardiovascular disease, cancer, endocrine disorders, infections, and psychiatric disorders. The relative risk of death was 89% lower in the surgery group [61]. Another study compared 7925 gastric bypass subjects with community-based controls. Mortality was lower by 40% among the surgery patients. Although deaths from causes other than disease were higher in the surgery patients, deaths from diabetes, cardiovascular disease, and cancer were all substantially reduced [62]. The SOS study, the only large, well-controlled prospective trial of bariatric surgery, found unadjusted overall mortality reduced by 31.6% [63].

Multiple studies of comorbid conditions that are common in obesity have shown improvement following bariatric surgery. A meta-analysis of bariatric surgery studies showed strong improvements in diabetes, hypertension, hyperlipidemia, and sleep apnea [60]. According to results from the SOS study, some of the improvements in morbidity may decrease over time; however, longer observation and additional studies are needed to confirm long-term effects [58].

Restrictive Procedures

Restrictive procedures reduce the size of the stomach without interfering with absorption of food. Food intake is restricted by creating a small pouch at the top of the stomach where the food enters from the esophagus. The pouch initially holds about 1 ounce

of food and can expand to 2–3 ounces over time. The pouch's lower outlet usually has a diameter of about ¼ inch. The small outlet delays the emptying of food from the pouch and causes a feeling of fullness. It does not otherwise alter the digestive tract. Restriction operations are intended to reduce the amount of food a patient can comfortably eat, thus reducing total caloric intake. The two most common restriction operations are gastric banding and vertical banded gastroplasty.

Gastric Banding

In this procedure, a band is placed around the stomach near its upper end, creating a small pouch and a narrow passage into the larger remainder of the stomach. The procedure is usually done laparoscopically. An inflatable, adjustable ring controls the flow of food from the smaller pouch to the rest of the digestive tract. The patient will feel comfortably full with a small amount of food. Because of the slower emptying, the patient continues to feel full for several hours, thereby reducing the urge to eat between meals. Typical weight loss is 36% of a patient's excess weight three years after banding. More than half of patients lose at least 25% of their excess weight.

Vertical Banded Gastroplasty (VBG)

In this procedure, both a band and staples are used to create a small pouch in the upper stomach with a narrow outlet reinforced by a mesh band to prevent stretching. After the procedure, the person usually can eat only a half to a whole cup of food without discomfort or nausea. Food must be well chewed. VBG, formerly one of the most common bariatric surgeries, is used less often now due to unsatisfactory weight loss results [55]. Complications from the restriction can include vomiting, gastroesophageal reflux, and erosion of the band into the gastric tissue.

Neither of these procedures involves any anastamosis of the stomach or intestine, nor is there repositioning of the stomach or intestines. Intake becomes a function of a patient's ability to chew thoroughly and eat slowly. Failure to do so can result in repeated vomiting and isolated cases of nutritional deficiency.

Malabsorptive and Combined Procedures

These operations combine creation of small stomach pouches to restrict food intake and construction of bypasses of the duodenum and other segments of the small intestine to cause malabsorption. The two most common gastric bypass operations are Roux-en-Y gastric bypass and biliopancreatic diversion. According to one report, in 2003–2004 more than 90% of the weight loss surgeries performed in the U.S. involved the Roux-en-Y technique, although this surgery requires longer time in surgery, longer hospital stays, and a higher likelihood of requiring intensive care [63]. In the SOS study, the gastric bypass group lost the most weight, compared to banding and vertical banded gastroplasty; they were also more likely to have lost more than 5% of baseline body weight [58]. A meta-analysis of multiple studies concluded that weight loss was about 61.6% with gastric bypass and 70.1% with biliopancreatic diversion, vs. 47.5% for gastric banding. However, these procedures carry a higher risk of nutritional deficiency.

Roux-en-Y Gastric Bypass (RGB)

In this procedure, a small stomach pouch, approximately 25–30 ml in size, is created by either stapling or vertical banding. This causes restriction in food intake, such that patients can only eat several bites as a meal. Next, a Y-shaped section of the small intestine is attached to the pouch to allow food to bypass the duodenum as well as the first portion of the jejunum. This causes reduced calorie and nutrient absorption, resulting in weight loss. Gastric bypass is usually done laparoscopically.

With this procedure, severe nutritional deficiencies can develop. For instance, patients are at risk to develop iron deficiency due to lack of food contact with gastric acid and consequent diminished conversion of iron. In addition, vitamin B12 deficiency may occur because food is not coming into contact with gastric intrinsic factor. Vitamin D and calcium absorption may be reduced because the duodenum and proximal jejunum, which are the sites of calcium absorption, are bypassed. Life-long supplements of multivitamins, B12, iron, and calcium are mandatory following this procedure.

Biliopancreatic Diversion

In this operation portions of the stomach (approximately two-thirds) are removed. The small pouch that remains is connected directly to the final segment of the small intestine, completely bypassing both the duodenum and jejunum. Thus, the time that food mixes with digestive fluids is fairly brief.

Bariatric surgery does have complications. Ten to twenty percent of patients who have weight loss surgery require follow-up operations. Gastric bypass operations may cause "dumping syndrome," whereby stomach contents move too rapidly through the small intestine. Typically, this is caused by the high osmolarity of simple carbohydrates in the intestine. The higher concentration causes fluids to shift towards the higher osmolarity. This results in additional fluid in the bowel, which causes it to be stretched, with subsequent pain and nausea. Activation of hormonal and nerve responses causes increased heart rate. There may be vomiting and diarrhea. A short time later, there typically is a glucose spike, as the small bowel absorbs sugar. The pancreas responds by secreting insulin, which then causes hypoglycemia, causing weakness and light-headedness. Dumping syndrome should be monitored carefully.

Abdominal hernias can also occur, requiring follow-up surgery. More than one-third of obese patients who have gastric surgery develop gallstones. Postoperative complications may include deep vein thrombosis, pulmonary emboli, bleeding, band migration, and infection. Possible later complications include breakdown of the staple line or band erosion, causing internal infections.

Nearly 30% of patients who have weight loss surgery develop nutritional deficiencies such as anemia, osteoporosis, and metabolic bone disease. Therefore, it is important that patients take supplemental vitamins and minerals.

Because bariatric surgical procedures are still evolving, true surgical mortality rates are uncertain. The overall risk of death from gastric bypass appears to be approximately 0.3% at 30 days. Although older data, gathered between 1987 and 2001, suggested a 30-day death rate as high as 1.9%, it is likely that outcomes have been improving as surgeons gain experience and more lower-risk patients seek treatment [55].

EVIDENCE-BASED PRACTICE RECOMMENDATION

According to the Society of American Gastrointestinal Endoscopic Surgeons, physicians must know how to diagnose and manage complications specific to bariatric surgery. Postoperative management of comorbidities should be directed by a practitioner familiar with relevant bariatric operations.

(http://www.guidelines.gov/summary/summary.aspx?doc_id=4383.
Last accessed January 28, 2008.)

Level of Evidence: Expert Opinion/Consensus Statement

Selection of Surgical Procedure

The appropriate surgery depends on a number of factors, including the skill of the surgeon and patient preference. Typically, restriction operations create slower and steadier weight loss than the bypass operations, which often show rapid weight loss in the first few months, stabilizing a year after surgery. With restriction operations, weight loss is typically 1–2 pounds per week, continuing on average for two years. However, restriction operations have higher potential for nutritional deficiency.

Bariatric surgery will not work for all patients. Between 10% and 40% of surgical subjects will not succeed with long-term weight loss [55]. Ongoing follow-up is an essential part of treatment, to watch for complications and encourage ongoing weight loss efforts.

Newer Procedures

Sleeve gastrectomy involves laparoscopic partial gastrectomy, leaving a small, tubular stomach. Because the fundus of the stomach contains the cells that produce ghrelin (a hormone involved in regulation of food intake), removal of the fundus may contribute to weight loss beyond simple restriction. Sleeve gastrectomy is generally done in super-obese patients and followed, once weight is somewhat reduced, by completion of a Roux-en-Y gastric bypass.

The intragastric balloon is not yet available in the U.S. Intended as a minimally-invasive, short-term treatment, this procedure involves placement in the stomach of an inflatable, free-floating balloon. It may have indications for moderate obesity and for morbidly obese patients who need to lose weight before bariatric surgery. A 2007 Cochrane Review suggests that intragastric balloon treatment may not provide benefits over conventional therapy. However, evidence was limited and different trials used different techniques and clinical considerations [64].

Gastric stimulation is an experimental technique involving an implanted device similar to a cardiac pacemaker. Controllable from outside the body, the gastric stimulator is intended to reduce caloric intake [55].

CONSIDERATIONS FOR NON-ENGLISH PROFICIENT PATIENTS

As a result of the evolving racial and immigration demographics in the U.S., interaction with patients for whom English is not a native language is inevitable. Because patient education is such a vital aspect of the prevention and treatment of overweight and obesity and related conditions, it is each practitioners' responsibility to ensure that information and instructions are explained in such a way that allows for patient understanding. When there is an obvious disconnect in the communication process between the practitioner and patient due to the patient's lack of proficiency in the English language, an interpreter is required.

In this multicultural landscape, interpreters are a valuable resource to help bridge the communication and cultural gap between clients/patients and practitioners. Interpreters are more than passive agents who translate and transmit information back and forth from party to party. When they are enlisted and treated as part of the interdisciplinary clinical team, they serve as cultural brokers, who ultimately enhance the clinical encounter.

INSURANCE COVERAGE

There is limited insurance coverage for obesity treatments.

FEDERAL PROGRAMS

In 2004, Medicare, the federal program for health services for the elderly and disabled, made revisions to its *Medicare Coverage Issues Manual*, which removed language stating that obesity was not a disease or illness. Previously, the Medicare program did recognize gastric bypass surgery in some cases for an underlying condition that caused obesity. However, because Medicare is required to cover only "medically necessary services for illness or injury," the previous wording prevented most obesity treatments from being covered [65]. While this revision did not change coverage directly, it allows individuals or organizations to request that specific treatments be evaluated to determine if potential beneficial effects are supported by current medical evidence. Additionally, medical nutrition therapy is a supported treatment. For more information regarding Medicare services, please visit http://www.cms.hhs.gov/home/medicare.asp.

Starting in January 2006, Medicare began to offer prescription drug plans, whereby it would assist in the payment of enrolled individuals' medications. Weight loss medications such as orlistat may be covered; many variables contribute to the amount of coverage available. Medicare provides more information and implementation tools on its website at http://www.medicare.gov.

Medicaid is a jointly-funded, Federal-State health insurance program for certain low-income and needy people. Some Medicaid programs do pay for obesity surgery although the number of such claims appears small. This may be due to either low interest in the procedure or possibly due to low reimbursement rates, and thus limited surgeons who are willing to perform the procedure for Medicaid patients. The federal statute governing Medicaid coverage of pharmacological compounds specifically excludes payment for drugs for weight loss. However, states can apply for a waiver from this provision. Many states have received such a waiver and do cover orlistat. For the most accurate information regarding your specific state's coverage policies, contact the state Medicaid office.

PRIVATE INSURANCE

Private sector insurance is varied. Fee-for-service and general indemnity typically have very limited coverage, although there is more coverage than existed ten years ago. When they do cover services, surgery is typically included; coverage is often determined on a case by case basis. Managed care programs generally offer more coverage. For example, some managed care companies provide support, such as corporate wellness programs, that incorporate weight management, prescription drugs, reimbursement for membership in weight loss programs, and surgery. Some programs do require, however, a comorbid condition such as hyperlipidemia or Type 2 diabetes as a condition of covering weight loss treatments. Given the focus on the increasing prevalence of obesity, it is expected that there will be expanded coverage in the near future.

TAX DEDUCTIONS

In April, 2002, the IRS announced a new policy (IRS Ruling 2002-19) stating that "Obesity is medically accepted to be a disease in its own right." For taxpayers, this means that treatment specifically for obesity can now be claimed as a medical deduction under certain conditions. According to the IRS [66; 67]:

"Uncompensated amounts paid by individuals for participation in a weight loss program as treatment for a specific disease or diseases (including obesity) diagnosed by a physician are expenses for medical care that are deductible under § 213, subject to the limitations of that section."

This policy will likely help individuals who have high expenses related to their obesity, who itemize their deductions, and who are eligible for the medical deduction. In addition, the ruling applies to individuals who can participate in a flexible savings account because those programs use the same IRS rules. This means that many persons can put aside pre-tax dollars to use for weight management during the year.

The text of the ruling is available at http://obesity1.tempdomainname.com/subs/tax/taxbreak.shtml. Patients should contact a tax professional when considering this deduction.

SUMMARY

The number of overweight and obese people is quickly reaching epidemic proportions. Most estimates show that 66% of the adult population is either overweight or obese. This represents an 18% increase from just ten years ago. Ample scientific evidence exists that demonstrates an increasing body mass index corresponds to increasing morbidity and mortality. Numerous treatments for obesity are available. The cornerstone of any treatment regimen is behavioral modification, focusing on diet changes and exercise regimens. Additional therapies include drugs and surgery. To improve care for overweight and obese patients, physicians and other providers need to have a thorough understanding of obesity and its treatment and to understand the importance of addressing the topic with patients. In addition, they must recognize that recidivism and failure are quite high and that successful treatment requires a concerted and sustained effort.

ADDITIONAL INFORMATION

CDC Reports and Guidelines for Overweight and Obesity
http://www.cdc.gov/nccdphp/dnpa/obesity

Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults
http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm

Dietary Guidelines for Americans
http://www.health.gov/dietaryguidelines

Exercise: A Guide from the National Institute on Aging
http://www.nia.nih.gov/HealthInformation/Publications/ExerciseGuide

ACSM/AHA Physical Activity and Public Health: Updated Recommendation for Adults
http://www.americanheart.org/presenter.jhtml?identifier=1200013

Institute of Medicine (IOM) Dietary Reference Intakes for Energy, Carbohydrates, Fiber, Fat, Protein and Amino Acids (Macronutrients)
http://www.nap.edu/books/0309085373/html.

Guide to Clinical Preventive Services
http://www.ahrq.gov/clinic/uspstfix.htm

NHLBI Obesity Education Initiative
http://rover.nhlbi.nih.gov/health/public/heart/obesity/lose_wt

FACULTY BIOGRAPHY

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Dr. Whyte is a board-certified internist, having completed an internal medicine residency at Duke University Medical Center and a health services research fellowship at Stanford University. His research focused on the management of hyperlipidemia in patients with coronary disease. He remains clinically active, performing as a locum tenens in underserved areas.

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Dr. Whyte has written extensively in the medical and lay press on health policy issues.

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