Clinical Assessment and Management of Adult Obesity

Robert F. Kushner, MD

Overweight and obesity are the most common medical problems seen in primary care practice, affecting >68% of adults and 33.0% of children and adolescents in the United States. Obesity is a risk factor for several of the leading causes of preventable death, including cardiovascular disease, diabetes mellitus, and many types of cancer. Thus, successful treatment and control of obesity should be major imperatives. However, multiple studies have shown that detection and counseling rates among physicians remain low. Thus, a gap exists between the need to provide obesity care and the actual provision of care. In this article, current recommendations for the medical evaluation of the obese adult patient are reviewed, followed by management approaches to using lifestyle therapy, pharmacotherapy, and surgery.

A Case for Physician Involvement

Few other chronic public health conditions parallel the prevalence of overweight and obesity. They affect two thirds of adults and one third of children and adolescents in the United States. Minority racial and ethnic groups are especially affected; nearly 76.6% of blacks and 80% of Mexican Americans are overweight or obese. Per capita medical expenditures and the cost of both absenteeism and presenteeism (workers being on the job but, because of medical conditions, not fully functioning) attributable to obesity range from $1143 (obese I men) to $6684 (obese III women).

Clinically, determination of height and weight functions as a simple and inexpensive surrogate measure for percent body fat when the values are entered into the Quetlet index (weight [kg]/height [m²]), commonly referred to as body mass index (BMI). Categorization of patients by BMI also serves as a useful risk estimate for morbidity and mortality that is interpreted by the patient as being insensitive. There is reason to be concerned. There are few other conditions in medical practice and in our society that are as stigmatized and shunned as obesity. In reality, obesity is a complex disease caused by genetic, biological, economic, environmental, psychosocial, and behavioral determinants. Rather than blaming patients for their weight, recognizing obesity as a medical condition will pave the way a frank, open, and respectful dialog.

There is no clearly established method for telling patients that they are overweight or obese. Initiating talk about weight is an interactive process with information sharing between patient and physician. When the topic of body weight is first raised, words matter. The approach that physicians use to broach this potentially sensitive topic may influence how patients react emotionally and cognitively to the discussion and advice provided. Language used by the physician sets the stage for the interaction. The reason for the concern is that the word obesity is a highly charged emotive term. It has a significant pejorative meaning with many patients, leaving them feeling judged and blamed when labeled as obese. The bottom line is that the physician and patient must use shared terminology that is agreeable, inoffensive, and understandable to both individuals. Recently, the American Medical Association issued a pamphlet titled Weigh What Matters, a family prevention program designed...
to provide resources needed to address weight with patients and their families. The pamphlet contains several additional conversation starters to broach this sensitive topic.

**Taking an Obesity-Focused History**

The first step in initiating obesity care is to take a comprehensive history that addresses issues and concerns specific to obesity treatment. This obesity-focused history allows the physician to develop tailored treatment recommendations that are more consistent with the needs and goals of the individual patient. A useful, practical, and reflective technique to quickly identify the behavioral and biopsychosocial determinants of weight gain is to ask patients to complete a lifestyle events–body weight graph (the Figure). For many patients, weight gain initially occurs with or is accelerated coincident to smoking cessation, initiation of a medication, or change in life events such as a change in marital status, change in occupation, or illness. At-risk times for women include pregnancy and menopause. Stressful life events often result in a change in eating and physical activity habits. Using the lifestyle events–body weight graph as a conversation map is an efficient and productive means to facilitate discussion from the patient’s perspective. Insight into predisposing genetic factors is obtained by taking a family history. Similarly, it is important to ascertain whether the patient was overweight as a child or adolescent because early onset of obesity is a predictor of severe obesity in adulthood.

A dietary and physical activity history should be assessed in all patients before counseling is initiated. In today’s society, walking to or from the car, train, or bus or keeping the home clean often represents the extent of daily physical activity for many individuals. Assessment of psychological health and psychiatric history should be done routinely during the history. Particular attention should be paid to the presence of mood and anxiety disorders, which are the most common disorders in the general population and occur with high rates among persons with obesity. Probing for conditions of disordered eating such binge eating disorder, bulimia, or night-eating syndrome or other psychological conditions that may impair treatment such as attention deficit disorder or posttraumatic stress disorder should be part of a comprehensive obesity history. The occurrence of a major depressive episode, eating disorder, or serious psychological condition should trigger a referral to a mental health provider.

Determining a patient’s readiness for weight loss is an essential part of the initial evaluation. The National Heart, Lung, and Blood Institute’s “Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults” recommends that physicians assess patient motivation and support, stressful life events, psychiatric status, time availability and constraints, and appropriateness of goals and expectations to help establish the likelihood of lifestyle change. It is important to remember that most patients are ambivalent about changing longstanding lifestyle behaviors, fearing that it will be difficult, uncomfortable, or depriving. Motivational interviewing is a particularly useful technique to explore ambivalence and has been shown to modestly enhance weight loss in obese patients. Once a healthcare provider is trained and skilled in motivational interviewing, the technique can be delivered in a time-efficient manner.

**Physical Examination of the Obese Patient**

According to the National Heart, Lung, and Blood Institute “Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults,” the Practical Guide on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults recommends that physicians assess patient motivation and support, stressful life events, psychiatric status, time availability and constraints, and appropriateness of goals and expectations to help establish the likelihood of lifestyle change. It is important to remember that most patients are ambivalent about changing longstanding lifestyle behaviors, fearing that it will be difficult, uncomfortable, or depriving. Motivational interviewing is a particularly useful technique to explore ambivalence and has been shown to modestly enhance weight loss in obese patients. Once a healthcare provider is trained and skilled in motivational interviewing, the technique can be delivered in a time-efficient manner.

**Figure.** Lifestyle events–body weight graph. Patients are asked to mark life events and diet attempts that have contributed to their current weight. This patient has experienced a progressive weight gain that has recently been accelerated by smoking cessation and increased commute to work. Adapted from Kushner et al with permission from the publisher. © 2009 American Dietetic Association.
dual-energy x-ray absorptiometry or air displacement plethysmography exist, they are impractical and too expensive for routine clinical application. The inherent problems with using BMI alone to estimate risk is exemplified by the obesity paradox, the observed inverse correlation between BMI and mortality in patients with existing chronic heart failure, coronary heart disease, and chronic kidney disease. Although reasons for the obesity paradox remain uncertain, proposed confounding factors include the poor sensitivity of BMI to detect excess adiposity versus lean muscle mass, body fat distribution, and the independent contribution of fitness.

In addition to BMI, the risk of overweight and obesity is independently associated with excess abdominal fat and fitness level. Population studies have shown that people with large waist circumferences have elevated obesity-related health risk compared with those with normal waist circumferences and within similar BMI categories. The threshold for excessive abdominal fat appears to vary between racial and ethnic groups. Proposed cut points have been suggested by the International Diabetes Federation (Table 2). Determination of fitness level is another modifier of health risk compared with those with normal waist circumferences and within similar BMI categories. The staging system was recently shown to predict increased all-cause and CVD mortality among 2 large population cohorts. Future studies will need to determine whether the Edmonton Obesity Staging System improves risk stratification over other tools such as the Framingham Risk Score.

### Table 1. Classification of Overweight in Adults According to BMI

<table>
<thead>
<tr>
<th>Classification</th>
<th>BMI, kg/m²</th>
<th>Risk of Comorbidities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td></td>
</tr>
<tr>
<td>Normal range</td>
<td>18.5–24.9</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>≥25.0–29.9</td>
<td>Increased</td>
</tr>
<tr>
<td>Class I obesity</td>
<td>30.0–34.9</td>
<td>High</td>
</tr>
<tr>
<td>Class II obesity</td>
<td>35.0–39.9</td>
<td>Very high</td>
</tr>
<tr>
<td>Class III obesity</td>
<td>≥40.0</td>
<td>Extremely high</td>
</tr>
</tbody>
</table>

BMI indicates body mass index. Adapted from National Institutes of Health and North American Association for the Study of Obesity with permission of the publisher. © 2000 National Institutes of Health.

### Table 2. Ethnic Specific Values for Waist Circumference

<table>
<thead>
<tr>
<th>Country/Ethnic Group</th>
<th>Waist Circumference, cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American</td>
<td></td>
</tr>
<tr>
<td>European</td>
<td>≥102</td>
</tr>
<tr>
<td>South Asian/Chinese</td>
<td>≥90</td>
</tr>
<tr>
<td>Japanese</td>
<td>≥85</td>
</tr>
<tr>
<td>Ethnic South and Central Americans</td>
<td>Use South Asian recommendations</td>
</tr>
<tr>
<td>Sub-Saharan Africans</td>
<td>Use European data</td>
</tr>
<tr>
<td>Eastern Mediterranean and Middle East (Arab) populations</td>
<td>Use European data</td>
</tr>
</tbody>
</table>

Adapted from Alberti et al with permission from the publisher. © 2006 John Wiley and Sons Inc.

**Identifying the High-Risk Obese Patient**

With the high prevalence of obesity and the imprecision of BMI and waist circumference alone to estimate individual risk, identifying which patient to treat is an important clinical decision. Among US adults, 51.3% of overweight adults and 31.7% of obese adults are metabolically healthy, defined as having 0 or 1 cardiometabolic abnormality. Obesity increases the risk for CVD predominantly through its effects on other risk factors. According to a meta-analysis of 21 cohort studies including >300,000 persons, the adverse effects of overweight on blood pressure and cholesterol levels account for ≈45% of the increased risk of coronary heart disease. Conflicting data exist on whether BMI or waist circumference independently contributes to cardiovascular outcomes in addition to the predicted Framingham Risk Score. It is suggested that overweight patients with clinical markers of insulin resistance would benefit most by losing weight. Specific markers include elevated triglyceride concentration, a low high-density lipoprotein cholesterol concentration, a high ratio of triglycerides to high-density lipoprotein cholesterol, or a combination of an enlarged waist and elevated triglyceride concentration.

According to the practical guide, patients at very high absolute risk who trigger the need for intense risk factor modification and management include those with established atherosclerotic diseases, type 2 diabetes mellitus, and sleep apnea. Presence of the metabolic syndrome should also prompt urgent treatment. Obesity is associated with medical conditions, the incidence and prevalence of which vary by BMI class, sex, and age. A direct relationship with increasing BMI categories is particularly observed for diabetes mellitus, hypertension, and dyslipidemia. Unique aspects of the physical examination for patients with obesity have recently been reviewed. No single laboratory test or diagnostic evaluation is indicated for all patients with obesity, although a fasting glucose and lipid profile is consistent with current guidelines. The specific evaluation performed should be based on the presentation of symptoms, risk factors, index of suspicion, and screening guidelines appropriate for the patient.

Although BMI and waist circumference are useful anthropometric markers to identify potential risk, they do not accurately reflect the presence or severity of the health risk. Analogous to other staging systems commonly used for congestive heart failure and chronic kidney disease, Sharma and Kushner recently proposed the use of a new functional staging system for obesity that would complement the current anthropometric classification (Table 3). This risk-stratification construct, called the Edmonton Obesity Staging System, classifies individuals with obesity into 5 graded categories based on their morbidity and health-risk profile. The staging system was recently shown to predict increased mortality among 2 large population cohorts. Future studies will need to determine whether the Edmonton Obesity Staging System improves risk stratification over other tools such as the Framingham Risk Score.
Approaching Obesity as a Chronic Disease

The cause of obesity is multifaceted, brought about by an interaction between predisposing genetic and metabolic factors and a rapidly changing modern environment. There is a strong selection bias in favor of regulatory systems that vigorously defend against deficits in body weight. The regulatory changes with weight loss include significant reductions in levels of leptin and the gastrointestinal hormones peptide YY, cholecystokinin, and amylin and increases in the levels of ghrelin, hormonal changes that are associated with increased hunger and urges to eat. Energy expenditure with weight loss is disproportionately reduced, attributable largely to increased skeletal muscle work efficiency and reduced physical activity. As a result of these underlying adaptive physiological factors and the behavioral challenges of balancing caloric intake and expenditure, weight loss maintenance is difficult. According to self-report data from 14,000 participants in the 1999 to 2006 National Health and Nutrition Examination Survey (NHANES), only 17.3% of adults reported losing 10% of maximum body weight and keeping it off for at least 1 year. For these reasons, obesity should be considered a chronic relapsing disease in which we use multiple modalities of treatment, including lifestyle counseling, pharmacotherapy, and surgery.

Lifestyle Treatment

The foundation of obesity care is assisting the patient in making healthier dietary and physical activity choices that will lead to a net negative energy balance. The initial goal is to achieve a 5% to 10% weight loss over the initial 6 months of treatment. For some patients, weight maintenance may be a reasonable goal. A comprehensive review of lifestyle modification for obesity was previously provided by Wadden et al. It is important to remember that personal choices are heavily influenced by exposure to environmental factors, ie, home and work life, access, affordability, media, and advertising, so all recommendations must have a contextual perspective. Caloric reduction is the most important component in achieving weight loss, whereas increased and sustained physical activity is particularly important in maintaining the lost weight. Weight loss is dependent primarily on reducing total caloric intake, not the proportions of carbohydrate, fat, and protein in the diet. The macronutrient composition (ie, proportion of calories from carbohydrate, fat, and protein) will ultimately be determined by the patient’s taste preferences, cooking style, and culture. However, the patient’s underlying medical problems are also important in guiding the recommended dietary composition. As Table 4 shows, the dietary prescription may vary according to the patient’s metabolic profile and risk factors. A consultation with a registered dietitian for medical nutrition therapy is particularly useful, along with the importance of emphasizing collaborative care and self-management of chronic disease. Incorporating meal replacements into the diet is another useful strategy. Meal replacements are foods designed to take the place of a meal or snack while providing nutrients and good taste within a fixed caloric limit. An alternative dietary strategy is to refer the patient to one of several commercial weight loss programs that have demonstrated weight loss outcomes.

In addition to reducing caloric intake, patients are encouraged to burn more calories. There is a distinction between physical activity and exercise. Whereas physical activity consists of any bodily movement that increases energy expenditure, eg, activities of daily living like walking, climbing stairs, and gardening, exercise is defined as planned, structured, and repetitive bodily movement done to improve or maintain 1 or more components of physical fitness. Weight loss counseling should encourage both entities as part of treatment. Studies have demonstrated that lifestyle activities are as effective as structured exercise programs in

Table 3. Edmonton Obesity Staging System

<table>
<thead>
<tr>
<th>Stage</th>
<th>Obesity-Related Risk Factors</th>
<th>Physical Symptoms, Psychopathology, Functional Limitations, and Impairment of Well-being</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None (blood pressure, serum lipids, fasting glucose, etc)</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Subclinical (borderline hypertension, impaired fasting glucose, elevated liver enzymes, etc)</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Established (hypertension, type 2 diabetes mellitus, sleep apnea, osteoarthritis, reflux disease, polycystic ovary syndrome, anxiety disorder, etc)</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Established end-organ damage (myocardial infarction, heart failure, diabetic complications, incapacitating osteoarthritis, etc)</td>
<td>Significant</td>
</tr>
<tr>
<td>4</td>
<td>Severe disabilities (potentially end-stage disabilities, etc)</td>
<td>Severe</td>
</tr>
</tbody>
</table>

Adapted from Sharma and Kushner with permission from the publisher. © 2009 Nature Publishing Group.

Table 4. Dietary Recommendations for Overweight or Obese Patients With Components of the Metabolic Syndrome

<table>
<thead>
<tr>
<th>Metabolic Syndrome Component</th>
<th>Dietary Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased waist circumference (population and country specific)</td>
<td>Caloric reduction</td>
</tr>
<tr>
<td>Elevated blood pressure</td>
<td>DASH diet</td>
</tr>
<tr>
<td>Systolic ≥ 130 mm Hg and/or diastolic ≤ 85 mm Hg</td>
<td>Carbohydrate controlled diet</td>
</tr>
<tr>
<td>Elevated fasting glucose</td>
<td>Mediterranean diet or TLC</td>
</tr>
<tr>
<td>≥ 5.5 mmol/L (100 mg/dL)</td>
<td>Mediterranean diet or TLC</td>
</tr>
<tr>
<td>Elevated triglycerides</td>
<td>Mediterranean diet or TLC</td>
</tr>
<tr>
<td>≥ 1.7 mmol/L (150 mg/dL)</td>
<td>Mediterranean diet or TLC</td>
</tr>
<tr>
<td>Lower high-density lipoprotein cholesterol</td>
<td>Mediterranean diet or TLC</td>
</tr>
<tr>
<td>&lt; 1.0 mmol/L (40 mg/dL) in men</td>
<td></td>
</tr>
<tr>
<td>&lt; 1.3 mmol/L (50 mg/dL) in women</td>
<td></td>
</tr>
</tbody>
</table>

DASH indicates Dietary Approaches to Stop Hypertension; TLC, Therapeutic Lifestyle Change. All diets are energy reduced by 500 to 1000 kcal/d and should be accompanied by exercise to maximize metabolic benefit.
improving cardiorespiratory fitness and weight loss.91 The most useful strategy in achieving lifestyle goals is to include self-monitoring. Patients are asked to track their food intake, physical activity, and weight throughout treatment.92 The benefits of tracking include having real-time data on dietary intake as it relates to caloric and other nutritional goals, allowing reflection and planning of diet, introducing restraint, and providing information to share with the provider. Similar benefits are achieved by tracking physical activity by recording time or steps. Finally, it is important to remember that lifestyle management is 1 component of a comprehensive approach to the patient with obesity and cardiovascular disease. Control of glucose, blood pressure, and lipid levels, along with secondary prevention of recurrent events, is optimized with the use of concurrent medication management.93

### Pharmacotherapy

According to current Food and Drug Administration guidance, pharmacotherapy is approved for patients with a BMI ≥30 kg/m² or ≥27 kg/m² when complicated by an obesity comorbidity (Table 5). Although sound in principle, few agents are currently approved for treatment of obesity. They fall into 2 major categories: appetite suppressants or anorexiant and gastrointestinal fat blockers. The 2 most commonly used sympathomimetic amines are phentermine and diethylpropion, both labeled schedule IV drugs by the Drug Enforcement Agency. A full discussion of pharmacological treatment for obesity was previously provided by Bray and Ryan.94 Three medications were submitted to the Food and Drug Administration for a new drug application.95–97 However, at the time of this writing, none of the medications has been approved. A concern about two of these medications, phentermine/topiramate extended release (Qnexa; Vivus, Inc, Mountain View, CA) and naltrexone/bupropion (Contrave; Orexigen, La Jolla, CA), is the potential cardiovascular risk from the slight increase in pulse rate.98 Regardless of whether new antiobesity agents are available, it is important to avoid or minimize weight-gaining medications when possible.99

### Bariatric Surgery

According to the 1991 NIH Consensus Development Conference Panel on bariatric surgery,100 patients with a BMI ≥40 kg/m² or those with a BMI ≥35 kg/m² who have associated high-risk comorbid conditions such as cardiopulmonary disease or type 2 diabetes mellitus could be considered surgical candidates (Table 5). Consequently, Medicare and other third-party insurance payers have followed these criteria for reimbursement qualifications. The bariatric laparoscopic adjustable gastric banding surgical procedures were previously reviewed by Dixon et al.101 Compared with standard care, differences in BMI levels from baseline to year 1 are −2.4 kg.m² for laparoscopic adjustable gastric band, −10.1 kg/m² for laparoscopic gastric sleeve, −9.0 kg.m² for Roux-en-Y gastric bypass, and −11.3 kg.m² for biliopancreatic diversion.102 Significant improvement in multiple obesity-related comorbid conditions, including type 2 diabetes mellitus, hypertension, dyslipidemia, obstructive sleep apnea, and quality of life, has been reported.103 A recent meta-analysis of controlled clinical trials comparing bariatric surgery and no surgery showed that surgery was associated with a reduced odds ratio risk of global mortality (odds ratio, 0.55), cardiovascular mortality (odds ratio, 0.58), and all-cause mortality (odds ratio, 0.70).104

The decision to recommend bariatric surgery is dependent primarily on the patient’s BMI and the presence of comorbid conditions that are likely to be responsive to weight loss. Other patient-related factors such as psychosocial health, adherence, expectations, and past weight loss attempts are taken into consideration. There is not enough predictive information available to differentially select 1 procedure over another for an individual patient. However, restrictive-malabsorptive procedures appear to result in greater weight loss and improvement in comorbid conditions than restrictive procedures. Furthermore, the surgeon’s experience and risk-to-benefit ratio are considered. Contraindications include an extremely high operative risk, active substance abuse, or a major unstable or uncontrolled psychopathological condition such as major depressive disorder, schizophrenia, or bulimia.

All patients who are considering weight loss surgery should undergo a comprehensive assessment by a multidisciplinary team of healthcare providers that includes a physician, registered dietitian, and mental health professional.59 During the preoperative process, patients are typically instructed on healthy eating and physical activity patterns, behavioral strategies to implement the lifestyle changes, and the importance of stress reduction and social support for

### Table 5. A Guide to Selecting Treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>BMI Category</th>
<th>With comorbidities</th>
<th>With comorbidities</th>
<th>With comorbidities</th>
<th>With comorbidities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet, exercise, behavior therapy</td>
<td>25–26.9 kg/m²</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>27–29.9 kg/m²</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>30–34.9 kg/m²</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>≥35 kg/m²</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Prevention of weight gain with lifestyle therapy is indicated in any patient with a body mass index (BMI) >25 kg/m², even without comorbidities, whereas weight loss is not necessarily recommended for those with a BMI of 25 to 29.9 kg/m² or a high waist circumference unless they have 2 or more comorbidities. Combined intervention made up of a low-calorie diet, increased physical activity, and behavior therapy provides the most successful therapy for weight loss and weight maintenance. Adapted from National Institutes of Health and North American Association for the Study of Obesity90 with permission from the publisher. © 2000 National Institutes of Health.
long-term success. Evidence-based recommendations for best practice patient care have recently been published.\textsuperscript{59,105}

**Conclusions**

Obesity is a serious and highly prevalent disease associated with increased morbidity and mortality. Healthcare providers must take an active role in the identification, evaluation, and treatment of high-risk individuals. Broaching the topic of weight and conducting an obesity-focused history need to be incorporated by all physicians. All patients should be provided lifestyle therapy with consideration for pharmacotherapy and bariatric surgery when indicated. Primary treatment should be directed at preventing further weight gain for overweight patients and achieving a modest 10% weight loss for obese patients.

**Disclosures**

Dr Kushner has served on the medical advisory boards for Vivus, Amylin, Orexigen, GI Dynamics, Novo Nordisk, Zafgen, and Retronet.

He sits on the Board of Directors for the Obesity Action Coalition.

**References**


Key Words: diet ■ life style ■ obesity ■ primary health care ■ therapy
Clinical Assessment and Management of Adult Obesity
Robert F. Kushner

Circulation. 2012;126:2870-2877
doi: 10.1161/CIRCULATIONAHA.111.075424

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2012 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/126/24/2870

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org//subscriptions/