Providing Quality Skin and Wound Care for the Bariatric Patient: An Overview of Clinical Challenges

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Abstract
Obesity, (defined as body mass index [BMI] ≥30), and especially morbid obesity (defined as BMI ≥40), has a profound impact on the health and integrity of the patient’s integumentary system and on the caregivers who strive to provide care for larger, heavy patients. The purpose of this overview is to address some common skin and wound care issues faced by bariatric patients in order to inform clinicians, patients, and caregivers and enable them to optimize care. For bariatric patients, extra attention must be paid to skin care, cleanliness, skin fold management, perigenital care, odor management, and effective pressure redistribution. Despite these interventions, the multifactorial challenges presented by morbid obesity increase patient risk for serious skin diseases and wound conditions. Implications for practice include how best to educate patients and caregivers for optimal problem prevention. Future research should target improving bariatric care equipment and decreasing risk indices.

Keywords: bariatric, morbid obesity, skin, wound

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Obesity is a chronic disease state that affects people across the planet. Worldwide obesity has nearly doubled since 1980; 35% of the world’s adults older than 20 years are overweight, 11% are obese, and 65% of the world’s population lives in nations where overweight and obesity kill more people than underweight. The repercussions of this pandemic of abnormal or excessive fat for the global healthcare system are substantial and intensifying.

Epidemiology
In the United States, the preponderance of obesity and morbid obesity is serious and costly. More than one third (37.5%) of US adults are obese; the southern states have the highest prevalence (approximately 35%). Obesity is a complex disease involving metabolic, environmental, social, behavioral, and psychological factors. Because obesity, and particularly morbid obesity, increase the risk for serious health conditions such as hypertension, type 2 diabetes, coronary heart disease, and abnormal lipid concentrations, the number of patients entering the health system across settings (acute care to home care to outpatient clinics) will continue to rise. Notably, one third of critical care patients are obese or morbidly obese.

Body mass index (BMI) is a measure of weight for height used to define or classify obesity and overweight in adults. It is calculated as weight in kilograms divided by height in meters squared. More commonly, a BMI reference chart is used. The World Health Organization definition of normal weight is BMI under 25, ≥25 to 29 is overweight, ≥30 is obesity. Morbid obesity (sometimes called severe obesity) is defined as a BMI ≥40. Severe obesity also can be defined as ≥35 if comorbidities exist. Between 30 and 40 are several subclasses of obesity. Exact figures for morbid obesity rates are difficult to elucidate, but a state review in New Hampshire found a prevalence of 2.5% in 2007.

The economic costs of obesity are sobering. Treating obesity and morbid obesity and their complications in the US costs approximately $100 billion yearly. What may not be as evident is the cost of obesity on patients and their caregivers as they strive to promote optimal personal care and quality of life.

The purpose of this overview is to address some common skin and wound care issues faced by bariatric patients in order to inform clinicians, patients, and caregivers to enable them to optimize care.

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Risk Factors/Complications of Obesity/ Morbid Obesity

**Bariatric** is a word derived from the Greek word *baros*, which means weight. A bariatric patient is of greater size, usually with a BMI >30. Morbid obesity is a multifactorial disease of metabolism that is lifelong, progressive, degenerative, and life-threatening. It is genetically related.\(^3,9\) Morbid obesity is considered a metabolic disease because adipose (fat) tissue secretes hormones. These fat hormones increase insulin resistance, hyperlipidemia, inflammation, hypertension, and thrombosis.\(^7,9,10\)

The fundamental cause of obesity and morbid obesity is an imbalance between calories consumed and calories expended. This imbalance can be exacerbated by risk factors, such as a sedentary lifestyle; consumption of energy dense, high-fat food; family or personal history of diabetes (especially if disease is poorly controlled); psychological problems; and family history of obesity. Prolonged immobility with excess caloric intake can increase body weight substantially. Certain endocrine disorders such as type 2 diabetes mellitus, polycystic ovarian syndrome, and metabolic syndrome can be associated with substantial weight gain.\(^6,10\) Persons with eating disorders may develop obesity and morbid obesity.\(^11\) Ethnicity plays a role, probably a mix of genetics and lifestyle. Minority American women are particularly affected; more than 50% of non-Hispanic black and Mexican-American women are obese.\(^4\)

**Comorbidities Associated with Obesity**

Obesity and morbid obesity are associated with substantial complications. Obesity has been linked with hypertension, ischemic heart disease, type 2 diabetes, stroke, osteoarthritis, and chronic renal failure. Other disorders include obstructive sleep apnea, restrictive lung disease, chronic low back pain, lymphedema, venous insufficiency, immobility, depression, metabolic syndrome, ovarian cancer, breast cancer, irritable bowel syndrome, nonalcoholic fatty liver disease, gastroesophageal reflux disease (GERD), colon cancer, disorders of the gall bladder, and esophageal cancer.\(^12-15\)

Obese patients who undergo any form of major surgery have substantial postoperative complication risks. Complications can include greater-than-average risk of sepsis, skin ulcers, wound infection and dehiscence, and venous thromboembolic disorders.\(^16-18\)

The critically ill obese patient is at special risk for complications. Critical care patients who are obese are at a much higher risk for systemic inflammatory response syndrome (SIRS) leading to multi-organ dysfunction syndrome (MODS). The hypotension, hypoxia, and hypoperfusion of MODS substantially increase the risk for skin breakdown and wound deterioration.\(^4\)

Wound healing can be impaired by obesity. Wagner et al\(^19\) studied the progenitor cell levels in peripheral blood samples of 25 obese and 17 non-obese persons. They used a similar testing process for 15 obese and 15 non-obese mice, along with creating 6-mm stented wounds. Progenitor cells that are critical for effective wound healing were impaired in human obese participants and mice. For humans, decreased new blood cell formation was associated with obesity. For mice, wound healing also was impaired at days 14 and 21 (\(P<0.001\)). The researchers suggested impaired vasculogenic progenitor cell function and number are associated with impaired obese wound closure in humans.

A recent study by Baldwin et al\(^20\) examined the impact of morbid obesity on lower-extremity, long-bone fracture healing and postoperative complications. The authors retrospectively analyzed data from the National Trauma Data Bank. Out of a possible sample of more than 12,000 patients with traumatic fractures, researchers identified 206 morbidly obese persons with femoral or tibial fractures. Although mortality or complications was not greater in inpatient morbidly obese patients, length of stay and need for prolonged subacute care to prevent complications were significantly higher (\(P=0.003\)).

**Obesity and the Skin**

As the body’s largest organ, the skin has multiple functions, including communication medium, environmental barrier, sensory organ, thermoregulatory system, and elimination agent. Given its complex structure and barrier function, loss of skin integrity can be quite serious, possibly resulting in infection, pain, damaged self-esteem, body odor, and altered mobility. Skin injuries among obese and morbidly obese individuals can pose serious to life-threatening clinical care situations.

Several factors predispose bariatric patients to loss of skin integrity. Adipose tissue has relatively less blood supply, leading to inadequate oxygenation. Excessive sweating increases skin moisture and consequently increases risk for bacterial/fungal invasion, especially within deep skin folds.\(^21\) Immobility, friction, and shear due to the substantial weight stress the skin’s barrier function. Another issue is nutrition. Although it may seem contradictory because of physical appearance, obese and morbidly obese persons can be markedly malnourished. Poor nutrition can lead to inadequate protein, vitamins, and nutrients essential to wound repair.

Key Points

- Morbid obesity and frequently associated comorbidities increase the risk for impaired skin integrity and slow-to-heal wounds.
- To help increase awareness and optimize care, the author reviews these risk factors and methods to help prevent skin and wound problems.
Iatrogenic damage due to tubes, catheters, and other intervention can affect the skin.5,6,21

In addition, stretch marks (striae) are common and reflect the tension on the skin from expanding subcutaneous fat deposits. In obese women, hirsutism may result from increased production of testosterone associated with visceral obesity. Acrochordons (skin tags) are common in obesity.6,21 These changes in skin physiology due to greater skin-weight ratio and reduced adipose vascularity can result in poor wound healing and risk for skin breakdown.22

Specific skin/wound issues. The healthcare literature has focused much recent attention on care of obese patients due to their increasing prevalence and the serious integumentary conditions that can occur, including skin infections (ranging from mild fungal infections to cellulitis to Fournier’s gangrene, intertrigo, and erythrasma), atypical pressure ulcers (found in skin folds as opposed to over bony prominences), perigential irritant dermatitis due to urinary and/or fecal incontinence, diabetic foot ulcers (DFUs), venous insufficiency with possible ulceration, lymphedema, acanthosis nigricans, abdominal elephantiasis, and surgical site infections (SSI, possible dehiscence and evisceration).3,4,9,11,15,16,23-31

Because of their body habitus and comorbidities, bariatric patients are at risk for multiple skin disorders and delayed wound healing. Some processes are more benign; some (eg, Fournier’s gangrene) are deadly if not treated swiftly and appropriately.

Bariatric Skin Disorders

Pressure ulcers. An obvious risk because of weight is the development of pressure ulcers. If the bariatric patient becomes immobilized for a length of time, the risk for deep tissue injury and pressure ulceration rises. The risk is present particularly over bony prominences such as the sacrum and heels.4,23,32,33

What may not be as evident is the development of atypical pressure ulcers located deep within skin folds that create pressure on each other.12,25 Although the area below a large pannus (which in some patients can weigh hundreds of pounds) is an obvious place to assess, atypical pressure ulcers can occur anywhere on the body, including the neck, upper back, upper medial thigh, flanks, and posterior legs/ankles. Relief of pressure is the ultimate intervention. Poorly sized beds can exacerbate poor positioning and promote curvaceous skin fold assessment.15 This can mean moving all lines, catheters, tubes, and fat deposition areas (eg, pannus) every 2 hours. Addressing other contributing factors such as friction, shear, moisture, and poor nutrition is also important. Notably, no pressure ulcer risk assessment scales have been validated for the obese.15

Irritant dermatitis. Perigential irritant dermatitis due to urinary and/or fecal incontinence is another common problem. Good general and perigential hygiene is essential to skin health. Despite the best of intentions, bariatric patients may not be able to toilet effectively. Large skin folds or large hip tissue (sometimes called saddle bags) may impede access for self-care. A Grade 3 to Grade 5 pannus (in a five-grade system in which a higher number indicates how far down the pannus apron sag/covering the mid thigh to the knee and beyond compounds the challenge. Once skin irritation has occurred, a need exists for cleansing and ongoing protection. If the environment is not set up for bariatric clientele, the patient may be unable to cleanse and dry the urethral and rectal orifices and be in danger of falling.

Skin infections. Skin infections in the morbidly obese occur on a spectrum of simple benign conditions to life-threatening necrotizing infections. Notably, both diabetes mellitus and obesity are risk factors for necrotizing soft tissue infections.34 Research suggests that obesity is playing a major role in hospitalization rates. Swiney35 noted that the proportion of obese patients hospitalized for skin and soft tissue infections increased from 47.56% in 2003 to 50.42% in 2007.

Obesity increases risk for skin infections by several mechanisms. Excessive skin folds trap humidity and moisture, inducing maceration and related microbial overgrowth. Lymphatic flow also is hindered, decreasing oxygenation of surrounding tissues. With possible venous insufficiency, perfusion to tissues may be further impaired. Increased tension on wound edges from obesity may predispose to poor wound healing or actual dehiscence of a closed wound. Skin pH is higher in obese individuals, increasing risk for candida, which thrive in alkaline environments.35 Skin infections can be relatively benign (candidal intertrigo) or more serious (cellulitis). Necrotizing fasciitis is a disorder with severe consequences if inadequately treated.

Cellulitis. Cellulitis is inflammation of interstitial tissues, usually due to infectious processes. Because of all the physiologic challenges created by visceral adiposity, cellulitis of the lower extremities is most common. The risk is ratcheted up when the obese person is also diabetic. Therapy for cellulitis involves good skin cleansing, possible topical antimicrobial therapy using advanced dressings for open wounds, and systemic antibiotic therapy. Severe lymphedema and venous congestion can impede perfusion of antibiotics to affected tissues.4

Necrotizing fasciitis. Necrotizing soft tissue infections such as necrotizing fasciitis are a threat to the obese population, especially the morbidly obese. Although morbid obesity is not specifically an identified risk factor, diabetes mellitus is a particularly well-documented risk factor. Because diabetes and morbid obesity are common comorbidities, the risk relationship is evident.34

Known as “flesh-eating bacteria,” the organisms causing the disorder (Group A streptococci or Staphylococcus aureus) for type II infection (the most virulent) can be present in both the community and on the patient’s skin. Diabetes is a critical factor in necrotizing infection. These infections...
occur most commonly in the lower extremities but also in the head/neck and perineum regions. If a morbidly obese person develops the infection, care can be challenging given the impact of larger body habitus on requisite extensive surgical debridement and antibiotic therapy.

Characteristic features of type II necrotizing fasciitis include pain out of proportion to the findings, erythematous (without sharp margins) swelling, and a warm shiny appearance. The affected area changes color rapidly from erythematous to red-purple or blue-gray. Notably, the development of anesthesia or the gradual loss of sensation in the affected area may precede the appearance of skin necrosis. Fever, tachycardia, change in mentation, and other signs of toxicity occur. Rapid recognition and therapy are imperative. Surgical exploration with debridement is the only definitive therapy. Broad-spectrum, empiric antibiotic treatment and management of septic shock (if present) are required.

Fournier’s gangrene is necrotizing fasciitis that affects the perineum. Because morbidly obese patients may have difficulty with perineal cleansing, a risk for the condition is present. Critically ill, morbidly obese patients are at risk due to the immune compromise associated with critical illness. Treatment is similar in that systemic antibiotics, serial surgical debridement, and hemodynamic support therapy are necessary. Because of the large tissue defects associated with necrotizing skin infections such as Fournier’s gangrene, skin grafts usually are required. However, graft failure is common in obese, especially morbidly obese, individuals. Consequently, wound care for large open areas healing by second intention is possible.

Intertrigo. Intertrigo is an infectious or noninfectious inflammatory condition of two opposed skin surfaces. The maceration of the skin due to excess moisture and friction can occur within deep skin folds or commonly under a large abdominal pannus. These intertrigal fissures can be several inches in length and painful due to their depth. Risk factors for intertrigo and especially its most common form, candidal (fungal) intertrigo, include obesity, hyperhidrosis (excessive sweating), tight clothing, diabetes mellitus, insensitivity, and medications (eg, glucocorticoids, antibiotics).

Intertrigo presents as erythematous, macerated plaques and erosions with possible scaling. Candidal intertrigo has red satellite papulo-pustules that are the seeding of the infection into adjacent tissue. Most intertrigo and candidal infections are diagnosed clinically because of classic appearance, classic locations (eg, perineal area, deep skin folds), and complaints of itchiness (pruritis). Two major interventions include treating with topical antifungal (eg, miconazole powder) and use of drying agents (eg, aluminum acetate [Domeboro’s solution, Bayer Healthcare, Leverkusen, Germany], fans, and special materials with drying and antimicrobial properties [Interdry, Coloplast, Minneapolis, MN]). A hairdryer set on cool also may help dry the patient’s skin folds. If a patient fails topical therapy, oral antifungal agents (eg, fluconazole) may be needed for a short term of therapy.

Erythasma. Another condition affecting skin folds and the perineal area is erythasma. A superficial infection of the skin caused by Corynebacterium minutissimum, erythasma presents as macerated reddened scaly plaques in intertriginous areas, commonly in the groin, axilla, and foot. If the infection is long-term, the involved areas have a brown discoloration, visible fine scale, and wrinkling. The areas may be itchy or asymptomatic. Risk factors include obesity, excessive sweating, and type 2 diabetes. The condition is more common in tropical or hot, humid climates. Because the infection is bacterial, antifungals do not work. For localized disease, topical therapy with clindamycin or benzoyl peroxide is therapeutic. For more widespread infection, systemic clarithromycin or erythromycin is helpful. For prevention, bariatric patients need to avoid moist, uncleaned skin folds and any kind of occlusive diapers or garments that trap moisture.

Acanthosis nigricans. Acanthosis nigricans is another disorder for which bariatric patients are high risk. The benign condition is characterized by velvety, hyperpigmented plaques on the skin and intertriginous areas such as the back of the neck and the axillae. In the US, acanthosis nigricans is seen more in persons of African, Hispanic, and Native American origin. Obesity is the most common reason for development of acanthosis nigricans. Disorders associated with insulin resistance also are seen with the condition (eg, type 2 diabetes, metabolic syndrome). “Treatment” for the disorder is usually unnecessary except for cosmetic concerns; however, close attention to the underlying causes (obesity, hyperglycemia) is recommended.

Abdominal elephantiasis. A highly unusual condition, abdominal elephantiasis can occur in the large abdominal pannus. Due to prolonged lymphedema and associated fibrous tissue proliferation, the affected pannus becomes characterized by chronic, thickened, edematous skin and associated skin and subcutaneous tissue inflammation. Morbidly obese patients develop this massive localized edema and associated skin changes secondary to increased tissue tension. It is theorized the massive pannicus causes increased interstitial and intravascular pressure, predisposing patients to lower-grade cellulitis and lymphangitis. Differential diagnosis of abdominal wall cellulitis versus elephantiasis may depend on accompanying systemic signs and symptoms and laboratory testing (eg, blood count, blood cultures). Possible treatment involves antibiotic therapy, meticulous skin care, use of drying agents, and use of 5% salicylic acid products if hyperkeratosis requires removal.

Venous insufficiency and lymphedema. Bariatric patients are at great risk for the development of venous insufficiency, venous ulcers, and lymphedema. Venous insufficiency is a disorder where blood supply to the lower extremities is adequate to good but the return path is impaired. Venous
blood pools in the extremities with the generation of edema (fluid in the interstitial tissues) and eventual hemosiderin staining (leeching out of the hemoglobin component of the red blood cells to permanently discolor the tissue). Early in the process, the ankles of both legs may look “dirty.” Selected risk factors for the disorder include deep vein thrombosis, multiple pregnancies, venous injury, and obesity, to name only a few. Years to decades of obesity can severely damage the venous system and circulatory changes ensue.14 A more serious sequel of venous insufficiency is venous ulceration. A wound will occur most commonly above the inner malleolus and can exude substantial amounts of fluid due to the associated edema.

Therapy for venous ulceration is compression combined with an absorptive dressing. The obese or severely obese patient presents a real dilemma for care. The leg itself may be difficult to wrap due to fat depositions. Further, self-care may be impossible if a patient cannot reach around a large pannus. The excessive weight placed on the extremities with ambulation further exacerbates the venous hypertension situation. Leg elevation may be impossible, because it may impair ability to breathe.

Lymphedema is a serious disorder of the lymphatic system seen most frequently in older women. Recent reports suggest lymphedema is present to a substantial degree in the morbidly obese population (up to 75%).14 In this group, lymphedema is usually secondary in nature (not congenital) due to damage of the lymphatic pathways related to excessive weight. Notably, in the morbidly obese, edema can occur in the extremities, hands, face, and abdomen (in the pannus). Clinical presentation of lymphedema in the obese relates to duration of the disorder. Skin inflammation, related to the lymphedema, generates functional impairment, pain, and chronic cellulitis. Usually Stemmer’s sign (an inability to pinch a fold of skin at the base of the toes) is present in lymphedema. Skin can be dry, hyperkeratotic, and chronically affected by fibromas, lymphangiomas, and papillomas.14

Lipedema. Lipedema is a pathological accumulation of fat in both lower extremities. It can affect persons of normal weight or the obese. Several features differentiate lipedema from lymphedema. In lipedema, the feet are spared of edema (the swelling stops at the ankle), and in lipedema both legs are affected symmetrically. It is possible that with time an individual can develop both conditions known at “lipolymphedema.”14

Management of the skin issues associated with these disorders can include containment or absorption of wound fluid (lymphorrhea) and decreasing skin bacteria. If wounds are present, they require quality wound bed preparation and protection. However, lymphedema requires special approaches including complete decongestive therapy or manual lymph drainage. When combined with special bandages that are wrapped distal to proximal gradiently (that is, the higher pressure more distally), the swelling can be significantly improved. For morbidly obese patients, semi-rigid devices like the Circaid boot (Circaid Medical Products, Inc, San Diego, CA) may be more appropriate.

Management of wounds due either to venous insufficiency or lymphedema must address treatment of the underlying disorder. Management of lymphedema consists of four basic cornerstones: compression, exercise, skin care, and lymphatic drainage. With the exception of lymphatic drainage, all are important for venous insufficiency.30 Topical interventions include controlling bioburden (cleansing, antimicrobial dressings), debridement of slough and detritus, and drainage management.

Skin care and prevention involve good cleansing of the extremities, good drying processes, and moisturizers. Razors should be used carefully and avoided if possible to avoid nicking and trauma. For hyperkeratotic skin, lactic acid products (eg, Lachydrin, Bristol Myers Squibb Co, New York, NY) can be helpful in removing old tissue and nurturing new skin health.14 Vigilance for skin infections and inflammation is critical to avoid future complications.

Diabetic foot ulceration. Because obesity is a major risk factor for chronic hyperglycemia, obesity and type 2 diabetes are closely related. One disorder that affects about 15% of persons with diabetes is DFUs.4 For obese or severely obese clients, DFUs can become life-threatening because self-care and self-awareness may be substantively impaired by excess weight. DFUs most often occur on the sole of the foot, commonly at the base of the metatarsals. Quality care requires debridement of the callus around the wound opening, management of bioburden, and protection against osteomyelitis; in addition to surgical debridement and antibiotics, therapy is dependent on offloading of the ulcer.4,21,24 This goal can be daunting in a morbidly obese patient. Special larger-size offloading devices for the extremity or the enforcement of non-weightbearing (eg, bed rest, wheelchair) may assist with better outcomes.

SSIs. SSIs are a grim risk for obese patients. Even patients who have opted for life-changing bariatric surgery are still at risk for wound infection.

Morbidly obese and obese patients typify many of the risk factors for SSIs. Type 2 diabetes, difficulty breathing due to visceral adiposity, poor nutritional baseline status (protein deficiency), the presence of large subcutaneous spaces with poor blood supply,40 and other metabolo-endocrine dysfunctions (eg, hypothyroidism) can contribute to substantially higher risk. In addition, perioperative subcutaneous wound and tissue oxygen tension is substantially reduced in morbidly obese patients. Tissue hypoxia is pronounced during surgery and may contribute to wound infection risk in obese individuals.29 Wound edges must be assessed for stress on the surgical incision, including pain and obvious dehiscence. An appropriately sized abdominal binder may be needed to support the abdominal wall.19

Wound healing processes may be impaired by the obesity process itself, even when patients are post bariatric surgery.
and have lost substantial weight. D’Ettorre et al41 examined the effect of gastric bypass on wound healing parameters compared to preoperative samples, analyzing the biochemical parameter content of scar skin samples in seven postbariatric surgery patients (six women, one man) 36 months after the surgery. The authors found significantly decreased (P <0.001) biochemical healing parameters (protein, elastin) in scar skin tissue postoperatively and suggest high mechanical stress of tissues before bypass probably influences wound healing afterwards.

Warmth, redness, pain, and drainage at the incision may indicate wound infection. If a drain is being used, the amount, color, odor, and consistency of wound fluid should be monitored and documented. Fever, malaise, and other signs of systemic toxicity should be shared with the surgeon.9

Prevention of SSIs in obese and morbidly obese persons is the best “therapy.” Preoperative administration of antibiotics such as cefazolin (Ancef, GlaxoSmithKline, Research Triangle Park, NC) or, if allergic to beta-lactam agents, use of clindamycin plus ciprofloxacin may decrease the risk.18 In addition, prevention of intraoperative hypothermia, good blood glucose control, and quality perioperative skin preparation can lower SSI risk. Research by Kabon et al26 suggests postoperative supplemental oxygen administration (10 L/min) also may lower SSI risk because it improved subcutaneous tissue oxygen tension in morbidly obese surgical patients. The researchers randomly assigned 42 laparoscopic bariatric surgery patients to either 80% oxygen (10 L/minute) via a Hi-Ox (Ceretec, Garden Grove, CA) mask or 30% oxygen via nasal cannula (2 L/minute) following surgery to the next morning. The authors measured subcutaneous tissue oxygen tension and found a significantly higher level in the Hi-Ox group (58 mm Hg versus 43 mm Hg, P = 0.002). Theoretically, a primary defense against surgical pathogens is oxidative killing by neutrophils that depends on tissue oxygen tension.

If a wound infection occurs in a bariatric patient, aggressive intervention is usually necessary. Antibiotics will be used based on culture and/or empirial choices, but dosing antibiotics in morbidly obese patients can be challenging due to uneven pharmacokinetics (marked changes in distribution, binding, and elimination of medications).4,15 Dosing of hydrophilic medications (eg, vancomycin) is based on actual body weight; lipophilic (fat-soluble) medications (eg, opioids) are dosed based on ideal body weight.15,18 However, evidence-based guidelines to determine dosing strategies for acutely and critically ill bariatric patients with BMI >40 are lacking.18

Bariatric patients are at risk for general postoperative complications such as hemorrhage, deep vein thrombosis, arrhythmias, and pneumonia. A challenge for quality assessment relates to the excess weight. Signs of cardiac failure such as jugular venous distention, peripheral edema, and hepatomegaly may be masked by body habitus. Perceptive assessment is crucial for optimal care.15 Advanced therapies including negative pressure wound therapy or special dressings (eg, silver-impregnated, alginates) may be needed. Dressings also should be selected with pain control in mind.4

Bariatric-specific surgery. Various review articles support that bariatric patients can resolve their morbid obesity comorbidities most effectively by undergoing some form of gastric bypass (malabsorptive) or gastric restrictive procedures.3,5,7,42-44 Therefore, many bariatric patients may opt for this surgery. Bariatric patients also may require emergency surgeries such as C-sections or appendectomies. Whatever the reason, bariatric patients are faced with a higher risk of SSI than normal weight individuals. Rates of wound infection are specifically higher in open gastric bypass (10% to 15%) than laparoscopic (3% to 4%) surgery.46

Education for Bariatric Patient Skin and Wound Care

Education for preventive therapy for bariatric patients and skin/wound disorders must be designed with a focus on universal issues. Critical clinical content related to physical aspects of care must be included, but the larger aspects of psychological health are no less important.

Psychosocial issues. Multiple review articles and some research studies contain substantive references to patient dignity, self-image, and psychosocial challenges experienced by obese, especially severely obese, patients, as well as their lay and professional caregivers.3,22,23,25,37,45,46 Some concerns will persist even after weight loss surgery.45,47 Although the basic direct care issues should be clearly described and re-emphasized periodically (in educational terms, the cognitive and psychomotor components), the affective (mood, attitude, values) aspects are vitally important. For example, compliance or concordance with interventions and care regarding one’s own care can be profoundly influenced by depression, apathy, or conversely, anger.47,48

Psychological concerns such as body image affect persons with obesity and severe obesity even after weight loss.45 A recent narrative analysis of 20 (18 women, two men), Caucasian, post bariatric surgery/radical lifestyle change adults via qualitative interview was conducted in the United Kingdom.45 Despite massive weight loss, the participants expressed a core theme of body image ugliness. Three related subthemes (feeling socially marginalized, feeling depressed, and sexual and intimacy difficulties) suggest morbid obesity profoundly affects mental well-being and affects the psychodynamic needs of patients.

Psychosocial issues such as self-image of loathing may contribute to behavioral challenges. Behavioral compliance before and after bariatric surgery may be problematic. A literature review47 of bariatric patient behavior before and after weight loss surgery notes binging, not following good nutritional approaches, and compulsive behavior have been reported both before and after surgical intervention.

The psychological issues for bariatric patients are so com-
pelling that bariatric surgery programs usually incorporate some form of psychological assessment and counseling both before and after the intervention. Major untreated depression, psychoses, and binge disorders may be a contraindication to surgery.7

The emphasis on psychological health and positive effect for obese and morbidly obese persons is not just a “fluffy” consideration. Broadbent and Koschwanetz’s40 review of the psychology of wound healing supports that positive affect, low stress, social support, and positive coping styles are associated with modulating effects of stress. Psychological interventions targeting these components affect actual physiological parameters (oxytocin, vasopressin, epinephrine, cortisol, and leukocyte distribution) and promote better wound repair and healing.

Skin and wound care. Education for skin and wound care of bariatric patients is theoretically simple, but the patients’ body habitus, lack of bariatric equipment, inappropriate environmental design, and caregiver fatigue may make care procedurally complex.12 Major areas of foci include bathing and hygiene, skin fold management, perigenital care, toileting, and odor management.12,25

If wound management is necessary, required approaches may become technologically and procedurally demanding given the larger size of the body and a potentially large wound defect. For example, if a wound is on the leg or in a fold below an abdominal pannus, the requisite care can require three people: two people to hold and one to intervene.23 In addition to proper cleaning and thorough, ongoing assessment, skin care and breakdown prevention involve proper nutrition, specialized equipment, and staff/patient/caregiver education. Large open wounds may require use of negative pressure wound therapy. All parties must be educated on how to apply and monitor the system. Failure to address these issues, recognize impending breakdown, treat extant damage, and meet nutritional demands can result in severe consequences for the bariatric patient.

Cleanliness. Bathing and hygiene may seem to be too low-tech to justify primary focus, but their importance cannot be ignored. Patients, caregivers, and staff need to be educated about these issues. Bariatric patients need to have access to bathing facilities where the skin, including deep skin folds and crevices, can be cleansed and rinsed. Long brushes, hand-held showerheads, and shower chairs can assist. All areas of the body need good cleansing; underneath a large pannus is critical. Once skin is cleansed, it has to be dried. Skin-to-skin contact has to be avoided. This goal can be achieved with soft cloths, pads, powders, and the like. Notably, cornstarch powder should not be used because it predisposes to yeast infections. The whole process of cleansing and drying allows all parties to fully assess skin integrity, especially in deep skin folds.12

Skin fold management. Skin fold management demands special mention. Any area of the body with deep skin folds and skin-to-skin contact is at high risk for skin pathology. It is especially true under a large abdominal pannus. This abdominal “apron of fat” can be markedly heavy and large in some severely obese persons. In some case reports, abdominal pannus weights were approximately 300 lb.14

Deep skin folds such as those under pendulous breasts, in groin folds, or under a pannus have to be closely monitored, cleansed, and dried thoroughly, and kept as open to air as possible. Strategies include use of soft cloths, special drying products (Interdry, Coloplast Corp, Minneapolis, MN), and positioning (eg, side-lying to keep a large pendulous pannus from covering the groin folds). Powders, especially fungal inhibitors, can be very effective. Skin tears, abrasions, and other forms of damage (eg, atypical pressure ulcers) can be prevented with careful handling, repositioning, and shifting maneuvers.

Perigenital care. Perigenital care is critically important given the dire problems that can result from skin bacteria and intestinal flora (eg, Fournier’s gangrene). Patients have to be involved in and educated about self-care. Patients, family caregivers, and staff must participate in open, sensitive communication about personal care issues.

Toileting approaches are closely linked to perigenital care issues. Easy cleansing with appropriate equipment promotes better self-care. Toilet risers, extra wide toilet seats, or bariatric commodes, all with handrails for support, are needed. Prepackaged washcloths or moistened wipes may assist optimal cleansing and protection.12 Good perineal care must occur with each voiding or defecation and cannot “wait till I get to it.” If patients are incontinent, appropriately sized incontinence briefs and/or pads are needed to wick away fluid and maintain skin integrity.

Odor management. Body odor usually results from bacterial/fungal skin organisms and sweat that are not removed and is exacerbated by skin-on-skin contact and deep skin folds.12 Daily care must include good hygiene and removal of excessive moisture with cloths and drying materials, some of which are antimicrobial.

Bariatric equipment. Equipment designed specifically for bariatric care is a focus of patient and caregiver (family and staff) education. Specialized equipment can substantially increase the safety of bariatric patients, especially if they are critically ill or immobilized in the acute care setting.4 Bariatric weight, mechanical, lateral transfer devices, ceiling lifts, air-assist devices, and friction-reducing devices made of slippery-type material are available and should be used.40 Innovative limb holders can be used to assist with dressing changes on extremities.23

One approach promoting safe bariatric patient handling is the use of toolkits containing evidence-based algorithms. Muir and Archer Heese40 describe one program in Canada where various care algorithms help patients and caregivers communicate clearly on care approaches.

Optimal, authentic caring has to acknowledge the legitimate concern caregivers have related to possible physical in-
jus when managing a bariatric patient. Equipment specially designed for large heavy patients is mandatory to avoid problems. Quality of care and patient satisfaction improve when the proper tools of care (eg, bariatric bed, lift devices) are available. Ultimately, patient dignity is promoted as well.35

**Bariatric beds.** Bariatric beds should be at least 44 inches wide and support up to 1,000 lb. Ideally, a low-air-loss mattress makes it easier to transfer and move the patient. Caregivers, both professional and personal, should be taught to closely examine the mattress on the bed, because not all bariatric beds have a recommended, high-quality pressure redistribution mattress.36 The mattress should be checked for bottoming out or high pressure points over bony prominences with the bariatric patient lying on the surface.37 More research is needed on how to determine the optimal mattress for obese patients of varying weights.38

**Communication issues and techniques.** A critical issue for bariatric care is to listen to patients. People of size have lived with the condition for years and are “expert” in their movement approaches. It may sound overly simplistic but unfortunately is overlooked, or worse, totally discounted.

Conversely, managing bariatric patients’ needs may involve limit-setting. A descriptive survey quantitative design study by Pokorny et al17 (N = 75) found that 70% of home care nurse participants described morbidly obese patients as more demanding in interpersonal relationships with caregivers than non-obese persons. Recognition of the fatigue experienced by obese persons and the persons caring for them and the need for honest conversations about reasonable approaches for all parties is required.39

Quality education for bariatric patients and care providers is critical for injury prevention. Lack of training, poor staffing, and unsafe handling techniques can result in iatrogenic tissue damage. All aspects, including cognitive, affective, and psychomotor issues, must be incorporated for holistic care.40

Contemporary cognitive psychology offers assistance to promote meaningful education. Instruction can be enhanced and made memorable with creative strategies such as analogies and metaphor.41 All patients and caregivers have some baseline knowledge due to previous living experiences. Ausubel,42 an educational theorist, suggests learners require frameworks into which new information can be assimilated by linking new information to previous understanding.

A clinician educating obese patients and their caregivers about chronic wound healing challenges can compare delayed healing to a light switch stuck in the on position. Using metaphor also can help. When discussing diabetes and obesity (sometimes called diabesity), the educator can say heredity (genetic predisposition) is a gun; the environment (obesity and morbid obesity) pulls the trigger into full-blown disease. Creative approaches help the most challenged patients and caregivers “get it.”

The Internet enhances the availability of education. Helpful educational resources such as literature summaries, clinician care handbooks, and websites are available for teaching evidence-based approaches to comprehensive bariatric care.36-38

**Conclusion**

Obesity has been called the most prevalent, chronic, relapsing, and ultimately fatal disease of the modern world.12 Obese and severely obese patients may defer seeking healthcare and possible needed hospitalization due to discomfort, resentment, and embarrassment. Given that the prevalence of obesity and morbid obesity will continue to increase for the foreseeable future, the implications of substandard care are obvious. Healthcare providers and caregivers are encouraged to interact effectively with large patients to avert complications and promote health for all those involved in the care. n

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**References**