A Pictorial Overview of Technology-assisted Care Options for Bariatric Patients: One Hospital’s Experience

Margaret Arnold, PT, CEES, CSPHP; Elizabeth Roe, RN, PhD; and Deborah Williams, RN, BSN, MA, CWOCN

Abstract

Best practice guidelines to avoid pressure ulcers and skin breakdown among obese patients include early and progressive mobility, rigorous turning schedules, and proper skin care. However, implementation of some these guidelines may increase the risk of patient and caregiver injury. An acute care hospital implemented safe patient handling protocols that involved equipment purchase and extensive training for all care staff. The new equipment facilitated repositioning, including boosting and turning, lateral transfers, vertical transfers and ambulation, and bathing and toileting. All healthcare facilities are expected to see an increase in the number of bariatric patients and need for safe patient handling protocols and procedures. At the same time, research is needed to evaluate the safety, effectiveness, and cost-effectiveness of currently available devices designed to improve patient safety and reduce caregiver injury.

Keywords: bariatrics, obesity, moving and lifting patients, patient care, equipment and supplies

Index: Ostomy Wound Management 2014;60(1):36–42

Potential Conflicts of Interest: Ms. Arnold provides consulting services for several safe patient handling and mobility companies.

The World Health Organization considers obesity one of the world’s most significant health problems. The prevalence of obesity in the United States has steadily increased over the last two decades; 35.7% of adults are considered obese (body mass index [BMI] >30) in 2009–2010. The percentage of the population considered morbidly obese (BMI >50) has increased more than 10-fold since 1986. Hahler describes patients who are overweight by more than 100 to 200 lb or with body weight >300 lb as bariatric.

The increase in the number of obese individuals puts strain on the healthcare system. In 2009, the approximately 2.8 million hospital stays for which obesity was either a principal or secondary diagnosis represent a 6% increase from 1996. When hospitalized, obese patients are more likely to have increased lengths of stay, higher morbidity, and increased likelihood of discharge to nursing home facilities. Obese patient care is challenging, particularly in terms of preventing skin breakdown, healing wounds, and preventing complications of surgery and prolonged immobility.

Pressure ulcers and skin breakdown. Despite efforts to implement evidence-based guidelines, pressure ulcers and skin breakdown persist as a major problem in healthcare institutions. Pressure ulcers are estimated to affect 2.5 million people in the US annually. The problem is not unique to the US: in one international study published in 2006, adult stays in hospitals related to pressure ulcers totaled $11 billion in hospital costs, and the length of stay for hospitalizations principally for pressure ulcers was nearly three times longer than hospitalizations for other reasons (14.1 days versus 5.0 days). In addition to the morbidity, mortality, and financial cost of pressure ulcers, patients with pressure ulcers also report decreased quality of life and other burdens including pain, and restricted activities.

Pressure ulcers and obesity. Newell et al stratified risk for pressure ulcer development among 1,543 critically ill trauma patients by BMI and found the risk for pressure ulcers in patients with a BMI of 30 to 39.9 was more than 1.5
times greater and almost three-fold greater for patients with a BMI >40 compared with patients with a normal BMI.

Pressure ulcer risk assessment scales include friction and immobility as variables; caring for obese patients poses challenges regarding adequate mobilization and physical activity levels to offset these risks. For immobile patients, in addition to the weight to be lifted, body mass distribution presents unique care challenges for the safety of the caregiver as well as for the patient. For example, it can be difficult to adequately clean and dry all parts of the body due to difficulty with sustained holding of limbs or body parts on the part of the caregiver(s).

Other risks to obese patients during mobility tasks are entrapment of excess body tissue between sidebars of the bed or between surfaces or equipment; falls; and pain and bruising from caregiver assistance with positioning or moving. Another patient concern is the lack of dignity when multiple caregivers are needed to help them perform basic tasks.

In consideration of the risk factors for pressure ulcers, it is essential for providers to be proactive in the prevention of skin breakdown while caring for patients and, in particular, during patient handling activities. Implementation of pressure ulcer prevention and treatment guidelines in the obese patient population may be difficult for a number of reasons, including the unavailability of staff and special equipment such as pressure-redistribution surfaces, specialized beds, and patient lifting and handling equipment.

Caregiver safety. In addition to the safety and well-being of the patient, emphasis is increasing on preventing injuries to healthcare providers. According to 1998 guidelines from the National Institute of Occupational Safety and Health (NIOSH), the maximum safe lifting limit under ideal conditions is 46 lb for women and 51 lb for men; this limit was revised to 35 lb for use in healthcare. The maximum load limit is lower when the load is lifted away from the body, lifted at an angle, lifted above or below ideal lifting conditions, if the frequency of the lifts is high, or if the hand coupling among multiple care providers is poor. Although highly predictive of risk in most industries, these data do not adequately reflect additional challenges to effective risk assessment in lifting and handling patients, especially among the obese population. Patients are not static loads and often move in reaction to events. They may try to help or resist movement, the distribution and mobility of the weight being lifted can change during a lift, and dignity and comfort must be preserved. High-risk care tasks include boosting, repositioning, and transfers; additional risks arise from applying excessive forces during pushing or pulling such as in turning patients and awkward postures while assisting patients in activities of daily living such as hygiene, bathing, ambulation, and dressing changes.

Another cornerstone ergonomic risk analysis tool to help determine individual capability is the psychophysical risk evaluation developed by Snook and Ciriello in 1991. The tables were developed from controlled experiments to find the percentage of persons working in industrial jobs capable of performing the tabulated levels of lift, lower, push, pull, and carry. According to the Snook and Ciriello tables, 90% of the population can lift 11 lb, and only 10% of the population is capable of lifting more than 21 lb for one lift every 30 minutes, a vertical distance of 25 cm (10 inches) in the knuckle to shoulder height range, at a distance of 20 inches away from the body. The maximum push/pull forces listed in the tables for women are 23 lb pulling and 28 lb pushing at waist height. The forces of pushing/pulling patients and lifting/lowering patients consistently exceed those listed in the Snook and Ciriello tables — ie, below the forces required to roll or turn a dependent patient who weighs >300 lb.

Although some of the biomechanical studies were conducted several years ago, the analyses are still relevant and applicable. In a study of 17 participants, Marras et al assessed probability for caregiver low back injury during one person-to-chair transfer in which researchers compared hooking under the patient arm, two-person hook method of transfer from bed to chair, two-person draw sheet repositioning task, and two-person lift holding onto thigh and shoulder. All methods were found to have a >70% probability for low back injury, with the highest risk associated with a single person hook transfer.

In a biomechanical evaluation and psychophysical assessment, Zhuang et al measured compression forces during dependent bed-to-chair transfers using nine different battery-powered lifts and three manual methods involving nine nursing assistants and two elderly patients. They found a 60% reduction in compressive forces during transfers with mechanical lifts compared to manual methods. In addition, they found that patients felt more comfortable and secure when being transferred with a lift compared to a manual transfer.

In a descriptive study of shoulder pain mechanisms, Gallagher and Arnold noted back, shoulder, and neck injuries are common among caregivers who perform manual handling of patients, and injuries to patients include shoulder pain and the potential for skin tears and abrasions from...
friction and shearing of the patients’ skin against the bed sheets. A large, multisite evaluation of risk factors found friction is one of the key risk factors for pressure ulcers and is a core measure in the Braden scale.\textsuperscript{20,21}

Preventing caregiver injury. A position paper by the American Nurses Association\textsuperscript{22} (ANA) urges nurses to make appropriate use of assistive equipment and devices in order to reduce injury. Although this document does not differentiate between obese and nonobese patients, the National Association of Bariatric Nurses\textsuperscript{24} issued a position statement in which it supported the ANA position and pointed out the particular importance of safety precautions when caring for the morbidly obese. Healthcare in general has seen an increased emphasis on providing evidence-based care. Agencies such as the Veterans Health Administration\textsuperscript{25} have released bariatric toolkits to assist hospitals in caring for obese patients. These guidelines use scoring systems to assess patient mobility and recommend appropriate equipment.

A quality improvement endeavor was initiated at McLaren Bay Region, a 420-bed acute care facility in Bay City, MI, to reduce patient and caregiver risk for injury. The initiative included purchase of safe patient handling and mobility (SPHM) equipment for all floors, including ceiling lifts in six rooms; three floor-based, 500 lb-capacity dependent lifts; one floor-based 700-lb dependent lift; three powered sit-stand lifts; and 19 nonpowered sit-stand lifts. In addition to the lift devices, 300 pairs of slider sheets and slings in all sizes for each lift were purchased. The hospital previously owned five 350 lb-capacity dependent lifts and five 350 lb-capacity standing and raising aids. These had been purchased in 1996 with no comprehensive start-up program. Utilization had been high in the first 6 months after purchase then dropped off to minimal utilization before 2006.

McLaren Bay Region opted to purchase a consulting package along with the new equipment, which consisted of provision of initial training, education materials, assistance with program implementation, unit manuals, assessment algorithms, and monthly visits for 3 years to assist with injury tracking, compliance, and culture change.

Extensive training was provided for all care staff. A train-the-trainer program was implemented; trainers received 8 hours of instruction and all care staff received 2 hours of training. Policies and procedures were written outlining responsibilities at all levels of the organization. Process mapping was carried out to support the new equipment utilization, including laundering processes, purchasing, storage of specialty items, incentives for compliance, and unit contests to increase awareness.

The difference between purchase of the lifts in 1996 and in 2006 was the comprehensive program that has sustained culture change since 2006. This is consistent with findings by Tullar et al\textsuperscript{26} in a systematic review of 16 safe patient handling interventions, where equipment purchase alone was found not to be sufficient, and training alone was found not to be effective but multifaceted programs had consistent benefits on caregiver safety.

Examples of Technology-assisted Care Options

Repositioning. Repositioning includes boosting, turning, and adjusting patient position for comfort.

Boosting. Boosting involves moving the patient closer to the head of the bed. This requires the patient to be lifted vertically, moved in the horizontal plane a distance (up to 18 inches at times), and lowered back onto the bed. When a boost is performed using friction-reducing devices (FRDs), the patient does not have to be lifted. Rather, they are “slid” from one position to the other (see Figure 1). FRDs typically consist of two surfaces of very low friction material, which glide on each other easily. This in turn may reduce high friction forces on the buttocks and on the heels.

Use of a ceiling-mounted power lift with a repositioning sling is another method to replace manually boosting and turning patients (see Figure 2). This involves placing a sling under the patient and hooking it up to a ceiling-mounted motor, allowing the motor, rather than the caregiver, to provide vertical lift. Some versions of the apparatus also have a four-way motor that can move the patient along the track in
Use of a dependent lift and sling when boosting and turning further reduces the forces needed for lateral transfers. Using a ceiling-mounted lift is more time-consuming than using FRDs. The caregiver must use judgment as to whether use of the FRD is sufficient or whether a dependent lift with sling should be used.

Lateral transfers. This involves moving a patient from one surface to another, such as from the bed to a gurney. The patient is slid from one surface to the other. When this care task is performed manually, the risks to the patient include friction, pain, and pannus entrapment between the surfaces (see Figure 4). Using a FRD lowers the force needed to move the patient.

Vertical transfers and ambulation. During vertical transfers such as bed-to-chair, bed-to-commode, and standing and walking, the portion of the patients’ weight that they are unable to move themselves needs to be lifted by an external source (caregiver or device). Patients are at risk for shoulder discomfort or falling to the floor. Once they move away from the edge of the bed, this risk increases.

Using powered or nonpowered sit-stand devices with slings around the patients’ back or ceiling mounted or floor based lifts with ambulation slings offers mechanical support for the weight patients are unable to move themselves. Their use reduces the risk of injury because these devices eliminate the need to pull on patients to lift them; the device provides the external force (see Figures 5, 6, 7, 8). Patients can be safely transferred or ambulated according to their medical tolerance, rather than the tolerance of the caregiver.

Some of the sit-stand devices have footplates that can be removed so the patient can ambulate, and there are ambulation slings available to use with overhead lifts (either ceiling lifts or floor based lifts) that will allow ambulation safely without fear of falling. If the patient loses his/her balance, the sling and lift will prevent them from falling without compromising the caregiver’s stability.

A relatively new technology that McLaren Bay Region now utilizes is a patient bed that stands up to a full standing position (see Figure 9). The advantage of this technol-
Body posture is that even patients who are not able to move independently, are in pain, too ill or too high risk to stand and walk away from the bed can benefit from standing and weight-bearing. This can be done in varying degrees of tilting angle, and patients can perform many exercises such as mini squats and marching, which can allow them to be upright while still in their bed. This technology also completely eliminates the lifting requirement for the caregiver(s).

Bathing, toileting, and wound care. These tasks require lifting patients’ limbs or their whole body to transfer in and out of the shower or tub. Working in tight spaces results in awkward positions and reaching around patients to assist with toileting hygiene and clothing management, as identified by Waters et al.15

Use of sit-stand devices can help hold the patient up while the caregiver provides the hygiene and washing assistance. This eliminates the need to lift the patient manually. Also, the sit-stand device can be moved away or turned to allow better access for cleaning the patient and reduces the need for awkward positioning.

Holding limbs/prolonged lifting put the caregiver at substantial risk. In a patient weighing 300 lb, one leg weighs approximately 48 lb. The risk to the patient can include insufficient cleaning or drying if the caregiver supporting the limb gets tired and cannot hold it up any longer. Insufficient cleaning or drying can increase the risk of skin breakdown10,20,21

Use of limb slings connected to ceiling lifts or floor-based lifts enables the limb needing care to be adequately supported, thereby reducing the risk of pain and sudden movements as the caregiver shifts or moves while supporting the limb (see Figures 10, 11). The use of the limb slings also allows for more thorough care of the limb or body part, whether dressing a wound or washing and drying the limb. Time can be taken to thoroughly wash and dry or dress because caregiver fatigue is removed as a time-limiting factor.

As seen with turning and rolling, slings and overhead lifts also can be utilized to position the patient in bed more easily for cleaning, bathing, and drying. Some shower chairs are height-adjustable and mobile to allow for improved patient hygiene of patients (see Figure 12). The chairs can be raised to the height of the caregiver to eliminate stooping and bending.

Discussion

Several pre/post comparison studies,26-29 (one involving more than 1,700 patients30) regarding implementation of mechanical devices demonstrate reduced injuries to caregivers who implement SPHM programs. A survey study by Pellino et al30 of perceived caregiver exertion and patient comfort found use of mechanical-assist devices for lateral transfers resulted in fewer personnel being needed for the transfer, an average 5-minute reduction per transfer, and increased comfort and feeling of security for the patient. This is consistent with findings from Zhuang et al.18 A pilot study30 of pressure ulcer prevention when mobilizing obese patients showed that assembling and utilizing a lift team of personnel to help move and lift patients with Braden scores of <18 decreased hospital-acquired pressure ulcers by 43% and employee injuries by 38.5%.

Despite the growing evidence base regarding SPHM equipment to safely move and handle patients, in particular for the obese patient population, the possibility exists that assistive devices may be underutilized as a result of staff not being aware of the availability of equipment and the insufficient weight capacity of beds, lifts, toilets, and bedside commodes.33 SPHM technology continues to change and improve; many manufacturers are responding to the increased demand for higher weight limits to accommodate the obese patient population. Facilities must be knowledgeable of, and equipped with, appropriate patient handling equipment for obese patients to protect the safety of both the patient and the caregiver. Pellino et al’s30 findings are consistent with the experience at McLaren Bay Region, where use of a lift enables fewer caregivers to safely perform the task, thereby freeing up other caregivers to continue to administer care to their own patients.
Another possible reason for equipment underuse is cost. However, although investing in comprehensive SPHM programs can be expensive, the cost of patient and caregiver injuries is substantial and increasing. Having the right tools in place improves the safety and efficiency of care, which ultimately benefits the bottom line.

Conclusion
The increase in the prevalence of obesity has widespread ramifications for a variety of reasons. Hospitals will be admitting more patients with a BMI >40 at a time when economic factors and value-based reimbursement systems will further challenge health care facilities to find solutions for improved, cost-effective care for this growing population and its caregivers. Common care tasks such as repositioning in bed, transfers and mobility, ambulation, bathing, and wound care can put the caregiver, as well as the patient, at risk of injury and/or result in less-than-optimal care. Ongoing advances in SPHM technology to provide innovative solutions may help decrease the risk of caregiver injury, reduce the number of caregivers needed to safely provide care, and offer opportunities for improved quality of patient care. Studies to document care improvements attained by implementing patient lift and support technology are needed to justify the use and cost of technology-assisted care.

Acknowledgments
The authors are grateful to Guldmann (Tampa, FL), ArjoHuntleigh (Addison, IL), EZway (Clarinda, IA), and Aplha Modalities (Seattle, WA) for permission to use their images to represent care tasks and for technology to assist with those tasks. They also thank the administration and staff at McLaren Bay Region for assisting with pictures and for their continued dedication to quality care for their patients.

References
Feature

Otostomy Wound Management (ISSN 0889–5899) is a peer-reviewed journal owned and published 12 times a year by HMP Communications. Copyright © 2014 by HMP Communications. Opinions expressed by the authors are their own and not necessarily those of the publisher, the editorial staff, or any member of the editorial advisory board.

Association affiliation

Otostomy Wound Management and WOUNDS: A Compendium of Clinical Research and Practice are the official professional journals of the Association for the Advancement of Wound Care (AAWC). AAWC members receive a 25% discount off the subscription rate. There is no discount on back issues. To receive the AAWC discount, include your membership number with the subscription order.

2014 subscription rates

OWM is free to qualified subscribers by request. Rates for U.S. subscriptions: outside controlled universe: $100, annual; $23, single copies; foreign subscriptions: $165, annual; $36, single copies.

Correspondence

For manuscript submission information, please visit www.o-wm.com, Information for Authors, or contact the Editor. Letters to the Editor are welcome and may be submitted to bzeiger@hmpcommunications.com. Advertising and business communication information also is available on the website. Communications regarding the following subscription services should be directed to the Circulation Manager:

- To initiate a subscription to Otostomy Wound Management;
- To change a subscription address;
- To order a back issue (single copy) or request a missing issue (see guidelines below);
- To have one complimentary copy of Otostomy Wound Management sent to your institution’s library.

Back issues or missing issues

Claims for missing issues can be honored only up to 3 months for domestic addresses and 6 months for foreign addresses. Duplicate copies will not be sent to replace ones undelivered through failure to notify HMP Communications of a change of address. To order back issues (single copies) or request a missing issue, call or write to the Circulation Manager at the address below.

Rights, reprints, and permissions

For permission to copy or use material from Otostomy Wound Management, please visit www.o-wm.com. All rights reserved. No part of this publication may be reproduced, stored, or transmitted in any form or by any means (electronic or mechanical) including photocopying, recording, or using any information storage and retrieval system, without permission in writing from the publisher.

Indexing services

Otostomy Wound Management is indexed in MEDLINE® and Cumulative Index to Nursing & Allied Health Literature™ (CINAHL®).

Address Otostomy Wound Management, HMP Communications, 83 General Warren Boulevard, Suite 100, Malvern, PA 19355; email: bzeiger@hmpcommunications.com.