White Paper

Bariatric Design 101 –
An Introduction to Design Considerations

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Executive Summary

Obesity has become an alarming epidemic with enormous implications for our healthcare system. Obese people require more healthcare than average people, and there are increased physical problems for staff and attendants in administering that care across the spectrum of healthcare services.

Additionally, a boom in gastric bypass, stomach reduction and banding operations has been bringing even larger numbers of bariatric patients to healthcare providers. Respecting patient dignity and delivering optimum clinical care are primary issues, as are establishing procedures for safeguarding the health and well-being of these patients and their caregivers.

Design is a critical tool in the care of and the improved long-term clinical outcomes for bariatric patients. Design concerns include appropriate facilities and space, proper equipment and furnishings.

We begin with a brief discussion of the obesity epidemic in our country, defining what qualifies as requiring bariatric care.

The Obesity Epidemic

Obesity is defined by body mass index (BMI): Weight (lbs)/Height (in2)

BMI ranges are as follows:

- Normal weight = 18.5-24.9
- Overweight = 25-29.9
- Obese 1 = 30-34.9
- Obese 2 = 35-39.9
- Obese 3 (also referred to as extremely or morbidly obese) 40

5'2", 190 pounds & 6'2", 450 pounds could both be considered bariatric patients

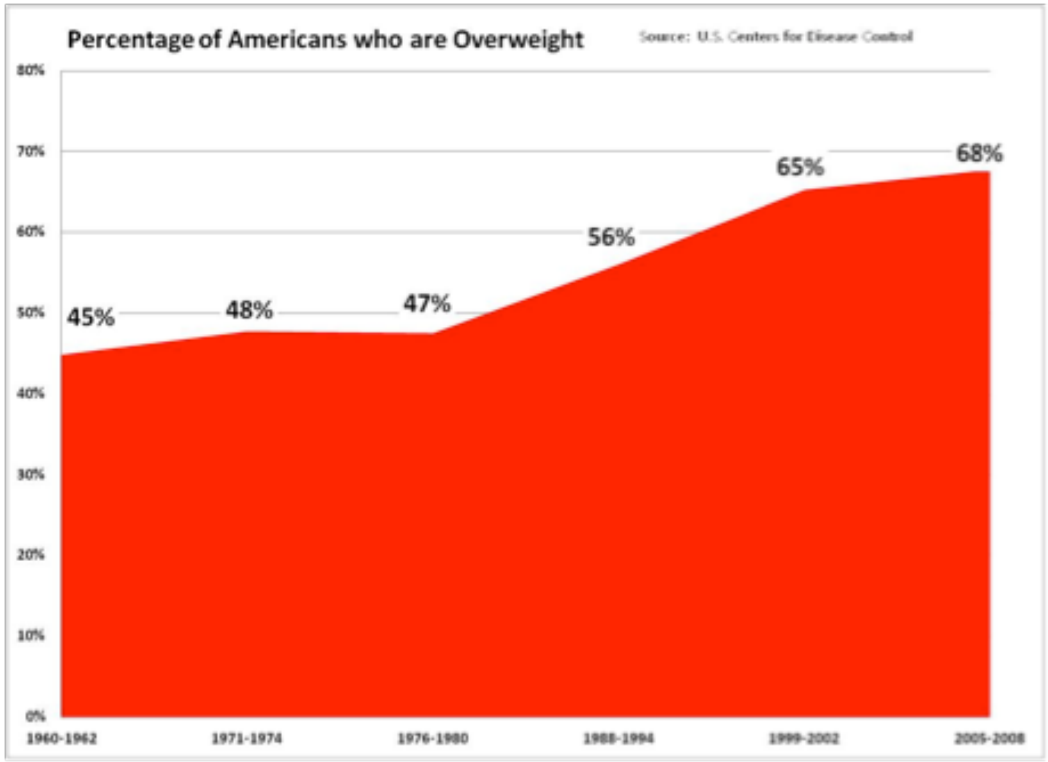

Figure 1

Figure 1 shows the percentage of Americans who are overweight, which includes both those who are overweight and those who are obese. As you can see here, only 32% of Americans are considered to be at or below normal weight. At the current rate of increase all Americans will be obese by 2059 (CDC 2010).

Research indicates that overweight children are more likely to become obese as adults.

Between 1976 and 2007:

- For preschoolers aged **2–5, obesity increased from 5.0% to 10.4%**
- For children aged **6–11 obesity increased from 6.5% to 19.6%**
- For adolescents aged **12–19, obesity increased from 5.0% to 18.1%.** (CDC 2010)

Obesity is becoming an epidemic with no end in sight, and with significant implications on healthcare as it sets the stage for the occurrence of numerous medical problems including asthma, joint degeneration, sleep apnea, and lower back pain.

Severely obese people are more than twice as likely as people of normal weight to be in poor health and have about twice as many chronic conditions:

- **Type II Diabetes** 80% of patients with Type II Diabetes are obese
- **Gallbladder disease** The incidence of gallstones soars as a person's body mass index (BMI) goes beyond 29
- **Coronary heart disease** 70% of diagnosed cases are related to obesity
- **High blood pressure** Obesity more than doubles one's chance of developing high blood pressure
- **Breast & colon cancer** Almost ½ of breast cancer cases are diagnosed among obese women.

Obese patients have longer, more costly hospital stays. In 2009, the CDC estimated overweight patient care costs averaged $1,400 more per obese patient compared to a non-obese patient. The healthcare costs of caregivers are also impacted. Healthcare workers sustain nearly five times more overexertion injuries than the average worker. And these costs and impacts are spread over the entire healthcare services spectrum, not just in bariatric units.

[1] http://www.azom.com/article.aspx?ArticleID=988
[2] http://205.254.135.24/tools/faqs/faq.cfm?id=34&t=6

Common terms, definitions and standards in bariatric design.

Bariatric furnishings, fixtures and equipment are not just 'bigger' or 'hold more weight'. Bariatric equipment must combine load limit, appropriate dimensions and a design aesthetic that blends with the environment by which a patient's and caregiver's comfort and safety is ensured. Common considerations are:

Dimension and shape: Not all people have the same physique, so a person's shape must be considered.

Safe working load or Working load limit: Rating for bariatric beds, lifts and other equipment. It is the largest load (in pounds) that equipment can safely lift.

Static load: The maximum amount of non-moving weight a piece of equipment can bear. Would be applied to furniture, handrails, grab bars and toilets, for example.

Dynamic load: Designing for safety, dynamic load accommodates the weight of a patient in falling motion. Dynamic load must always exceed the static load. This load rating is critical as unstable patients often will reach out to grab or lean upon items like grab bars, furniture or railings to stop a fall.

As a rule of thumb, a falling human is double their weight. If we are designing for a Bariatric population of up to 900 lbs, anything we specify has to withstand an impact weight – or dynamic load – of 1,800 lbs.

Functional load: A level of loading intended to be typical of hard use.

People within the bariatric segment of the population face numerous challenges in daily life. In addition to the emotional and psychological effects of stigmatization in society, there are many hardships that must be overcome in terms of general mobility as well as interacting with architecture, furnishings and products designed in ways that often effectively exclude them.

The Trend Toward Bariatric Design

Design should emphasize the similarities between people rather than their differences. Keep patients from feeling alienated and restricted as they move through the facility. Design spaces and products that serve everyone.

ECRI – the Emergency Care Research Institute - recommends several strategies to effectively address the special needs of bariatric patients in terms of facility design and equipment.

Considering obesity trends and the skyrocketing increase in bariatric surgical programs, hospitals should plan to address the special design and equipment needs of extremely obese patients in both their short- and long-range planning.

These needs should be addressed not just in particular care areas, but throughout the healthcare continuum. Primarily, the ECRI says the design team should be charged with the overarching goal of providing safe, respectful, high-quality care for extremely obese patients.

And secondly, the ECRI states that a multidisciplinary team should be designated to assess bariatric-related facility design and equipment needs throughout the continuum of in-hospital care.

Most facilities currently do not have dedicated units for bariatric patients. In the past, the occasional severely obese patient was handled on an ad-hoc basis with existing hospital equipment, reinforced or lashed together as needed. In existing facilities:

- The patient room is often not large enough to house bariatric equipment, beds and required caregivers
- Bathrooms are too small, doors are too small
- Toilet fixtures are incapable of supporting bariatric patients
- Handrails are pulled from the wall when used by bariatric patients, and
- Floors deform or peel-up from beds being moved.

As the average weight of Americans climbs ever upward, hospitals are rethinking facility design not only to accommodate larger patients, but also the medical equipment needed to care for them. Safety – not only for the patient, but also for the care team must be factored into the design.

The ultimate design goal when designing for the bariatric patient: Provide opportunities and encouragement for increased mobility, independence and strength.

[3] http://www.eastman.com/Company/Encapsulation_Technology/Pages/Encapsulation_Overview.aspx

Proactive solutions addressed as early as possible in the design process are important. It is essential to thoroughly discuss and plan for the following critical issues:

- A description of the patient population – physical and mental capacities, medical conditions
- The types of procedures being performed and what equipment is required
- How and where patients are transported (patient flow);
- Dimensions and storage of equipment

Taking direction from evidence-based design

While there is no evidence-based research specifically pointing to the field of bariatrics, we can look to more general evidence based design guidelines for:

Reducing Pain – Scientific studies have shown that exposing patients to nature can produce significant alleviation of pain. Other research also suggests that patients experience less pain when exposed to high levels of daylight in their rooms. Finally, some research also supports displaying visual art with nature subject matter helps reducing pain.

Reducing slip/fall risk – In one Washington University School of Medicine study alone (2007), there were 8,974 inpatient falls at just 9 hospitals tracked from 2001 to 2003. The slip-fall risk in healthcare continues to be a major problem leading to injury, higher costs, liability and protracted recovery.

Improving Patients' Sleep – Sleep disruption and deprivation are common problems in healthcare buildings; increasing acoustic performance with reduced reverberation time increased sleep quality.

Reducing Patient Stress – Patient stress is a significant negative outcome in which bears many other healthcare negative consequences. A physical environment that contains stressful features makes a psychological patient state worse. Several experimental studies have shown that real or simulated views of nature can produce restoration from psychological stress in minutes.

Reducing Depression – Many studies show that exposure to bright artificial light and daylight is effective in improving mood and reducing depression, even for people affected by deep depression.

Reducing Spatial Disorientation – Wayfinding problems in hospitals have an impact both on patients and visitors, who can be stressed and disoriented. Improved signage can greatly reduce the stress associated with moving through the healthcare facility.

Improving Patient Privacy and Confidentiality – It is based on great evidence that the provision of single-bed rooms increases patient privacy. Furthermore, providing private discussion rooms near waiting, admission, and reception areas may help avoiding breaches of speech privacy.

Fostering Social Support – Some studies recommend the provision of stays and waiting rooms with comfortable furniture arranged in a cluster, in order to encourage social interactions.

Reducing Staff Injuries – The risk of caregiver injury is multiplied in bariatric settings. While proper procedures play a role, staff injuries can also be reduced through adequate space for movement, proper equipment placement and appropriate fixtures and furniture.

Decreasing Staff Stress – Stress is the most common cause of staff retirement. Environmental stressors include noise, light, and multi-bed patient rooms. In fact, survey research shows that single-bed patient rooms are perceived to be less stressful for both family and staff than ones containing multi-beds.

Increasing Staff Effectiveness – While most research is aimed at patients, there is a growing body of evidence suggesting to improve hospital efficiency through making the jobs of staff easier. This can be achieved by spatial solution, environmental factors and technological devices.

Increasing staff recruiting and retention – well-designed facilities that reduce stress, increase efficiency and lower the risk of injury can be effective tools in recruiting, and lead to higher staff satisfaction.

[4] http://www.natureworksllc.com/

Design factors for bariatric spaces

This next section addresses the essential design factors for the various spaces in a bariatric or healthcare facility, including:

- Entrances and routes
- Patient rooms and bathrooms
- Diagnostic and treatment spaces
- Lobbies and waiting areas

We're basing much of this on the 2010 FGI Guidelines for Healthcare Facilities for the design of bariatric care units, and the 2010 Patient Handling and Movement Assessments (PHAMA).

Entrances and Routes

Providing adequate space and a safe environment begins at the outside of the clinic or hospital. Easy access with ramps and handrails, and wide enough to accommodate bariatric wheelchairs, walkers and other specialized conveyances, communicates to the patient that the facility is equipped to address and understand their medical needs.

Establish an accessible path from the hospital entrance to all major departments by accommodating for a 39" by 49" wide wheelchair (700 lbs capacity) with a 6' turning radius, per the Facilities Guidelines Institute 2010 revised guidelines.

One of the most-significant design issues is associated with the patient accessing various areas of the healthcare facility. Considerations: registration, physical rehabilitation, food service, common/family areas, emergency services, diagnostics, even the gift shop or vending areas.

Factor door width and elevator capacity to make common areas more easily accessible for a patient, equipment and caregivers. Most hospital elevators have an average weight capacity of 2,000 to 3,000 lbs, a capacity that may be exceeded when the weight of the bariatric patient, bed, transport staff, and specialized equipment are added together.

Bariatric Patient Room

Most examples of bariatric rooms currently in place are modifications to standard private or semiprivate bedrooms with a width (headwall-to-footwall dimension) of around 12 feet. The Bariatric Room Design Advisory Board (BRDAB) concluded that the optimal width should be 14 feet (13 feet was felt to be the minimum), and depth be 15 feet (corridor to exterior wall).

Focus on the primary space drivers in these rooms, which include space for such specialized equipment and furnishings as bariatric beds, resident lifts, bariatric wheelchairs, or oversized chairs.

High-quality bariatric beds address the challenges inherent in bariatric care – patient comfort and mobility and mitigating the risk of injury to caregivers and patients. Such beds have built-in scales and can be converted to chair position, a configuration to facilitate patient transfer.

Other patient room space drivers include maneuverability needs for both the bariatric patient and for the care team who are trying to safely and ergonomically assist the patient.

One additional design consideration is the placement of cubicle track in relation to ceiling-mounted lift tracks. This is especially important for privacy curtain placements as the lift track runs from bed to bathroom.

[5] http://bioplastics-cms.de/bioplastics/download/land_use_bioplasticsMAGAZINE_200904.pdf

Safely moving from bed to bathroom

Bariatric patients are likely to require assistance in transferring from a bed to chair or a chair to toilet. Depending on the patient's ability to bear weight, level of cooperation, and upper body strength, two to three caregivers may be needed to assist the patient. Even with the most observant and diligent care, patients will fall. Wide spacing between the bed and other obstacles will facilitate the care team's effort in up righting the patient, and can mitigate the circumstance of the patient striking objects during a fall.

According to a 2008 white paper by the Houston office of Page Southerland Page architects, the average hospital patient room requires a 16 to 19 foot unassisted trip from bed to the toilet. Where possible in new construction, patient rooms should be designed to minimize the distance between the bed and bathroom. In one project – St. Luke's Sugar Land Hospital in Texas – PSP was able to cut the trip distance in half.

However, in all cases of new construction, renovation or retrofit, evidence-based design advocates are calling for handrails to be installed from bed to bathroom to reduce slip-fall risk. At St. Luke's Sugar Land, all rooms had a continuous handrail installed in the room, thus making all rooms handicap accessible.

The bariatric patient bathroom

Sliding ICU-style doors are employed in some bariatric room settings. A sliding door that will yield a 60-inch opening requires an overall opening of between 9 and 12 feet. The BRDAB preferred a pair of unequal-leaf swinging doors--one leaf 42 inches wide, the other 18 inches--as the optimal solution. This configuration will yield the desired clear opening with the least overall width, thereby giving more wall space to supporting functions.

Oversized toilet seats are another preferred option. Toilet fixtures and sinks should be mounted to the floor versus the wall, although care should be taken that floor-mounted sinks do not interfere with wheelchairs.

Bathrooms should be sized to allow for staff assistance on two sides of the patient at the toilet and shower. Dispensers should be flush mounted to aid in clearance and safety. The shower stall should have a sufficient opening and space for unrestricted movement by the bariatric patient and, if necessary, staff performing assists.

Consider combing shower and toilet into a central bathing room. The BRDAB concluded that a room of at least 45 square feet, with waterproof walls and floor, would be the ideal toilet/shower room. With strategic placement of the fixtures and sloping of the floor to a drain, the entire room becomes the shower. By not having enclosing walls around the shower and using a shower curtain instead, caregivers can offer maximum assistance.

The receptor should be tested for load bearing per ANSI Z124.1.2-2005. The receptor should also have a front transitional edge for easy access. Multiple grab bars should be available and rated for 1,000 pounds each. Also consider contrasting colors of grab pars for those who may have visual impairments.

In addition, space for adaptive equipment such as wheelchairs and lifts is essential to plan for. Consider tracking for ceiling lifts, accommodating ready access to shower, toilet and sink.

Space design provides maximum safety and comfort - patient and care giver - and encourages some degree of participation by the patient.

Treatment and diagnostic spaces

Many of the same space and load requirements in the patient room carry over into diagnostic and treatment spaces:

- Should be designed as an easily accessible, private and comfortable area
- Surgical and exam tables – 1,000 LBS rated
- Table should be powered (up/down) for patient transfers
- Scales – 1,800 LBS rated
- Clear floor area - 150 SF minimum
- Treatment table clearance –5 FT at sides and foot
- Portable or built-in lift - 600 lbs. minimum
- Furniture, plumbing fixtures, casework - floor mounted and rated at 1,000 LBS

Lobbies and waiting areas

Basic room furnishings, such as chairs, may lack the size and weight capacity needed for bariatric patients. Standard chairs with arms are a particular problem in this regard, as there may not be enough space between arms for patient use. Obese patients and visitors are often reluctant to sit for fear of not fitting in standard-sized furniture or breaking furniture.

As mentioned earlier, there are two types of severely obese people--pear-shaped (weight concentrated below the waist in the hips and thighs) and apple-shaped (weight concentrated above the hips in the stomach and chest). This is important when considering seating, as pear-shaped people cannot abide chairs with arms, whereas apple-shaped bodies will do well in seating with or without arms. Offering both types of seating would service the general population as well as the severely obese.

A seat too low, the patient may have trouble standing without assistance. The arms must have a grasp point on the front of the arm, providing a stable platform or push point. A larger seat width accommodates the greatest number of patients. A seat that pitches forward assists the patient with a safe exit from the chair.

The need for increased interior protection

Before we leave the topic of designing specific spaces in a bariatric facility or treatment area, we want to talk briefly about protecting surfaces.

We have already stated that there is the potential for greater wear and tear in bariatric spaces due to higher loads and the movement of specialized equipment needed for the care of obese patients. It stands to reason that wall and door protection should receive special attention and consideration to minimize damage and maintain a clean, fresh appearance.

We'll start with wall protection. Wall cladding should be considered in either a wainscoting or full-wall application. And we would suggest that thicker rigid cladding be chosen.

Handrails can act as wall guards, so impact resistance is critical. In addition, ratings for load bearing should be high, and should have the proper grip radius for both patient comfort and safety.

Wall guards complete the wall protection package by absorbing impact from wheelchairs and lower equipment surfaces, such as carts, gurneys, and diagnostic equipment.

Two options for wall construction in bariatric installations are:

1. 20 gauge metal framing with vertical studs spaced 16" on center. Horizontal metal strapping to be 16 gauge x 6" wide. A layer of ½" plywood to be mechanically fastened to the metal framing followed by 5/8" gypsum board.
2. 20 gauge metal framing with vertical studs spaced 16" on center. Horizontal wood strapping to be 2x6 board. A layer of ½" plywood to be mechanically fastened to the metal framing followed by 5/8" gypsum board.

It is almost a given that a simple tape-on corner guard is not going to be up to the task of corner protection in bariatric spaces. Selection should be based on impact resistance, with particular attention paid to the design and construction of the inner retainer.

Patients and equipment moving through doorways can lead to heavy wear on the door surface, jamb, handle and frame. Protection options include fully clad doors, door frame guards, kickplates and handle protectors.

Conclusions

- Obesity has become an alarming epidemic with enormous implications for our healthcare system.
- Respecting patient dignity and delivering optimal clinical care are primary issues, as are establishing procedures for safeguarding the health and well-being of these patients and their caregivers.
- Design is a critical tool in improving long-term clinical outcomes for bariatric patients.
- Designers must focus on appropriate facilities and space, proper equipment and furnishings in bariatric care facilities.
- The probability of greater wear and tear call for stepped-up interior protection for walls, corners, door and door frames.

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