Outcomes and Complications After Bariatric Surgery

Five of the most common procedures and nursing implications for pre- and postoperative care.

OVERVIEW: Bariatric surgery is an effective and increasingly common treatment for obesity and obesity-related comorbidities. There are currently two major categories of such surgery, grouped according to the predominant mechanism of action: restrictive procedures, such as vertical banded gastroplasty and adjustable gastric banding; and malabsorptive procedures with a restrictive component, such as Roux-en-Y gastric bypass, vertical sleeve gastrectomy, and biliopancreatic diversion with duodenal switch. In general, the more complex the procedure, the better the results in terms of weight loss; but there’s evidence that more complex procedures also have higher morbidity and mortality rates. This article outlines five of the most common procedures, discusses the outcomes and complications of bariatric surgery, and describes the nursing implications for pre- and postoperative patient care.

Keywords: bariatric surgery, obesity, weight loss surgery, weight reduction

If you haven’t already cared for a patient who has undergone bariatric surgery, it’s likely that at some point in your nursing career, you will. Obesity has been shown to adversely affect all body systems—and prevalence rates for obesity and overweight stand at record highs in this country. Recent data from the National Health and Nutrition Examination Survey yield an estimated prevalence for obesity of 39%, while that for overweight and obesity combined is 68%.1 (For precise definitions of obesity and overweight, see Terms Defined.2) People who are obese are at greater risk for numerous illnesses, including type 2 diabetes, hypertension, coronary heart disease, stroke, osteoarthritis, cholelithiasis, sleep apnea, and certain types of cancers, among others.3, 4 Obesity may also have
psychological and psychosocial consequences. For example, people who are obese often experience prejudice, discrimination, and psychological abuse from coworkers, family members, friends, and strangers, making it harder for them to maintain personal relationships.\textsuperscript{5, 6} They are also at higher risk for anxiety and depression.\textsuperscript{7-9}

Probably for all of these reasons and more, bariatric surgery is becoming increasingly popular. In 1998, an estimated 13,365 bariatric procedures were performed in the United States; by 2007, that number had increased to approximately 200,000.\textsuperscript{10} The American College of Physicians recommends that surgical intervention be considered for patients with a body mass index (BMI) of 40 kg/m\textsuperscript{2} or greater who have had previous unsuccessful attempts at weight loss and have obesity-related comorbidities.\textsuperscript{11} Furthermore, the American Diabetes Association recommends that patients with a BMI of 35 kg/m\textsuperscript{2} or greater and type 2 diabetes also be considered for bariatric surgery, especially if the diabetes has not been well controlled with lifestyle changes and pharmacotherapy.\textsuperscript{12} This article outlines five of the most common procedures, discusses the outcomes and complications of bariatric surgery, and describes the nursing implications for pre- and postoperative patient care.

Candidates for surgery. Many people who opt for bariatric surgery have already tried numerous other weight loss strategies, without success. When diet, exercise, psychotherapy, and pharmacotherapy have failed, bariatric surgery has been shown to be an effective treatment for obesity and obesity-related comorbidities.\textsuperscript{13-18} A majority of patients seeking bariatric surgery are female (83%), white (60%), and have private insurance (78%).\textsuperscript{19} In one large study, the average age of patients was 42, but adolescents and older adults also undergo bariatric surgical procedures.\textsuperscript{20} While elective surgery is generally contraindicated for older patients because of their higher risk of complications, bariatric surgery has been shown to be safe for many patients over the age of 60.\textsuperscript{21, 22}

Bariatric surgery may be contraindicated for people who have extremely high operative risk factors such as severe congestive heart failure or unstable angina. Patients who are unable to understand the surgical risks and postoperative maintenance requirements, those who are active substance abusers, those with significant psychopathology (such as psychosis), and those with under- or untreated depression also may not be candidates.\textsuperscript{23}

**TYPES OF BARIATRIC SURGERY**

There are currently two major categories of bariatric surgery, grouped according to the predominant mechanism of action: restrictive procedures, such as vertical banded gastroplasty (VBG) and adjustable gastric banding (AGB); and malabsorptive procedures with a restrictive component, such as Roux-en-Y gastric bypass (RYGB), vertical sleeve gastrectomy (VSG), and biliopancreatic diversion with duodenal switch (BPD-DS). It’s also not uncommon for a surgeon to use a combination of both restrictive and malabsorptive procedures. In general, the more complex the procedure, the better the results in terms of weight loss; but there’s evidence that more
Vertical sleeve gastrectomy. VSG (often simply called sleeve gastrectomy) was originally used as the first step in the BPD-DS procedure, but it’s beginning to be used as a stand-alone procedure for bariatric surgery in high-risk patients with severe obesity (BMI of 50 kg/m² or greater). The surgery, which is irreversible, involves removal of 80% to 90% of the stomach, leaving only a gastric “sleeve.” The surgery both restricts intake and slows digestion and absorption. Usually performed laparoscopically, this procedure has lower risks of mortality and of major complications compared with RYGB and BPD-DS, although long-term outcomes need further evaluation. Moreover, VSG has been shown to significantly improve or resolve hypertension and diabetes.

Biliopancreatic diversion with duodenal switch. BPD-DS is usually considered for patients with severe obesity. The surgery, which is irreversible, is a variation on biliopancreatic diversion (the original surgery is now rarely performed). BPD-DS involves removing 65% to 70% of the stomach, leaving the pyloric valve intact. The remaining portion of the stomach is then connected to the proximal portion of the ileum. The surgery both restricts intake and slows digestion and absorption, as digestive enzymes cannot mix with food until it reaches the distal ileum. BPD-DS has demonstrated substantial reductions in excess body weight and in the severity of associated comorbidities. One study by Iaconelli and colleagues showed a 100% remission rate for type 2 diabetes within one year of surgery. The authors also found significant reductions in hypertension, hyperlipidemia, and cardiovascular disease.
Adjustable gastric banding is the second most common bariatric procedure performed in the United States.\textsuperscript{19, 25} The procedure, which is restrictive and reversible, was initially developed in the 1980s as an alternative to major surgery.\textsuperscript{36} A laparoscopic AGB device (the Lap-Band) first won U.S. Food and Drug Administration (FDA) approval in 2001, and since then its use has increased dramatically; indeed, one source notes that between 2004 and 2007, its use increased from 7\% to 23\%.\textsuperscript{14} With a second AGB device (the REALIZE band) receiving FDA approval in 2007, and with AGB considered to be “the safest of the currently available surgical options,” further increases are expected.\textsuperscript{14}

The procedure involves placing an adjustable silicone band around an upper portion of the stomach to form a small pouch, leaving a small stoma to the larger, lower portion of the stomach. Food passes first into the small pouch, where it begins digestion. The digested food then moves through the small stoma into the lower stomach portion and on through the remainder of the gastrointestinal tract. Food intake is restricted by the small pouch capacity; and because of the small stoma size, emptying of food into the lower stomach portion is also delayed. During surgery the band is also connected through tubing to a port placed under the patient’s skin. The tightness of the band can then be adjusted, depending on the patient’s tolerance, by instilling or removing fluid through the port. Adjustments are usually made by the physician on an outpatient basis. Both the band and port are usually placed laparoscopically. The procedure can be done in an ambulatory surgical setting, and patients generally go home within a few hours of surgery.\textsuperscript{37}

The FDA has approved the use of adjustable gastric bands for obese adults ages 18 and older, and is reportedly considering approval for adolescents as young as 14.\textsuperscript{38} Studies have found the associated mortality rate to be between 0\% and 0.1\%,\textsuperscript{14, 39} making it the safest of the available procedures.\textsuperscript{14} AGB is a good option for obese patients who need bariatric surgery and want to avoid permanent rerouting of the gastrointestinal tract.\textsuperscript{39}

Vertical banded gastroplasty. VBG, sometimes called “stomach stapling,” was developed in 1982; it’s a restrictive and reversible procedure. The surgeon first cuts a small hole into the stomach a few inches below the esophagus. Then the surgeon places a line of staples from the hole toward the esophagus to section off a small portion of the upper stomach, creating a small pouch. This pouch is then anchored distally by a prosthetic band. The band slows digestion by allowing smaller-than-normal amounts of food through to the remainder of the gastrointestinal tract. Both the reduced stomach capacity and the delayed emptying give the patient a feeling of early satiety. Rates of mortality and major complications are low.\textsuperscript{40}
complex procedures also have higher morbidity and mortality rates.\textsuperscript{24}

**OUTCOMES**

**Weight loss.** The overall success of a patient’s bariatric surgery and the rate and amount of weight lost post-operatively vary based on the patient and the type of surgery performed. One study defined success as a loss of more than 50\% of excess body weight and failure as a loss of less than 30\% of excess body weight at one year after surgery.\textsuperscript{24}

Patients who have undergone BPD-DS have lost an average of 80\% of their excess body weight at two years after surgery, and an average of 70\% at eight years out.\textsuperscript{24} Patients who have undergone VSG have lost from 59\% to 68\% of their excess body weight at 18 months to two years after surgery, respectively.\textsuperscript{28, 42} Patients who have undergone VBG have lost from 50\% to 57\% of their excess body weight at one to five years after surgery.\textsuperscript{40} But it’s important to note that up to 15\% of patients have eventually required revision of their surgery to RYGB or BPD-DS due to weight regain and vomiting.\textsuperscript{24} Patients who have undergone RYGB have lost from 60\% to 76\% of their excess body weight at one or more years after surgery.\textsuperscript{15, 43} Patients who have undergone AGB have lost from 50\% to 82\% of their excess body weight at one or more years after surgery.\textsuperscript{14, 44}

**Type 2 diabetes.** One of the most encouraging outcomes of bariatric surgery is the reduced severity and even the elimination of type 2 diabetes.\textsuperscript{15, 24} Overall, remission has been seen in 50\% to 85\% of all patients who have undergone bariatric surgery, although remission is “less likely” in older patients and in those who have had type 2 diabetes for a longer period of time.\textsuperscript{12} One study by Wool and colleagues even reported remission rates of 87\% to 90\%.\textsuperscript{22} Remission rates have been highest in patients who underwent either biliopancreatic diversion or BPD-DS, followed by RYGB, then laparoscopic AGB and VBG.\textsuperscript{15} Studies have found that 72\% to 81\% of patients with type 2 diabetes have been able to stop using diabetes medications at one year follow-up.\textsuperscript{15, 16}

**Sleep apnea, asthma, and other respiratory problems** are frequently seen in people who are obese.\textsuperscript{45, 46} The loss of abdominal and intrathoracic fat reduces restriction of the lower airway, while the loss of excess fat around the neck reduces obstruction of the upper airway, thus enhancing breathing.\textsuperscript{47} Several studies have shown that bariatric surgery increases pulmonary functioning and decreases the severity of asthma and sleep apnea.\textsuperscript{46, 47} Indeed, one study found that, of 29 obese patients with sleep apnea who used continuous positive airway pressure therapy preoperatively, only four required it at two years after bariatric surgery.\textsuperscript{10}

**Cardiovascular disease.** Multiple studies have shown an increased risk of coronary heart disease in patients who are obese. The Nurses’ Health Study found that the relative risk of coronary heart disease was 3.6 times greater for women with a BMI above 29 kg/m\textsuperscript{2}.\textsuperscript{12} Similarly, the Framingham Heart Study found that obesity was an important long-term predictor of cardiovascular disease.\textsuperscript{13} The incidence of coronary heart disease in men younger than 50 years was doubled in the heaviest group; among women younger than 50 years, the incidence was 2.4 times greater in the heaviest group.

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Related conditions such as hypertension and hyperlipidemia have been shown to improve in patients who undergo bariatric surgery.\textsuperscript{17, 18} In one study of people with severe obesity, 86\% of patients with hyperlipidemia and 81\% of those with hypertension no longer required medications for these conditions at 12 months after bariatric surgery.\textsuperscript{15}

**Musculoskeletal problems** are common in people with obesity. Some candidates for bariatric surgery will have already undergone surgery to repair or replace weight-bearing joints. Weight loss reduces the strain on the body’s muscles and weight-bearing joints, thus easing joint and muscle pain. Weight loss resulting from bariatric surgery has also been shown to improve the severity of lower back pain and to improve overall functionality.\textsuperscript{16}

**COMPLICATIONS**

Bariatric surgery, like other surgeries, carries some risk of complications. A study by Cawley and colleagues found that preexisting obesity-related comorbidities were significantly associated with the likelihood of developing certain complications after bariatric surgery.\textsuperscript{54} The two comorbidities most predictive of postoperative complications were sleep apnea and gastroesophageal reflux disease; others included diabetes, hyperlipidemia, and hypertension.

‘Dumping’ syndrome, a common complication, refers to a group of symptoms that can occur when calorically dense carbohydrates are ingested and
when the stomach “rapidly and without regulation empties its contents into the small intestine.” Symptoms, which can arise 15 minutes to two hours after eating and generally last about 30 minutes, may include tachycardia, dizziness, sweating, nausea, vomiting, bloating, abdominal cramping, and diarrhea. Patients should be instructed which foods to avoid in order to avoid this complication. Dumping syndrome occurs more often with RYGB than with BPD-DS, probably because the latter procedure preserves more of the stomach, including the pyloric valve. Patients who undergo laparoscopic RYGB, and patients who have preexisting hyperlipidemia or gastroesophageal reflux disease appear to be at especially high risk for dumping syndrome.

**Cholelithiasis.** The development of gallstones is a complication related to postoperative weight loss rather than the surgery itself. However, since cholelithiasis occurs in about one-third of patients who undergo bariatric surgery, it deserves mention. Both obesity and rapid weight loss increase a patient’s propensity to develop gallstones, especially among women. Studies indicate that 22% to 45% of patients who undergo bariatric surgery will develop gallstones within the first few months after surgery. In earlier years, it wasn’t uncommon for a prophylactic cholecystectomy to be performed along with bariatric surgery; with the advent of laparoscopic bariatric surgery, this is no longer recommended. Moreover, studies have also shown that in many cases the gallstones resolve on their own; the off-label, prophylactic administration of ursodiol has also been shown to help prevent gallstone formation.

**Pulmonary embolism and deep vein thrombosis.** Patients who undergo bariatric surgery are at higher risk for deep vein thrombosis and pulmonary embolism. As a result, physicians often recommend early and frequent ambulation following surgery. Some physicians may order the administration of low-molecular-weight or low-dose heparin after surgery. For patients who are at very high risk for pulmonary embolism, deep vein thrombosis, or stroke, some physicians may opt to place a temporary inferior vena cava filter. Compression stockings and pneumatic sequential compression devices are also frequently ordered for deep vein thrombosis prophylaxis.

**Anastomotic leak.** Postoperative leaking at the anastomotic sites in RYGB, BPD-DS, and VSG is a serious complication that can be life threatening. Anastomotic leak has been reported in 0.12% to 20% of patients undergoing open or laparoscopic RYGB. The signs and symptoms of anastomotic leak can be subtle or absent; they include abdominal pain, nausea and vomiting, tachycardia, fever, hypotension, and oliguria. Some physicians may order a swallowing study to evaluate for leaks on postoperative day 1 or 2. Snyder and colleagues have reported that robotic-assisted RYGB resulted in fewer anastomotic leaks and other major complications, compared with laparoscopic RYGB; hospital stays were also shortened.

**Death.** Although bariatric surgery is generally safe, there is always a risk of death. Overall, death occurs in 0.15% to 0.64% of patients who undergo bariatric surgery. Mortality rates vary somewhat by surgery type. For patients who undergo VBG, it’s approximately 1.6%. Among patients who have undergone either traditional biliopancreatic diversion or BPD-DS, the mortality rate is approximately 1.2%. Frezza and colleagues have noted that VSG has a mortality rate of 0.5%. The mortality rate for the adjustable gastric band is approximately 0% to 0.1%. A meta-analysis found that, among patients undergoing RYGB, mortality rates were 0.44% and 0.16% for open and laparoscopic procedures, respectively.

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The top three causes of death in people who undergo bariatric surgery are pulmonary embolism (15% to 32%), cardiac complications or arrest (13% to 18%), and sepsis (18%). Other causes of death can include anastomotic leak (15%), gastrointestinal bleeding or hemorrhage (8%), bypass obstruction (5%), and small bowel obstruction (3%).

**Complications unique to AGB.** Although this procedure presents with far fewer risks than other bariatric procedures, unique complications can occur. Among the most common are port disconnections or rupture, port displacement, and stomach slippage with pouch dilatation; others include band rupture,
band erosion, port blockage, port infection, and tubing-related malfunctions. Studies have found that 12% to 20% of patients require additional surgery within one to 12 years after AGB. In the event of minor complications, the band can be deflated or removed if necessary. If major complications arise, further surgery may be required.

NURSING IMPLICATIONS

Preoperative evaluation and patient teaching. As before any surgery, the nurse must obtain a thorough history, perform a physical assessment, and obtain baseline vital signs. For patients considering bariatric surgery, comprehensive preoperative evaluation by a psychiatrist or psychologist may also be indicated, or the patient’s insurer may require it. In a consensus statement, the American Society for Bariatric Surgery (now known as the American Society for Metabolic and Bariatric Surgery) noted that such evaluation “is not routinely needed, but should be available if indicated.” The purpose is to help identify psychological factors that might disqualify a patient from or delay surgery, such as untreated depression or a lack of understanding about the risks of surgery and the necessary postoperative regimen.

It’s essential for nurses to be aware of their own attitudes and behaviors regarding obesity and bariatric surgery. Many people who are obese have been the victims of discrimination and abuse. They may feel ashamed or embarrassed that they’ve been unable to lose weight by other means and thus require surgery. Some may have fears about the operation itself or about how life might change afterward; some may worry that even after surgery, they’ll fail to lose weight. Nurses need to be able to support a patient’s decision to have surgery, acknowledge the patient’s fears, and strive to maintain the patient’s dignity.

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Help patients know what to expect. It’s important to explain to patients beforehand what to expect upon awakening from surgery. This will likely include receiving IV fluids and having in place a urinary catheter, pneumatic sequential compression devices, and antiembolism compression stockings. The patient may also have a nasogastric tube, or a wound drain at the incision site. Methods of postoperative pain control should be discussed before surgery. Patients should know that the use of a patient-controlled analgesia pump after surgery is common, and that they may be prescribed additional analgesics as needed for breakthrough pain. Antiemetics may also be prescribed. The importance of early and frequent ambulation in preventing deep vein thrombosis, pulmonary embolism, bowel obstruction, atelectasis, pneumonia, skin breakdown, and even discomfort should be explained.

It’s also important to discuss realistic goals for weight loss with patients prior to surgery. Many patients have unrealistic ideas about what bariatric surgery can do. Some may expect to lose nearly 100% of their excess body weight; indeed, one study found that patients’ average “dream” weight (“a weight you would choose if you could weigh whatever you wanted”) was equivalent to 89% ± 8% of their excess body weight loss—about 40% higher than what most bariatric surgeons consider to be a successful outcome. Another study found that women, whites, and patients with higher preoperative BMIs were more likely to have unrealistic expectations of bariatric surgery. Patients whose expectations are unrealistic are more likely to be nonadherent to the postoperative plan of care, and thus are at higher risk for regaining weight.

Patients must be able to identify healthy behaviors that lead to successful weight loss. For example, one study found that attending postoperative support group meetings, being able to control food urges, being more physically active, and following up with a physician were all significant factors in successful weight loss. Both before and after bariatric surgery, then, patients should be encouraged to participate in support groups and individual counseling for help in learning and implementing relevant coping and lifestyle management techniques.

Lastly, patients should be prepared for certain aesthetic changes. Rapid weight loss following bariatric surgery can result in an excess of stretched skin, which can cause both physical and mental discomfort. Surgical removal of this skin is usually the only option. Such surgery can be risky; in particular, abdominoplasty has a rate of complications as high as 50%. Most insurance companies will not cover surgery to remove excess skin unless the skin causes significant obstruction to movement or frequent infections of the skin folds occur. Patients should be informed that the denial rate for such surgeries is reportedly 40% to 50%. But it’s also worth noting that a majority of patients who undergo abdominoplasty after bariatric surgery report an improved quality of life.
Respiratory function. Patients who undergo bariatric surgery are at risk for postoperative respiratory complications, as intrathoracic and abdominal fat can restrict lung expansion and decrease reserve volumes. Respiratory complications can also occur as a result of anesthesia or the use of opioids for postoperative pain management. Respiratory function should be assessed periodically using pulse oximetry; some patients may require continuous monitoring. Encouraging cough and deep breathing is essential to preventing atelectasis and pneumonia. Some physicians may order the use of incentive spirometry devices, although their therapeutic efficacy is still under scrutiny.89,91

Nutritional deficiencies are common after bariatric surgery, and patients are often prescribed a multivitamin regimen. One study found that, among patients who had undergone RYGB, more than half were deficient in vitamin B₁₂, vitamin D₃, beta carotene, and hemoglobin, and more than one-quarter were deficient in zinc, ferritin, magnesium, and iron.93 Protein deficiency is also common after bariatric surgery.94 Supplemental protein has been shown to help patients reach their daily protein intake goal.94 Patients are kept hydrated with IV solutions. Once patients are cleared by the evaluation, most can begin to take fluids orally, beginning with water, then clear liquids, then full liquids as tolerated. Because intake capacity has been drastically reduced to as little as 15 to 30 mL,2 the nurse should explain the importance of taking small sips in order to reduce nausea and vomiting. Fluids should be sugar free, caffeine free, and noncarbonated. High-protein supplements or shakes may also be prescribed. Once the patient is able to tolerate oral fluids, IV hydration can be discontinued. Strict management of intake and close monitoring of urine output are essential for determining fluid volume status.33 Advancement of the patient’s diet from liquids to solids will vary. Generally, patients consume a liquid diet for a few weeks after surgery and then progress to a low-fat, low-carbohydrate, high-protein diet. Concentrated sweets and carbonated beverages should be avoided.

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Skin care. Because their weight puts excess pressure on boney prominences, patients who are obese are more likely to develop pressure ulcers. Frequent repositioning and ambulation should be encouraged. Special mattresses or inflatable mattress overlays may be used to prevent pressure ulcers. Patients who are obese are also more likely to develop yeast infections under skin folds. These areas must be kept clean and dry; if a patient does develop a yeast infection, antifungal creams may be applied. Careful inspection and care of incisions are critical as well. If the surgeon has placed a drain, monitoring the amount and type of drainage should be done at least once per shift.33 Warmth, redness, pain, and drainage at the incision site can indicate infection and should be reported. Patients should be instructed on how to splint their incisions during coughing and movement in order to prevent dehiscence.33

Abdomen and bowel sounds. Abdominal rigidity or pain, absent bowel sounds, lack of flatus, lack of bowel movements, nausea, or a combination of these can indicate possible bowel obstruction and warrant immediate attention. Postoperative nausea and vomiting must also be managed. For example, vomiting after AGB can cause band slippage, which may require reoperation. Patients are often prescribed antiemetics and proton pump inhibitors after surgery as a preventive measure.66

Blood glucose levels must be monitored closely in patients with diabetes or who are on NPO orders (patients who have bariatric surgery are kept on NPO [not per os, or nothing by mouth] at least on postoperative day 1). Patients with diabetes may be placed on a sliding-scale insulin regimen after surgery for the treatment of hyperglycemia. Hypoglycemia is also common after bariatric surgery. Recognition and treatment of hypoglycemia must be swift. Many physicians will order glucose IV or glucagon IM because patients are typically on NPO orders, and to avoid dumping syndrome, which can occur with oral ingestion of glucose gel or juice.

Nutrition and hydration. After bariatric surgery, patients are kept on NPO pending evaluation with a Gastrografin swallow study or an abdominal X-ray; these tests are performed to rule out anastomotic leak and gastric dilatation or obstruction, usually on
eating slowly and chewing well; avoiding fluids with meals; and avoiding fried foods and foods high in fat or sugar content.85

The postoperative regimen. Several studies have shown that adherence to postoperative recommendations and attendance at follow-up visits and support groups are associated with more successful weight loss after surgery.86-88 Among patients who fail to achieve their weight loss goals, nonadherence to the postoperative plan of care is often a major factor. One study found that frequent snacking, not exercising, and not attending support groups were the most frequently cited areas of nonadherence to postoperative recommendations.89 Another study identified several factors associated with nonadherence, including emotionally triggered eating or “grazing,” impulsivity, binge eating, and having a “primary affective disorder.”94 Similarly, binge eating tendencies, low self esteem, physical inactivity, and a lack of social support have been associated with lower chances of postoperative success in losing or maintaining weight loss.87, 100

Extensive teaching regarding diet, physical activity, and lifestyle is vital in helping patients to make the necessary changes, achieve and maintain weight loss, and adjust to life after surgery. Indications that a patient might be nonadherent to the postoperative plan of care include a history of binge eating, a history of mood or anxiety disorders, missing preoperative appointments, and nonadherence to preoperative recommendations for weight loss and exercise.98, 101 Although it’s ultimately up to each patient to follow her or his plan of care, nurses should address any of these warning signs and discuss possible solutions with the patient.

Discharge teaching should include verbal and written instructions about the dietary progression; the medication regimen; incision care; signs and symptoms that must be reported to the physician; follow-up appointments (including those with the patient’s surgeon, primary care provider, and nutrition counselor); contact information for postoperative support groups; and any restrictions on driving and other activities. The nurse should ensure that the patient understands the importance of periodic assessment for nutritional deficits. One study found that, during the first postoperative year, some patients demonstrated an inadequate intake of nutrients such as protein, calcium, and iron.102 The value of regular physical activity and participation in support groups should also be reiterated.▼

Lauren E. Gagnon is a nurse on the cardiovascular surgical unit at Catholic Medical Center in Manchester, NH, where Emily J. Karwacki Sheff is the nursing practice and standards coordinator. Karwacki Sheff is also a clinical instructor in the School of Nursing at MGH Institute of Health Professions in Boston. Contact author: Emily J. Karwacki Sheff, esheff@cmc-nh.org. The authors have disclosed no potential conflicts of interest, financial or otherwise.

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