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The Importance of Engagement

What sets nurses who are engaged in their work apart from those experiencing burnout? Nurses who are engaged with their work have a psychological commitment to their jobs and workplaces (Fasoli, 2010). Engagement occurs when there is a match between nurses and their work settings. Evidence of engagement includes high energy, involvement, and positive self-worth (Maslach & Leiter, 1997). A positively engaged nurse reflects a productive work-related state of mind that is characterized by feelings of vigor, dedication to work, and absorption, which includes being fully committed and persistently immersed in work-related activities (Shaufeli, Bakker, & Salanova, 2006).

Engagement is a pervasive and lasting state rather than transitory. In addition, research supports the strong connection between a positive work environment, work engagement, and nurse retention. Keeping nurses engaged in their work can significantly affect the delivery of quality patient care and promote greater retention of nurses (Fasoli, 2010; Simpson, 2009).

Despite the dire predictions of health care’s future (e.g., a shortage of key personnel, escalating numbers of aging Baby Boomers, and an increase in the number of Americans with chronic healthcare issues), this issue of RNJ illustrates how rehabilitation nurses and other healthcare professionals are demonstrating their work engagement and, consequently, improving the delivery of quality care. For instance, Collins, Bell, and Gronqvist’s article provides an overview of evidence-based interventions intended to prevent nurses from overexerting themselves by avoiding slips, trips, and falls as well as actions to facilitate safe patient handling. Brown, Hickling, and Frahm describe the crucial role of rehabilitation nurses in various types of disasters, while the other authors of articles in this issue identify feasible interventions to improve the quality of life for patients with physical, psychological, and cognitive disabilities. By disseminating their research, these authors are advancing the scientific basis of our practice and energizing other nurses to contemplate additional questions that need to be explored.

Being engaged in their work—whether it is acute care, clinical, long-term care, or another setting—stimulates nurses to be more enthusiastic, involved, and responsive to new opportunities and challenges and maintains their passion for and contributions to nursing. Nurses who are engaged with their work also tend to be more innovative, involved in activities or projects (e.g., procedural and policy changes, program development), and participate in ways that are personally meaningful and engender an added sense of purpose and satisfaction. As you reflect on your specific engagement with your practice and setting, think about those drivers or antecedents (e.g., work culture, organizational processes and resources, leadership as well as effective communication between all stakeholders) that foster this psychological state and the resultant outcomes (e.g., nurse retention, positive patient experiences).

When engagement is present, nurses tend to function from a position of strength and determination to provide comprehensive quality care rather than a perception of uncertainty and sense of powerlessness. When working together to positively affect the drivers of work engagement, nurses at all levels can advance our practice, the quality of care provided, and the retention of nurses.

References
Developing Evidence-Based Interventions to Address the Leading Causes of Workers’ Compensation Among Healthcare Workers

James W. Collins, PhD MSME • Jennifer L. Bell, PhD • Raoul Grönqvist, PhD

Overexertion and slip, trip, and fall (STF) incidents are two of the leading sources of workers’ compensation claims and costs in healthcare settings (Bell et al., 2008; Bureau of Labor Statistics [BLS], 2008). Working in conjunction with a team of international researchers, the National Institute for Occupational Safety and Health (NIOSH) has been conducting research to demonstrate the effectiveness of comprehensive safe patient handling and STF-prevention programs. The purpose of this article is to summarize the research and outreach efforts of NIOSH and their partners to address the leading occupational injury hazards facing healthcare workers. This article also provides an overview of the changes that are occurring in the healthcare industry as a result of the evidence-based research on safe patient handling and STF prevention that has been conducted in recent years.

Work-related injuries are not only deleterious to healthcare workers’ well-being, but they also affect lost work days and the cost of care. When examining the most disabling work-related injuries, overexertion ranks first among causes, with approximately 50 lost workday injuries per 10,000 full-time equivalent (FTE) employees (BLS, 2008). This event category includes injuries related to lifting, pushing, pulling, holding, carrying, or throwing and costs businesses more than $12 billion in direct costs, accounting for more than one-quarter of the overall national burden of work-related injuries (Liberty Mutual Research Institute for Safety, 2009). The category falls on the same level ranked second as a leading cause of disabling injury, with 34.3 injuries per 10,000 FTE (BLS, 2008). In 2006 falls on the same level claimed direct costs of $6.4 billion and accounted for 13.3% of the U.S. injury burden. According to BLS data, those who work at hospitals and nursing homes, especially nursing aides, are at high risk of sustaining a musculoskeletal disorder or overexertion injury (particularly of the back and shoulder) and slip, trip, and fall (STF) injuries (BLS, 2007a). Frequent lifting and repositioning of patients is the leading source of injury for healthcare workers (BLS, 2003). Among female workers in the United States, nursing aides and orderlies suffer the highest prevalence (18.8%) and report the most annual cases (n = 269,000) of work-related back pain (Guo et al., 1995). In 2000, 10,983 registered nurses (RNs) suffered lost-time work injuries due to lifting patients (BLS, 2002). The average workers’ compensation cost for back pain is $10,689 and $11,411 for upper extremity disorders (Silverstein & Adams, 2006). In a follow-back study of nurses, 12% reported leaving the nursing profession because of back pain (Stubbs, Buckle, Hudson, Rivers, & Baty, 1986). Employment demand for nurses is projected to increase 25% by 2012, creating an expected shortage in the nursing labor pool of 20% by 2015 and 30% by 2020 (American Nurses Association [ANA], 2003). The high injury rate coupled with a critical nursing shortage raises serious concerns about the nursing workforce’s capacity to care for our nation’s growing population (Buerhaus, Staiger, & Auerbach, 2000). The critical shortage of nursing faculty in U.S. nursing schools places additional pressure on meeting the demand for the nursing labor pool. A science base has been developed that identifies root causes and effective intervention strategies to reduce these injuries in health care.

Progress in Reducing Healthcare Worker Injuries

According to BLS data, lifting healthcare patients is the leading source of injury in health care (Personick, 1990). From 1992–2005 the incidence rate for sprains and strains involving days away from work in nursing homes steadily decreased by 67% (from 482.7 to 159.7 per 10,000 workers), and the incidence rate for sprains and strains in hospitals decreased 52% (from 222.4 to 106.1 per 10,000 workers). Figure 1 shows that from 1992–2005, there has been a 70% reduction (from 397.8 injuries...
Developing Evidence-Based Interventions to Address the Leading Causes of Workers’ Compensation Among Healthcare Workers

To 121.2 injuries per 10,000 workers) in injury rates in nursing homes in which healthcare patients were listed as the source of injury. Similarly, a 52% reduction in lost workday injuries (from 110.8 to 53.5 per 10,000 workers) occurred from 1992–2005 in hospitals in which healthcare patients were listed as the source of the injury (Figure 1).

Safe Patient Handling and Movement Research
A search of the scientific literature revealed almost 4,000 published papers on the topic of nursing back injury. Nursing textbooks have discussed the risk of back injury since the emergence of professional nursing (Hampton, 1898). Although nurses have been at risk for the past 110 years, the musculoskeletal hazards of nursing work have historically been blamed on nurses’ lack of strength and poor lifting technique. A significant rise in work-related disability can be traced to shifting nursing care from the home to hospitals. Because hospitals had the reputation as unclean facilities, only 10% of the sick were cared for in such institutions in 1915 (Joel & Kelly, 2002). Most nurses worked in private homes caring for a single patient who was prescribed a long period of bed rest. With the advent of penicillin in the 1940s, the reputation of hospitals began to improve and more patients began receiving health care in hospitals rather than in their homes (Joel & Kelly). The revolutionary concept of early ambulation, which made its way from the battlefield to hospitals in the 1940s during World War II (Sheldon & Blodgett, 1946), increased the physical burden of nursing work from a single patient to a multitude of postoperative patients who could collapse or lose their balance with little notice while being ambulated. Shortly after this shift in nursing care, articles began to appear in nursing journals about “aching backs” (Svec, 1951). The research literature examining back and musculoskeletal injuries among nurses has been expanding rapidly since the 1980s. More recently, the emphasis on nursing back injury research has shifted from describing the magnitude of the problem to seeking solutions to significantly reduce the problem.

Prevention Effectiveness Research for Lifting and Moving Patients
During the 1990s caregivers made progress developing ways to handle and move patients in healthcare facilities. Since the emergence of professional nursing during Florence Nightingale’s time, lifting properly (or body mechanics) has been taught to nurses and nursing aides to help them perform lifts properly and prevent injury. Using body mechanics is intrinsically unsafe because the biomechanical forces required to lift and reposition adult patients exceeds the lifting capacity of most caregivers (Collins, Wolf, Bell, & Evanoff, 2004). Numerous studies have shown that training caregivers how

Figure 1. Rates of Nonfatal Injuries and Illnesses Involving Days Away from Work in Hospitals and Nursing Homes Where Healthcare Patients Were Listed as the Source of Injury (1992–2005)

to use proper body mechanics does not reduce the risk of injury to nursing personnel (Dehlin, Berg, Anderson, & Grimby, 1981; Dehlin & Lindberg, 1976; Snook, Campanelli, & Hart, 1978; Wood, 1986). After it became widely recognized that the hazard of lifting adult human bodies could not be alleviated by training alone, research studies began to examine patient lifting from an ergonomic viewpoint. Task analyses and biomechanical evaluations of patient handling tasks were conducted to redesign patient handling tasks so they would not exceed the capacities of caregivers.

**Biomechanical Laboratory Studies**

Laboratory-based biomechanical studies identified safer ways to lift and move patients that included removing the excessive forces and extreme postures that can occur when manually lifting residents. The collective assessment of the laboratory studies concluded that mechanical lifting equipment significantly reduces the biomechanical stresses that lead to musculoskeletal injuries among caregivers associated with patient lifting (Gagnon, Sicard, & Sirois, 1986; Lloyd, 2004; Marras, Davis, Kirking, & Bertsche, 1999; Ulin et al., 1997; Zhuang, Stobbe, Hsia, Collins, & Hobbs, 1999).

**Field Studies and Demonstration Projects**

After it was demonstrated that mechanical lifting equipment significantly reduced the physical stresses on caregivers under controlled conditions in the laboratory, the next phase of research validated the effectiveness of mechanical lifting equipment in field studies in real-world settings, specifically nursing homes and hospitals. A strong body of research evidence has been developed, demonstrating that a comprehensive safe patient handling and movement program can significantly reduce musculoskeletal injuries among healthcare workers (Collins, Wolf, Bell, & Evanoff, 2004; Garg, 1999; Garg & Owen, 1992; Nelson & Fragala, 2004; Yassi et al., 2001).

The elements of a comprehensive safe patient handling and movement program include

- ergonomic assessment for patient care environments
- an enthusiastic peer leader to promote and sustain program implementation
- mechanical patient lifts and repositioning aides
- patient care assessment protocols that prescribe the best methods for patient transfers
- written safe-lifting policies
- training on the proper use of patient handling equipment
- management support of the program.

A 6-year field study conducted by the National Institute for Occupational Safety and Health (NIOSH; Collins et al., 2004) demonstrated that a comprehensive safe resident handling program significantly reduced workers’ compensation injury rates by 61%, lost workday injury rates by 66%, and restricted workdays by 38% (injuries attributed to resident handling only). In addition, the number of workers suffering repeat injuries was significantly reduced. During the 36-month preintervention period, there were 129 workers’ compensation claims attributed to resident handling, and 11 workers filed more than one workers’ compensation claim for musculoskeletal injuries. During the 36-month postintervention period, 56 workers’ compensation claims were attributed to resident handling and only three employees filed more than one workers’ compensation claim associated with resident handling tasks. The initial investment of $158,556 for lifting equipment and worker training was recovered in less than 3 years based on postintervention savings of $55,000 annually in workers’ compensation costs.

**Key Practice Points**

1. Although slip, trip, and fall incidents appear to be random events that can occur anywhere inside or on the grounds of hospitals, evidence-based prevention actions specifically targeted at reducing slip, trip, and fall incidents among hospital employees have been proven to reduce fall injury rates among hospital employees by 58%.

2. Despite advances in the design of patient lifting equipment, legislation in certain states requiring safe patient lifting programs, and changes in student nursing curriculum to incorporate evidence-based science on patient lifting, musculoskeletal disorders associated with lifting and moving patients continues to be the leading cause of workers’ compensation among healthcare workers.

3. Although the frequent heavy lifting and repositioning of residents in nursing homes exceeds the lifting capacity of most caregivers, an evidence base of science has been amassed demonstrating that comprehensive safe patient handling and movement programs can protect workers’ from injury, reduce workers’ compensation costs, and improve the quality of care delivered to residents.

4. A business case has been developed to show that the investment in comprehensive safe patient lifting programs can be recovered through reduced workers’ compensation expenses and costs associated with lost and restricted work days.
Developing Evidence-Based Interventions to Address the Leading Causes of Workers’ Compensation Among Healthcare Workers

Patient Lifting Legislation in the United States
Although comprehensive safe patient handling and movement programs have not been fully implemented across the U.S. healthcare system, a paradigm shift is occurring in the healthcare industry. Legislation continues to be introduced in numerous states and at the federal level; the following safe patient handling legislation has been passed:

- Texas Senate Bill 1525 was signed into law on June 17, 2005 (State of Texas, 2005).
- New York companion bills A11484 and A07836 and S05116 and S08358 were signed into law on October 18, 2005 (State of New York, 2006).
- Ohio House Bill 67 was signed into law on March 21, 2006, Section 4121.48 (State of Ohio, 2006).
- Washington House Bill 1672 was signed into law on March 22, 2006 (State of Washington, 2006).
- Hawaii House Concurrent Resolution No. 16 passed on April 24, 2006 (State of Hawaii, 2006).
- Rhode Island House 7386 and Senate 2760, passed on July 7, 2006 (State of Rhode Island, 2006).
- Maryland SB 879 safe patient handling legislation was signed into law April 2007 (State of Maryland, 2007a,b).
- Minnesota HB 712.2 safe patient handling legislation was signed into law May 2007 (State of Minnesota, 2007a,b).
- New Jersey S-1758/A-3028 safe patient handling practice act was signed into law January 2008 (State of New Jersey, 2008).

The legislation varies between states regarding which healthcare institutions are covered, requirements of the legislation, and whether funding is available to assist with implementation.

ANA’s Handle with Care Program
The ANA’s Handle with Care Program (2003) is an industry-wide effort designed to prevent back and other musculoskeletal injuries among the nation’s nurses. The campaign is helping reshape nursing education and federal and state ergonomics policy by highlighting safe patient lifting research that demonstrates technology-oriented safe patient handling benefits for patients and the nursing workforce. Other healthcare unions and employee organizations are launching similar efforts.

Safe Patient Handling and Movement Curriculum for Schools of Nursing
In 2004 NIOSH, ANA, and the Veterans Administration (VA) Patient Safety Center of Inquiry in Tampa, FL, collaborated to develop and evaluate a new safe patient handling and curriculum module at 26 nursing schools throughout the United States. The goal of the project was to “translate current research related to safe patient handling into the curricula that could be used by schools of nursing to change the way student nurses in the United States are taught to move and handle patients” (Waters, Collins, Galinsky, & Caruso, 2006, p. 4).

The objectives of the project were to
1. develop, implement, and evaluate a “train-the-trainer” program for safe patient handling and movement, targeting faculty at 26 nursing schools
2. develop, implement, and evaluate an evidence-based safe patient handling curriculum module at 26 nursing schools
3. compare the knowledge, attitudes, and beliefs of the students who were educated and trained at 26 nursing schools using the evidence-based safe patient handling curriculum module with the knowledge, attitudes, and beliefs of nursing students at three schools offering traditional nursing school curriculum
4. describe the process of implementing this evidence-based safe patient handling curriculum module at 26 nursing schools.

The curriculum consists of five main elements: a narrated slide presentation with an embedded video, a series of algorithms (decision tools that help nurses assess patient needs and decide which equipment is appropriate for a specific patient handling activity), didactic materials, laboratory activities, and a quiz to help students evaluate their knowledge of the new patient handling concepts. When the study was designed, it was agreed that a clinical component, in which students would be provided hands-on practice for properly selecting and using patient handling equipment, was needed. To equip the clinical skills laboratories, equipment vendors loaned or donated equipment to participating nursing schools. The safe patient handling and movement training presentation can be downloaded from the NIOSH website (www.cdc.gov/niosh/review/public/safe-patient), and the safe patient handling and movement algorithms, didactic materials, and quiz can be downloaded from the VA Patient Safety Center of Inquiry website (www.visn8.med.va.gov/visn8/patientsafetycenter/safePHandle/default.asp).

STFs Research
Falls on the same level or STFs have been documented as the leading cause of nonfatal injuries in the general population (Bergen, Chen, Warner, & Fingerhut, 2008) and are also one of the leading causes of
A variety of factors have been cited as contributing to STF incidents in the general population. Human factors, such as loss of balance, fatigue, body mass index, alcohol consumption, and use of psychopharmacologic agents can lead to slip and fall incidents, as can workplace conditions such as spilled liquid or debris, uneven or slippery surfaces, or objects in the path of travel (Buck & Coleman, 1985; Davis, 1983; Leclercq, 1999; Maalmivaara, Heliovaara, Knekt, Reunanen, & Aromaa, 1993; Manning, 1983; Templer, Archea, & Cohen, 1985). Most often, slipping is initiated by walking on wet, icy, or oily surfaces (Cohen & Compton, 1982; Kemmlert & Lundholm, 1998; Manning et al., 1988). Cold weather is also associated with an increased risk for slip- and fall-related injuries (Bell et al., 2008; Haslam & Bentley, 1999; Hassi, Gardner, Hendricks, & Bell, 2000). In many workplaces, older workers suffer higher rates of STF injury than younger workers, and this effect is more pronounced in women (Bell et al., 2008; Kemmlert & Lundholm, 1998). Preliminary findings from a case crossover study conducted concurrently with NIOSH research in some of the same hospital locations suggest that contamination and unfamiliarity with pathways are important factors related to the risk of an STF incident in hospital workers (Lombardi et al., 2007).

Because STFs result from a wide variety of circumstances, a number of countermeasures have been cited as having the potential to reduce STF injury incidents. Companies who report success with STF reduction programs typically include some combination of employee training, housekeeping procedures, slip-resistant floor treatment or flooring, and slip-resistant footwear (LaBar, 1998; Lewis, 1997; Morrison, 1999; Norwich, 1992). Unfortunately, these success stories have not been rigorously evaluated. For example, there is limited discussion of study design or methods, detailed results, comparison groups, or possible confounding factors, among other concerns. Manning and colleagues (1988) suggested that one out of every four STF injury incidents could have been prevented by quickly cleaning up spills and removing objects from the floor. Controlling perioperative worker STFs has been addressed by Brogmus, Leone, Butler, and Hernandez (2007). They detail the potential effects that perioperative suite layout and equipment choices can have on STF risks and provide suggestions for mitigating them in this setting. In general, there are very few examples of STF prevention programs that have been rigorously evaluated in the literature.
NIOSH Research to Prevent STF Injuries to Hospital Workers

NIOSH, together with a diverse team of researchers, designed, implemented, and evaluated a comprehensive STF prevention program for hospital workers. The research team has previously published the work (Bell et al., 2008; Collins et al., 2008), and the methods from the previously published work are reviewed briefly below.

Descriptive Analyses

Workers’ compensation injury data, hours worked per employee, and demographic data were linked for all staff employed at three acute care hospitals during a 6-year period (January 1, 1996–December 31, 2005). Demographic data included employee date of birth, gender, job title, and date of hire. The BLS’s Occupational Injury and Illness Classification Structures were used to code injuries. Narrative descriptions of all cases were reviewed, and, for STFs, a more detailed code was assigned to each claim, which included as many details as possible about the specific type of STF incident. A descriptive analysis of preintervention STF incidents was conducted to examine the circumstances of the incidents and locations and patterns of work-related STF incidents to identify countermeasures and targets for prevention. A postintervention analysis was also conducted to identify any changes in patterns.

Case Crossover and Case Follow Back Study

As part of the research partnership, the Liberty Mutual Research Institute for Safety conducted a case crossover and case follow back study to identify the contribution of transient risk factors and describe STF circumstances that could be targeted for prevention during the intervention field study (Lombardi et al., 2007). Healthcare workers who suffered a fall in the study hospitals were recruited into the study when they reported the STF incident to the occupational health department. Employees who consented to participate were interviewed by telephone using a structured questionnaire. Preliminary findings (Lombardi et al.) suggest that the short-term relative risk (95% CI) of a STF was highest when

- walking on an unusual pathway, 86.8 (46.6–161.6)
- contamination was present, 39.8 (31.5–50.2).

Other transient factors in decreasing order of short-term relative risk included carrying objects, being distracted, or being rushed. Pushing or pulling reduced the short-term STF relative risk by about 77%, RR = 0.23 (0.12–0.45).

The results of the case crossover study suggest the importance of several transient modifiable risk factors to help prevent STF events at work. Importantly, floors should be kept clean and dry, and hospitals should develop a system that allows employees to rapidly report floor spills so that contaminants can be cleaned up promptly.

Laboratory Testing of Shoe/Floor Slip Resistance

Working in partnership with NIOSH, the Finnish Institute of Occupational Health (FIOH) conducted laboratory tests to evaluate the slipperiness of shoes (most commonly worn and promising slip-resistant shoes), and hospital flooring (existing and promising slip resistant) tested with soapy and oily contaminants (Collins et al., 2008). The test apparatus was a slip simulator instrument that was developed to closely reproduce the biomechanical parameters of a human walking with a normal gait (Grönqvist, Roine, Jarvinen, & Korhonen, 1989). Seven types of new shoes were first pretested on a stainless steel surface and again after abrasion of the shoe sole according to a draft standard (British Standards Institute, 2007). Glycerol was used to simulate the oily condition. Table 1 presents the slip-resistance classification of the shoes and flooring based on the measured dynamic coefficient of friction.

The study identified slip-resistant shoes and flooring that performed optimally under soapy and oily conditions. The results for the shoes are presented in Table 2, and Table 3 shows results for floorings in oily and soapy conditions. The results confirmed previous data (Grönqvist, 1995) showing that heel and sole abrasion significantly improved slip resistance.

Flooring Testing and Classification

Slip-resistance evaluations of ten hospital floorings were conducted with both slip-resistant (shoe 2; Table 2) and standard athletic shoes (shoe 3; Table 2). Shoe 2 was classified as slip resistant (Dynamic Coefficient of Friction [DCOF] > 0.30) and shoe 3 as “slippery” (DCOF < 0.20) on stainless steel (i.e., “oily”) test condition.

All DCOF differences between the two contaminant conditions (oily versus soapy) were statistically significant (p < .01) for all floorings, except flooring 4 and 8 tested with shoe 2 (Table 2). All DCOF were significantly different (p < .01) between the two test shoes (2 and 3; Table 2). Quarry tile was the only tested flooring that was slip-resistant with both test shoes under all contaminant conditions (Table 2). Although there were limited opportunities to replace flooring in the hospitals, results from the laboratory studies were used to select slip-resistant shoes for hospital staff.
Hospital Hazard Assessments

On-site STF hazard assessments were conducted at the study hospitals to identify environmental conditions and housekeeping procedures that might contribute to the risk of STF incidents. The condition of walkway surfaces, contaminants on the floor, projecting objects and cords, lighting, handrails, and drains inside and outside the hospitals were examined. Areas examined inside included the hospital’s entrances, stairs, ramps, operating rooms, emergency room, scrub sink areas, nursing stations, pharmacy, histology laboratory, hallways, kitchen (including dishwashing areas) and cafeteria, patient rooms (including bathrooms), areas where surgical instruments are decontaminated, engineering and carpenter shops, and the morgue. Outside areas examined included the parking garage, street, handicap ramps, and sidewalks. This assessment targeted STF hazards for employees; however, eliminating some hazards also benefited patients and visitors. General and specific STF hazards were described in a written report that was provided to hospital management, safety staff, the housekeeping manager, and the groundskeeper manager. Recommendations addressed walkway repairs, degreasing some food-preparation areas, employee training, an awareness campaign, and products and procedures that can help prevent STF incidents.

Table 1. Classification of Slip Resistance Based on Measured Dynamic Coefficient of Friction

<table>
<thead>
<tr>
<th>Dynamic Coefficient of Friction (DCOF)</th>
<th>Level of Slip Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;0.30</td>
<td>Slip resistant</td>
</tr>
<tr>
<td>≥0.20–0.30</td>
<td>Moderately slip resistant</td>
</tr>
<tr>
<td>&lt;0.20</td>
<td>Slippery</td>
</tr>
</tbody>
</table>

Table 2. Slip-Resistance Rating for Shoes Pretested on the Reference Stainless Steel Surface—Oily Condition

<table>
<thead>
<tr>
<th>Shoe Number and Type</th>
<th>Intact Heel/Sole</th>
<th>Abraded Heel/Sole</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nursing shoe with laces</td>
<td>0.159 (0.001)</td>
<td>0.198 (0.022)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>2. Slip-resistant shoe with laces (a)</td>
<td>0.328 (0.026)</td>
<td>0.375 (0.028)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>3. Shoe with laces (b)</td>
<td>0.149 (0.015)</td>
<td>0.173 (0.013)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>4. Clog</td>
<td>0.073 (0.012)</td>
<td>0.141 (0.008)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>5. Shoe with open heel</td>
<td>0.084 (0.011)</td>
<td>0.142 (0.012)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>6. Shoe with laces (c)</td>
<td>0.113 (0.009)</td>
<td>0.138 (0.019)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>7. Safety shoe with laces</td>
<td>0.140 (0.009)</td>
<td>0.153 (0.010)</td>
<td>&lt;.05</td>
</tr>
</tbody>
</table>

*Statistically significant difference between new and abraded soles (t-test paired 2-tailed)

Table 3. Floorings Tested in the Oily and Soapy Conditions with Two Shoes

<table>
<thead>
<tr>
<th>Flooring Number and Type</th>
<th>Shoe 2*, Oily Condition</th>
<th>Shoe 2*, Soapy Condition</th>
<th>Shoe 3**, Oily Condition</th>
<th>Shoe 3**, Soapy Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Waxed vinyl tile</td>
<td>0.356 (0.044)</td>
<td>0.263 (0.029)</td>
<td>0.133 (0.015)</td>
<td>0.163 (0.008)</td>
</tr>
<tr>
<td>2. Slip resistant (a)</td>
<td>0.325 (0.027)</td>
<td>0.452 (0.034)</td>
<td>0.129 (0.012)</td>
<td>0.254 (0.015)</td>
</tr>
<tr>
<td>3. Slip resistant (b)</td>
<td>0.369 (0.027)</td>
<td>0.353 (0.021)</td>
<td>0.155 (0.023)</td>
<td>0.283 (0.012)</td>
</tr>
<tr>
<td>4. Slip resistant (c)</td>
<td>0.367 (0.034)</td>
<td>0.378 (0.021)</td>
<td>0.144 (0.017)</td>
<td>0.290 (0.011)</td>
</tr>
<tr>
<td>5. Slip resistant (d)</td>
<td>0.335 (0.023)</td>
<td>0.277 (0.022)</td>
<td>0.131 (0.013)</td>
<td>0.202 (0.007)</td>
</tr>
<tr>
<td>6. Quarry tile</td>
<td>0.580 (0.026)</td>
<td>0.753 (0.021)</td>
<td>0.288 (0.021)</td>
<td>0.539 (0.018)</td>
</tr>
<tr>
<td>7. Safety (a)</td>
<td>0.352 (0.023)</td>
<td>0.405 (0.016)</td>
<td>0.163 (0.008)</td>
<td>0.243 (0.034)</td>
</tr>
<tr>
<td>8. Safety (b)</td>
<td>0.311 (0.018)</td>
<td>0.319 (0.012)</td>
<td>0.146 (0.008)</td>
<td>0.242 (0.023)</td>
</tr>
<tr>
<td>9. Safety (c)</td>
<td>0.351 (0.022)</td>
<td>0.483 (0.019)</td>
<td>0.154 (0.011)</td>
<td>0.248 (0.032)</td>
</tr>
<tr>
<td>10. Safety (d)</td>
<td>0.365 (0.020)</td>
<td>0.437 (0.014)</td>
<td>0.168 (0.008)</td>
<td>0.267 (0.025)</td>
</tr>
</tbody>
</table>

*Shoe 2: Slip-resistant shoe with laces. **Shoe 3: Common tennis shoe with laces.
Intervention Effectiveness Field Study

Researchers from NIOSH’s Division of Safety Research and safety staff from the hospital corporation designed, implemented, and evaluated the impact of a comprehensive STF prevention program in three hospitals on STF-related workers’ compensation injury claims. The findings from the descriptive analysis, case crossover study and case follow back study, hazard assessments, and laboratory tests were used to establish the comprehensive best practices program. The field study, conducted in conjunction with BJC Health System and the VA hospital system, compared the injuries of a cohort of approximately 17,000 hospital staff for a 10-year period from 1996–2005.

According to Bell and colleagues (2008), who reported on the results of the intervention evaluation study, the hospitals’ total STF workers’ compensation claims rate declined by 58% from the preintervention (1996–1999) rate of 1.66 claims per 100 FTE to the postintervention (2003–2005) time period rate of 0.76 claims per 100 FTE (adjusted rate ratio 0.42, 95% CI: 0.33–0.54). STFs caused by liquid contamination (water, fluid, slippery, greasy and slick spots) were the most common cause (24%) of STF claims for the entire study period 1996–2005. Food services, transport and emergency medical service, and housekeeping staff were at highest risk of an STF claim in the hospital environment. Nursing and office administrative staff represented the largest number of hospital staff and also generated the largest numbers of STF claims. STF injury events in hospitals have myriad causes and the work conditions in hospitals are diverse.

Examining the detailed circumstances of STF incidents among hospital employees revealed that many of these injuries are preventable. Although each component of the prevention program may seem insignificant (e.g., replacing shorter “wet floor” signs with taller, more noticeable signs), they all contribute to a comprehensive program that can have a substantial impact (Table 4; Bell et al., 2008). Given the diverse circumstances contributing to STFs, a comprehensive approach to prevention seemed to be the most logical starting point with the highest likelihood of reducing STFs for the hospital workforce. There were many similarities among hospitals’ patterns of STF incidents; however, the patterns were not identical. Each hospital is likely to have some unique features and processes, which underscore the importance of on-site hazard-assessment walkthroughs and reviews of injury incident information. Intervention evaluation research for occupational STFs is limited. This study evaluated the effectiveness of a comprehensive STF prevention program for hospital workers in a field setting. Safety professionals working in hospitals may be encouraged by the positive findings of this research to implement such a program in their own facilities.

A key component of this prevention program was the sustained commitment and upkeep by hospital staff. Replication of this intervention study in other hospitals and healthcare facilities is warranted, because replication (in addition to the use of control facilities) will provide stronger evidence for the effectiveness of a comprehensive STF prevention program.

This effort brought together a first-of-its-kind collaboration between private and public sector hospitals throughout the United States, organized labor, private and public sector health and safety researchers, and international researchers with cooperation from manufacturers of footwear, flooring, and floor wax. The goal of this collaboration was to research, develop, and test a program to prevent STF injuries among healthcare workers. Through analyses of historical STF work-injury data, telephone interviews of injured workers, laboratory studies evaluating flooring and shoes, and field studies in select hospitals, the group was able to establish a comprehensive best practices injury-prevention program. A user-friendly document is in development for distribution to all hospitals in the United States, and the results of various component studies have been presented at multiple national and international conferences.

Conclusions

An evidence base of scientific research demonstrates that multifaceted safety and health initiatives can be highly effective in reducing injuries associated with patient handling and STFs. In addition, the best-practice programs evaluated in these intervention trials provide practical information for owners of healthcare facilities, administrators, nurse managers, and safety and health professionals who are interested in replicating these types of programs in their facilities. Research has shown that incorporating mechanical lifting devices into a safe patient lifting program decreases caregiver injuries, lost workdays, and workers’ compensation costs and improves employee recruitment and retention, employee morale, and quality of care for residents (Collins et al., 2004; Nelson et al., 2006). Safe patient handling programs also make good business sense. Cost-benefit analyses have demonstrated that the initial investment in lifting equipment and employee training can be recovered in less than 3 years through reductions in workers’ compensation expenses (Collins et al., 2004; Nelson et al., 2006).

Intervention evaluation research for occupational STF prevention is limited. However, recent research has demonstrated that a comprehensive program can
Table 4. Main Strategies of the Slips, Trips, and Falls (STF) Prevention Program Implemented at the Study Hospitals

<table>
<thead>
<tr>
<th>Keep floors clean and dry.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Encourage workers to clean up, cover, and report floor contaminants promptly.</td>
</tr>
<tr>
<td>• Install wall-mounted spill pads or paper towel holders conveniently located throughout the hospital to provide easy access to cleaning materials.</td>
</tr>
<tr>
<td>• Advertise the phone/pager numbers for housekeeping through e-mails, posters, and general awareness campaigns.</td>
</tr>
<tr>
<td>• Install pop-up tent-style wet floor signs in wall-mounted tubes in easily accessible locations throughout the hospital to provide easy access to products to cover/identify a spill.</td>
</tr>
<tr>
<td>• Provide walk-off mats, paper towel holders, trash cans, and umbrella bags near entrances to minimize wet floors.</td>
</tr>
<tr>
<td>• Place water-absorbent walk-off mats with beveled edges at hospital entrances. The mats should be large enough for multiple steps to fall on the mat and wide enough to cover the entire doorway. Ideally, the soles of shoes should not deposit ice or water on the floor when they step off the mat. Consider use of these mats in areas where employees may be continually exposed to wet conditions.</td>
</tr>
<tr>
<td>• Use appropriate methods for cleaning and degreasing kitchen floors; choose appropriate cleaning products for the conditions and mix according to manufacturer’s directions.</td>
</tr>
<tr>
<td>• Check that pipes are correctly aligned with the drain they are emptying into.</td>
</tr>
<tr>
<td>• Unclog drains, particularly in kitchens.</td>
</tr>
<tr>
<td>• Prevent entry into areas with contaminated walking surfaces.</td>
</tr>
<tr>
<td>• Use barrier signs that block off areas (tension rod with hanging sign across doorways, tall cones with chains, hallway barriers).</td>
</tr>
<tr>
<td>• Use taller, more noticeable STF signage (48”-tall wet-floor signs, flashing lights on top of signs, pop-up tent style signs).</td>
</tr>
<tr>
<td>• Promptly remove wet floor signs after the floor is dry to avoid habituation.</td>
</tr>
<tr>
<td>• Completely block off area during floor waxing or stripping; use door-stopper barrier to prevent wax from overflowing into adjacent areas during waxing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eliminate indoor surface irregularities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Replace or restretch loose or buckled carpeting.</td>
</tr>
<tr>
<td>• Replace mats that are curled or ripped; secure edges with carpet tape.</td>
</tr>
<tr>
<td>• Remove, patch underneath, and replace indented or blistered tile.</td>
</tr>
<tr>
<td>• Consider replacing smooth flooring materials with rougher surfaces with a higher coefficient of friction.</td>
</tr>
<tr>
<td>• Patch or fill cracks in walkways that are greater than 0.25”.</td>
</tr>
<tr>
<td>• Highlight changes in curb or walkway elevation with yellow warning paint.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Check stairs and handrails.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ensure stairs and handrails are in compliance with safety codes and recommendations.</td>
</tr>
<tr>
<td>• Highlight the nosing of each step with contrasting paint or strips.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prepare for ice and snow.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide ice cleats (or similar product) for home health and maintenance workers to put over regular shoes.</td>
</tr>
<tr>
<td>• Distribute winter weather e-mail warnings to all workers with e-mail access.</td>
</tr>
<tr>
<td>• Provide bins that anyone can use to spread ice melting chemicals on icy patches.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Create general awareness campaign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prominently display phone and pager numbers for maintenance and housekeeping departments and e-mail this information intermittently to staff or reporting spills, slippery conditions, ice, and other STF hazards.</td>
</tr>
<tr>
<td>• STF hazard awareness campaign can be promoted through health fairs, posters, paycheck inserts, and e-mails.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Review past injury records.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Review several years of past STF-related workers’ compensation claims or incident reports to identify the most common STF patterns and circumstances and identify job groups at highest risk.</td>
</tr>
<tr>
<td>• Identify potential STF “hot spots” by reviewing the description of the incidents to identify locations where multiple STF incidents have occurred.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hazard assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct hazard assessments to identify environmental conditions that might increase the risk of STF incidents. Specific hazardous conditions to be assessed include the condition of walkway surfaces, objects and contaminants on the floor, protruding objects, cords, lighting, handrails, and drains. Areas inside the hospital that should be inspected include the hospital’s entrances; stairs; ramps; operating rooms; the emergency room; scrub sink areas; nursing stations; the pharmacy; the histology lab; hallways; the kitchen, including dishwashing areas and the cafeteria; patient rooms, including bathrooms; surgical instrument decontamination areas; engineering and carpenter shops; and the morgue. Areas outside the hospital that should be examined include parking areas, streets, handicap ramps, and sidewalks.</td>
</tr>
</tbody>
</table>
reduce STFs among hospital workers by approximately 60% (Bell et al., 2008). A key component to both the safe patient handling and STF prevention programs is sustained commitment by the hospital management and staff. Because the scientific evidence demonstrates that STF and patient lifting prevention programs can be highly effective, it is hoped that these results will facilitate widespread replication of these types of programs in other healthcare facilities.

Acknowledgment

The findings and conclusions in this manuscript are those of the authors and do not necessarily represent the views of NIOSH.

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References


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Emergencies, Disasters, and Catastrophic Events: The Role of Rehabilitation Nurses in Preparedness, Response, and Recovery

Lisa M. Brown, PhD • Edward J. Hickling, PsyD • Kathryn Frahm, PhD MSW

Rehabilitation nurses play an integral role in helping patients and communities plan for, respond to, and recover from disasters. This article provides an overview of various types of disasters, the terminology used by planners and responders, and the structure that governs the delivery of services, resources, and patient care. Information about specialized training in disaster response and volunteer opportunities through national and state humanitarian relief programs are provided. Although each nursing specialty lends expertise to emergency and disaster situations, rehabilitation nurses are particularly well-suited to help during times of complex, multifaceted medical and emotional responses.

Increasingly, the news is filled with reports of natural disasters and terrorist activity. There is a growing awareness that disasters can strike anytime and anywhere. Data on the frequency and type of disasters reported by the Federal Emergency Management Agency (FEMA) and the World Health Organization (WHO) support this impression. On average, a disaster occurs every day somewhere in the world (Rodriguez, Vos, Below, & Guha-Sapir, 2009) and weekly in the United States. In contrast, a fire that requires a fire department response occurs every 22 seconds in the United States (Karter, 2009).

Although disasters are events of greater magnitude than emergencies (Guha-Sapir, 2000), most communities are well prepared for emergencies and have dedicated fire stations with well-trained firefighters, emergency medical technicians, and a fleet of emergency vehicles. In addition, most people at some point in their lives will participate in fire drills and are familiar with basic principles of fire safety, fire alarms, smoke detectors, and extinguishers. In general, people are not as familiar with and prepared for disasters as they are for emergencies. In part, it is easier to justify the costs associated with education, training, and maintaining dedicated resources for responding to frequent emergencies than for rare, but calamitous disasters. Furthermore, public perception of risk associated with disasters is typically low, which diminishes motivation to prepare for an infrequent event.

However, to optimally function—personally and professionally—during a complex, demanding, and potentially enduring disaster (e.g., flu pandemic), it is advantageous to possess a basic knowledge of disasters, the terminology used by planners and responders, and the structure that governs delivery of services, resources, and patient care prior to the occurrence of an actual event. In addition to this general overview, this article also describes specialized training in disaster preparedness and response and volunteer opportunities with national and state humanitarian relief programs. Finally, because rehabilitation nurses play an integral role in helping patients and communities plan for, respond to, and recover from disasters it is imperative to have a personal disaster plan in place before an event occurs to ensure that the personal needs and those of loved ones, pets, and others are met during an unfolding event.

Information about how to prepare a plan is provided.
public health officials using local resources (Guha-Sapir, 2000). WHO defines a disaster as an event involving 100 or more persons, with 10 or more deaths, an official disaster declaration, or an appeal for assistance (Below, Wirtz, & Guha-Sapir, 2009). Understandably, major disasters typically require more resources than are available in the immediate geographic area. Essential services such as food, water, housing, health care, and sanitation are usually disrupted for prolonged periods of time. Finally, a catastrophe is a sudden and extreme disastrous event, causing an upheaval in the order of communities, which requires an extensive recovery process that fundamentally changes the surrounding environment (Homeland Security, 2008).

In 2008 there were 3,320 civilian fire fatalities (Karter, 2009); in contrast, only 10 major disasters in the United States have resulted in 1,000 or more fatalities (FEMA, 2010). However, all of these deaths occurred as a result of a single event. The psychological effects of a high death rate combined with a surge in those seeking assistance and healthcare services may easily overwhelm available systems of care. The ability of medical providers, relief workers, and disaster responder personnel to quickly mobilize and provide needed resources, such as water, food, and shelter, affects the recovery of the surviving population. The likelihood of an onset of a disaster-related mental or physical illness varies according to the time since the event. The postdisaster time frame is typically divided into three phases: acute or short term (1 month or less), intermediate (1–12 months), or chronic or long term (12 months or longer).

Disasters are also classified as natural or human made. Human-made disasters can be further categorized as intentional, such as acts of terrorism, or unintentional, such as technological events like the Three Mile Island accident in 1979. Common types of natural disasters include flooding, hurricanes, earthquakes, tsunamis, and tornados. There has been a move toward all-hazards planning for disasters. Although the H1N1 and H5N1 influenza viruses involve the spread of an infectious disease, many argue that pandemics also fall within the realm of disasters. In fact, because of the potential for significant and prolonged social disruption, President George W. Bush assigned the overall coordination of the pandemic response to the Secretary of Homeland Security.

It is evident that disasters are not uniform events. Unique differences exist between types of disasters (e.g., a hurricane is different than an earthquake) and variability exists within any specific type of disaster (e.g., some earthquakes are bigger and more damaging than others). Other parameters that define a disaster that should be considered include type of disaster (i.e., natural or human made), predictability, advance warning, frequency or probability of recurrence, duration of the disaster, intensity, and scope (DeWolfe, 2000). These elements have implications for planning and recovery and can be used when developing all-hazards plans.

Most all-hazards approaches recognize four phases of a disaster. The first phase, mitigation, seeks to minimize the effects of a potential disaster. For example, not building in a flood zone would greatly reduce the threat of damage by flooding for that particular structure. Likewise, helping patients consider how they would manage their rehabilitation medical care prior to the occurrence of a disaster could help them avoid interruption of treatment and possible negative health consequences. It is important for nurses to become familiarized with the types of disasters that are most likely to occur where they live and practice. For example, the Gulf Coast states are threatened by a recurring hurricane season, whereas the West Coast is more likely to experience unpredictable earthquakes. Disaster preparedness, the second phase, can take many forms—from preparing patients’ personal disaster plans to developing a disaster plan for a medical practice or an entire community. The third phase, response, involves efforts to minimize the hazards created by a disaster. For example, if sufficient warning takes place, such as with hurricanes, it may be possible for patients to evacuate in advance of the storm to a safe shelter. If there is little if any warning, such as with earthquakes, knowing safety procedures such as moving beneath a sturdy table or to a corner

<table>
<thead>
<tr>
<th>Key Practice Points</th>
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<tbody>
<tr>
<td><strong>1.</strong> The psychological effects of a high death rate combined with a surge in those seeking assistance and healthcare services may easily overwhelm available systems of care.</td>
</tr>
<tr>
<td><strong>2.</strong> It is imperative that responder personnel have the ability to quickly mobilize and provide needed resources, such as water, food, and shelter, as recovery efforts affect the well-being of the surviving population.</td>
</tr>
<tr>
<td><strong>3.</strong> Core competencies for rehabilitation nurses include familiarity with the disaster response plan of their workplace and community health system, understanding their specific role in response and recovery efforts, and the ability to evaluate the immediate situation and adapt as necessary.</td>
</tr>
<tr>
<td><strong>4.</strong> Because rehabilitation nurses play an integral role in helping patients and communities plan for, respond to, and recover from disasters, it is important to have a personal disaster plan in place prior to deployment to ensure that personal needs are met during an unfolding event.</td>
</tr>
</tbody>
</table>
Emergencies, Disasters, and Catastrophic Events: The Role of Rehabilitation Nurses in Preparedness, Response, and Recovery

of the room when the earth begins to tremble can be life saving. The final phase is the recovery. As noted above, the recovery period for major disasters can last from days to years. The demand for rehabilitation nursing services could increase significantly during this phase. Treatment would continue for existing patients and services would be initiated for new patients who have been harmed by the disaster.

In some instances, survivors may have to adjust to a new normal. In the case of a tornado, entire communities may be destroyed in a very short period of time. Personal belongings, homes, community institutions, tree-lined streets, and a favorite coffee shop may disappear during a single storm. Even though the replacement structures that are built after the storm will be new and perhaps better than what previously existed, these buildings will not be the same as what was standing before the tornado. Not surprisingly, people grieve the loss of what was, and some will have difficulty adjusting to the new normal. Rehabilitation nurses can help people during all phases of a disaster. To do so requires knowledge of the terminology used by planners and responders and familiarity with services that are available to assist others during each of the disaster phases.

Disaster Terminology and Systems
Just as the nursing profession has its own scientific language, shorthand, and workforce culture, so do the agencies responsible for preparing for and responding to a disaster. The National Incident Management System (NIMS) and the Hospital Incident Command System (HICS) are tasked with preparing for and responding to multiple types of disasters in the United States. Within NIMS, one of the core components is the Incident Command System (ICS), which is the national standard required for emergency management across all levels of government (local, state, national) throughout the United States.

An incident is an event that requires the response of emergency service personnel to prevent or minimize loss of life or damage to the environment. The ICS is based on military concepts that were developed by California fire-fighting organizations to handle large forest fires. In the past 3 decades, the ICS has further evolved and is now a standardized all-hazard approach that features an integrated organizational structure allowing response efforts to match the complexities of single or multiple events. ICS is a tactical system designed to build a comprehensive management structure from a variety of response personnel (i.e., both government and nongovernment agencies), cope with any size or kind of event, provide logistical support, guide task allocation, and avoid unnecessary duplication of services (FEMA, 2009a).

Importantly, ICS establishes common terminology allowing diverse disaster management and support entities, such as hospitals, nursing homes, and other nongovernment response agencies to work together. Standard terminology helps to define the major functions of each unit and describe available resources, facilities, and personnel so that all responding parties can communicate, collaborate, and interact efficiently.

For example, the Incident Commander typically has experience or advanced training in disaster response and is responsible for directing emergency operations and decisional authority for how all actions will be coordinated. To carry out response activities, people at each setting are assigned oversight for one of five major functional areas in the ICS: command, operations, logistics, planning, and finance. The ICS can be used to assign rehabilitation nurses to key emergency management duties and designate needed equipment and supplies to carry out tasks. To learn more about the ICS, two online courses are offered at no cost by FEMA—Introduction to the Incident Command System for Healthcare IS-100HC and Applying ICS to Healthcare Organizations IS-200HC (see http://training.fema.gov/IS/crslist.asp). In addition, the Center for HICS Education and Training posts a variety of educational materials, forms, and guidance for nurses and other healthcare professionals on their website (see http://www.hicscenter.org/pages/index.php).

Volunteer Opportunities
There are numerous opportunities for rehabilitation nurses to volunteer at the local, state, or international levels. Nurses can help develop and coordinate disaster preparedness plans at an individual, group, or systems level. For example, patients may require assistance with both pre- and postdisaster planning to manage their medical conditions. Rehabilitation nurses may be called upon to assist in planning the institutional response of hospitals, nursing homes, and medical practices. State departments of health and nongovernment organizations may desire guidance when planning for vulnerable populations, people with medical conditions, and operation of special needs shelters. In addition to the organizations listed in Table 1, there are a variety of religious organizations and international relief associations that also sponsor disaster-response teams. These major organizations have materials posted on their websites that explain how to apply, obtain required training, and complete the process to become credentialed as a disaster volunteer. Notably, the time to volunteer is before an event occurs.

In the days following the terrorist attacks on September 11, 2001, healthcare professionals traveled to New York City to volunteer their clinical services.
Unfortunately, these self-deployed people could not be part of the formal response effort because they were not credentialed and posed a potential safety risk to themselves and others. In recognition of the need to have a screened, registered, and trained cadre of healthcare clinicians, the Department of Health and Human Services integrated the initiatives of the Medical Reserves Corps (MRC) and the Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VHP).

The Office of Civilian Volunteer Medical Reserve Corps (OCVMRC) oversees the tasks required to establish, train, and maintain a national network of community-based volunteers. Each local MRC unit provides screening, credentialing, and training with the goal of supporting routine public health activities and preparedness and response efforts with other agencies during times of disaster (MRC, 2008). The ESAR-VHP program provides oversight for the development of standardized state-based programs for registering and verifying the credentials of volunteer health professionals (MRC, 2008). Each state ESAR-VHP registry uses a set of national standards to create a response system that can quickly identify and coordinate the services of volunteer health clinicians in a disaster. To achieve this objective, each state program is responsible for collecting and verifying information on the identity, licensure status, and credentials of healthcare professionals who wish to volunteer. Other relief organizations, including the American Red Cross, conduct similar background checks to verify identity and credentials of their volunteer relief workers. In addition to these organizations, opportunities exist with professional organizations and faith-based responder groups. To coordinate response of medical personnel, increased effort has been made to include clinicians during the disaster planning phase as well as in the response framework. To find volunteer opportunities, contact one of the agencies listed in Table 1 or one of the professional organizations listed in Table 2.

### Table 1. Internet Resources for Disaster Information

<table>
<thead>
<tr>
<th>Organization</th>
<th>Web Address</th>
<th>Content Description</th>
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<tbody>
<tr>
<td>American Red Cross</td>
<td><a href="http://www.redcross.org">www.redcross.org</a></td>
<td>A national, nonprofit organization with international partners that works to promote humanitarian aid to disaster survivors to prevent and relieve undue pain and suffering.</td>
</tr>
<tr>
<td>Centers for Disease Control and Prevention</td>
<td><a href="http://www.cdc.gov">www.cdc.gov</a></td>
<td>A major component of the Department of Health and Human Services designed to provide information, expertise, and tools that individuals and communities need to protect and enhance health.</td>
</tr>
<tr>
<td>Church of the Brethren Children’s Disaster Services</td>
<td><a href="http://www.brethren.org/site/PageServer?pagename=serve_childrens_disaster_services">www.brethren.org/site/PageServer?pagename=serve_childrens_disaster_services</a></td>
<td>A national, faith-based organization designed to meet the needs of traumatized children through the provision of disaster assistance in the form of respite, education, and consultation.</td>
</tr>
<tr>
<td>Citizen’s Corps</td>
<td><a href="http://www.citizencorps.gov">www.citizencorps.gov</a></td>
<td>A strategic FEMA program intended to bring together government and community leaders to involve citizens in disaster preparedness, response, and resilience.</td>
</tr>
<tr>
<td>Federal Emergency Management Agency (FEMA)</td>
<td><a href="http://www.fema.gov">www.fema.gov</a></td>
<td>A federal agency housed in the U.S. Department of Homeland Security with the mission of assisting communities and disaster responders with building and sustaining the capacity to deal with all disaster phases.</td>
</tr>
<tr>
<td>Medical Reserve Corps</td>
<td><a href="http://www.medicalreservecorps.gov">www.medicalreservecorps.gov</a></td>
<td>A program of the Office of the U.S. Surgeon General, it is designed to establish groups of medical and public health personnel to utilize their expertise in addressing community need.</td>
</tr>
<tr>
<td>National Center for Posttraumatic Stress Disorder (PTSD)</td>
<td><a href="http://www.ncptsd.va.gov">www.ncptsd.va.gov</a></td>
<td>A part of the U.S. Department of Veterans Affairs, this program aims to enhance the welfare and care provided to veterans and other individuals experiencing PTSD and other stress-related disorders through research, training, and education.</td>
</tr>
<tr>
<td>National Emergency Response Team</td>
<td><a href="http://www.nert-usa.org">www.nert-usa.org</a></td>
<td>A volunteer-driven organization committed to establishing programs to develop and implement disaster response services.</td>
</tr>
<tr>
<td>Ready America</td>
<td><a href="http://www.ready.gov">www.ready.gov</a></td>
<td>A program of FEMA, it is designed to help Americans prepare, plan, and be informed about disasters and emergencies.</td>
</tr>
</tbody>
</table>

### Training

Most organizations involved in disaster relief efforts provide ample opportunities for advanced training and education (see Table 1). The MRC often offers courses on such topics as surveillance and reporting of infectious disease, responding to people affected by weapons of mass destruction, and the distribution and administration of flu vaccines. Furthermore, many independent study courses can be accessed online from the FEMA website (see http://training.fema.gov/IS/crslist.asp). Some of the courses currently
Table 2. Nurse Resources for Disaster Training and Competencies

<table>
<thead>
<tr>
<th>Organization</th>
<th>Web Address</th>
<th>Content Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Association of Critical Care Nurses</td>
<td><a href="http://www.aacn.org">www.aacn.org</a></td>
<td>This website provides information on critical care nursing and free online modules related to critical care needs of specialized populations.</td>
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<td>American Nurses Association</td>
<td><a href="http://nursingworld.org">http://nursingworld.org</a></td>
<td>This website provides information to help nurses protect themselves, care for patients, and prepare healthcare systems and communities in the event of a disaster and provides links to educational learning opportunities.</td>
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<td>International Nursing Coalition for Mass Casualty Education</td>
<td><a href="http://www.nursing.vanderbilt.edu/incmce/modules.html">www.nursing.vanderbilt.edu/incmce/modules.html</a></td>
<td>This website contains free nursing curriculum education modules on emergency preparedness including information on different types of disaster and incident management systems.</td>
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<td>Nurse.com</td>
<td><a href="http://www.nurse.com">www.nurse.com</a></td>
<td>This website provides links to multiple continuing education courses on emergency preparedness and response for different types of disasters available for a small fee.</td>
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<td>Nursing Knowledge International</td>
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Personal Disaster Plan

Although each disaster has its own unique challenges, adequate preparation can strongly influence outcome. Just as institutions develop a disaster plan, nurses should have a personal plan in place for times of disaster. Recommendations for amount and type of supplies, evacuation, sheltering, and plans for contacting family and friends will vary by the type of the disaster but typically include adequate amounts of water, food, medicine, and other essentials such as batteries and pet food to independently survive a minimum of 3 days. A variety of plans, recommendations, and checklists can be downloaded from Homeland Security (FEMA, 2009b), the American Red Cross, and the Centers for Disease Control and Prevention (American Red Cross, 2006). It is difficult to work during a disaster, but even more so if you are worried about the welfare of family, friends, and pets. If you are part of a disaster response effort, personal advance preparation is necessary.

Disasters and Nursing

Nurses’ involvement in disaster response efforts dates back to providing treatment to wounded soldiers in battle zone field hospitals during the nineteenth century in the United States and abroad (American Red Cross, 2009). Since that time, the role of nurses in disasters has evolved into a critical component of comprehensive response efforts and encompasses multiple areas including triage, transportation, and treatment of disaster survivors (Veenema, 2006). Nurses comprise one of the largest groups of healthcare professionals that can be mobilized in the event of a disaster. In particular, rehabilitation nurses play a vital role in planning, recovery efforts, and fostering disaster resilience because they are intimately involved in treating survivors adapting to disaster-related disabilities.

The type of disaster directly affects the type of demands placed on rehabilitation nurses. Survivors of disasters may experience psychological and physical injuries requiring medical and rehabilitation services. For example, fractures, punctures, and respiratory problems are common after earthquakes, hurricanes, and tornados and, in most cases, are readily treated. However, exposure to chemical agents, biological toxins, or pandemic illnesses may result in symptoms and acute conditions that worsen and eventually become chronic. Rehabilitation nurses are skilled in treating patients who have physical injuries and caring for those who may be facing prolonged recoveries.

To address the immediate and long-term needs of disaster survivors, rehabilitation nurses must hold core competencies related to disaster mitigation, preparedness, and response. Core competencies for rehabilitation nurses include familiarity with the disaster response plan of their workplace and community health system, understanding their specific role in response and recovery efforts, and the ability to evaluate the immediate situation and adapt as necessary. For example, knowledge of existing plans will permit first responders to be aware of locations for emergency medications and supplies, coordinate with other medical personnel, and reassure patients with factual information about how their current needs will be met.
For rehabilitation nurses to be sufficiently prepared to respond to disasters, continuing education in disaster training and response is essential. Multiple disaster training resources on the core competencies of disaster preparedness and response are readily available for rehabilitation nurses and other health-care professionals. Table 2 lists sources available for disaster-related professional development.

Rehabilitation nurses base their practice on restorative principles that seek to maximize wellness and optimize long-term independence (Association of Rehabilitation Nurses, n.d.). This is particularly important and relevant when working with disaster survivors because emotional and mental health recovery, as well as long-term resilience, may be linked to physical recovery. Rehabilitation nurses provide a wide array of services to individuals, groups, and special populations to achieve this goal. Such activities include assessing the health and wellness of individuals and communities, developing plans to maximize recovery, addressing health prevention and promotion needs, and advocating for access and improvement of services to marginalized populations. Using core competencies in planning, response, assessment, and evaluation, rehabilitation nurses provide essential services to address immediate problems and provide long-term solutions in response to disasters.

Although each nursing specialty brings expertise to emergency and disaster situations, rehabilitation nurses are particularly suited to help at these times of complex, multifaceted medical and emotional responses. During medical interventions, rehabilitation nurses’ ability to address practical, focused problems can be reassuring and extremely valued to injured survivors. Further, nurses who work in rehabilitation medicine services are more familiar and comfortable with the emotional reactions that accompany loss and injury, which is useful in times of disaster and emergencies. Rehabilitation nurses are a vital part of disaster preparedness, response, and recovery efforts and must continue to be sufficiently prepared through ongoing training and education to respond to healthcare needs in the event a disaster should occur.

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Addressing the Need for Research on Bariatric Patient Handling

Traci Galinsky, PhD • Stephen Hudock, PhD • Jessica Streit, MS

During the past 3 decades numerous studies have documented the high prevalence of patient handling-related musculoskeletal injuries among healthcare workers and evaluated ergonomic interventions using mechanized equipment for lifting and moving patients. A great deal of research-based evidence now demonstrates the effectiveness of ergonomic interventions to reduce injury risk among healthcare workers who handle patients of average weights and sizes. In contrast, there is a lack of evidence-based research that evaluates ergonomic interventions for handling bariatric patients, whose extreme weights and sizes necessitate specialized handling equipment. The obesity epidemic, along with special medical and therapeutic concerns regarding bariatric patients, exacerbates healthcare workers’ patient handling demands. The National Institute for Occupational Safety and Health is conducting a new study to evaluate bariatric patient handling hazards and interventions and identify evidence-based best practices for handling this population.

This article provides an overview of ergonomic issues in patient handling and describes new research to identify safe practices for lifting and moving bariatric patients whose weights and sizes exceed the limit for use of standard-sized patient handling equipment.

Overexertion Injuries Among Healthcare Workers

Healthcare workers providing clinical or rehabilitative treatment who routinely lift and move patients, such as nurses, aides, therapists, and transport personnel, are at higher risk for musculoskeletal injuries than workers in most other occupations. In 2008 rates of injury due to overexertion among hospital and extended-care nursing personnel were 60.0 and 110.8 per 10,000 workers, respectively. By comparison, the average rate of work-related overexertion injuries for all U.S. industries is 26.4 per 10,000 workers. For several years, overexertion injury rates among healthcare workers have been two to five times the national rate for all industries and have exceeded rates in construction, mining, and other strenuous occupations (BLS, 1992–2008). Although rates of work-related injuries in most other occupations have been decreasing during the past decade, rates of musculoskeletal injuries among nursing personnel are epidemic (Owen, 1999) and have continued to increase (Fragala & Bailey, 2003).

Patient Handling and Injury Risk

Patient lifting and handling tasks, including patient transfers (e.g., bed to gurney, chair to bed) and patient repositioning, are consistently cited as the most frequent causes of back pain and injury among nursing staff (Agnew, 1987; Dehlin, Hedenrud, & Horal, 1976; Garg, 1999; Jensen, 1990; Orr, 1997; Owen, 1999). Lifting and moving a patient poses many challenges that are not present when lifting and moving an object. The human body is neither uniform nor compact. The shapes and weights of the body’s different parts are unevenly distributed, and there are no convenient handholds to grasp. Even under the best of circumstances, lifting a human is awkward and difficult, but most patient handling situations are far from ideal. Patients, by definition, are experiencing some type of illness or injury. They often can bear little or none of their own weight to lessen the load on caretakers, who must try to be gentle while exerting high forces to lift and move patients. Caretakers often have to cope with furniture and equipment that are in the way and take special care to not disturb tubes, catheters, and wires that are connected to patients. Patients may be uncooperative or even combative, unpredictably forcing caretakers off balance by making sudden movements or suddenly going limp. When this happens, the risk of injury increases because caretakers tend to exert sudden, high-muscle forces, often while in awkward postures, to try to maintain balance and prevent themselves and patients from falling (Garg, 1999; Nelson, Gross, & Lloyd, 1997).

Biomechanical Evidence

As pointed out by Garg (1999), nursing personnel are routinely required to lift and move patients weighing between 90 and 250 pounds. Biomechanical studies have shown that, whether performed by one person or two people, the forceful motions...
exerted during transfer and repositioning tasks result in compressive forces on the spine that exceed safety limits specified by the National Institute for Occupational Safety and Health (NIOSH) Lifting Equation (Gagnon, Sicard, & Sirois, 1986; Garg & Owen, 1992; Garg, Owen, Beller, & Banaag, 1991a, 1991b; Marras, Davis, Kirklng, & Bertsche, 1999; Owen & Garg, 1991; Waters, Putz-Anderson, Garg, & Fine, 1993; Zelenka, Floren, & Jordan, 1995; Zhuang, Stobbe, Hsiao, Collins, & Hobbs, 1999). Recent biomechanical analyses using the NIOSH equation indicate that even under ideal circumstances in which a patient is cooperative and unlikely to make sudden movements, the maximum recommended weight limit for manual lifting of a patient or a part of a patient’s body (e.g., a leg or an arm) is 35 pounds (Waters, 2007). The large majority of patient handling tasks exceed that limit, placing nursing and therapy personnel at significant risk for injury each time they manually lift more than 35 pounds during patient care. The potential cumulative effects of these tasks also are alarming, considering that under average conditions, nursing personnel lift an estimated 1.8 tons per work shift (Tuohy-Main, 1997).

Special Concerns for Physical Therapists and Rehabilitation Nurses
As described in detail by Waters and Rockefeller (2010), most patient handling tasks performed by rehabilitative personnel during physical therapy are of longer duration than typical transfer tasks, which increases these workers’ exposure to excessive spinal loads. Consequently, risk of injury from manual patient handling is likely to be even higher for these specialists than for general patient care personnel. Nelson, Harwood, Tracey, and Dunn (2008) also noted the high risk for musculoskeletal injuries among physical therapists and rehabilitation nurses. Moreover, they cited research in which a significant percentage of injured therapists stopped performing or altered treatments that aggravated their symptoms, raising concerns about the impact of patient handling injuries on the quality of rehabilitative treatment (Cromie, Robertson, & Best, 2000).

Patient Weight and Size
Patient weight clearly is a major factor in spinal compressive forces during patient handling (Zhuang et al., 1999), and healthcare workers’ risk for patient handling injuries is greatly exacerbated by the increasing numbers of overweight and obese patients. Increases in body mass index (BMI; BMI = weight in kg/height in m2) values over time in the United States have been documented by Flegal, Carroll, Ogden, and Johnson (2002) and Ogden, Carroll, and Curtin (2006) using data from the National Health and Nutrition Examination Survey. As of 2004, approximately 66% of adult Americans were overweight or obese (BMI > 25). Between 1988 and 2004, the average prevalence of obesity (BMI > 30) rose from 22.9% to 32.2%, and the average prevalence of morbid (extreme) obesity (BMI > 40) rose from 2.9% to 4.8%. Rates of adult morbid obesity recorded in 2004 ranged from 2.8% of men (all racial/ethnic groups) to as high as 14.7% of non-Hispanic black women.

Bariatric Patients
In healthcare settings, bariatric refers to patients whose weights exceed the safety capacity of standard patient lifting equipment (typically approximately 300 pounds) or who otherwise have limitations in health, mobility, or environmental access due to their weights and sizes (Bushard, 2002). Healthcare personnel are encountering hospitalized and critical care bariatric patients with increasing frequency (Pieracci, Barie, & Pomp, 2006; Reto, 2003; Tizer, 2007). In extreme cases, such patients weigh more than 1,200 pounds (Harrell & Miller, 2004).

Special Concerns and Challenges for Bariatric Patients
Obese people require more frequent and extensive health care than people who are not obese due to obesity-related problems such as diabetes, gastric reflux, heart disease, hypertension, incontinence, joint disease, pressure ulcers, respiratory problems, sleep apnea, soft-tissue infections, and some cancers (Bray, 1996; Carek, Sherer, & Carson, 1997; Davidson, Kruse, Cox, & Duncan, 2003; Gallagher, 1999; Sturm, 2003). Approximately 75% of morbidly obese people have at least one comorbid condition that significantly increases the risk of premature death (Must et al., 1999). El-Solh, Sikka, and Bozkant (2001) found that up to 24% of bariatric surgery patients were admitted to intensive care units (ICUs). Mortality risk for obese ICU patients is twice that for patients of normal weight (Tremblay & Banu, 2003). ICUs are experiencing increased admissions of bariatric patients as a result of postoperative complications, comorbid conditions, and delayed access to care due to lack of bariatric accommodations and diagnostic equipment at many medical facilities (El-Solh et al.; Muir, Heese, McLean, Bodnar, & Rock, 2007; Pieracci et al., 2006).

Increased Work Demands Involving Bariatric Patients
Obesity and the increased acuity associated with comorbid conditions necessitate increased caretaking
staff and increased time and physical exertion per staff member, especially for tasks requiring physical repositioning of bariatric patients (Davidson et al., 2003; Reto, 2003; Rose, 2006). Repositioning patients who are not obese in bed poses a high risk of injury for staff members under normal circumstances (Marras et al., 1999; Nelson & Baptiste, 2004). Bariatric patients are far more difficult to handle and require careful and frequent positioning and repositioning to prevent potential medical crises such as respiratory distress, impaired circulation, nerve damage, and cardiopulmonary decompensation, which is also referred to as Obesity Supine Death Syndrome (Brodsky, 2002; Hunt, 2007). Physical therapist and rehabilitation nurse work demands also are greatly increased with bariatric patients because heavier and larger body parts require more forceful exertions and awkward postures during therapeutic maneuvers.

Skin complications such as yeast infections in skin folds, pressure ulcers, and impaired wound healing are common for bariatric patients, and frequent repositioning and strenuous handling maneuvers are involved in cleaning and treatment (Davidson et al., 2003; Gallagher, 1997, 1999). Because pressure ulcers are considered preventable, hospitals often are not compensated for their treatment. This preventable cost compounds the higher physical demands on nursing personnel who are responsible for preventing pressure ulcers in bariatric patients.

Reducing Manual Patient Handling Through Ergonomic Interventions

Ergonomics refers to the concept of designing a work environment to optimally suit human capabilities. In the healthcare context, ergonomics provides an approach to circumvent the strength limitations of healthcare workers using mechanized lifts and other devices to assist in lifting and moving patients.

Many assistive devices for lifting and moving patients have been developed during the past several decades. For example, low-friction draw sheets and air-assisted transfer mats can reduce physical exertion by reducing or eliminating friction while staff members manually pull patients across bed surfaces. Gait belts can provide handles and improve leverage and stability while manually maneuvering patients. Hydraulic hoists reduce exertion by allowing caregivers to lift patients using hand- or foot-operated pumps or levers. Electronic hoists permit nonmanual lifting and transferring. Technological innovations have led to an increasingly wide variety of these and other devices.

Implementing an effective ergonomics program for safe patient handling entails far more than purchasing assistive devices, however. Staff members must use the devices if they are to be effective, and, unfortunately, noncompliance in use of mechanized hoists for patient lifting has been noted as a common problem (Bell, 1987; Evanoff, Wolf, Aton, Canos, & Collins, 2003; Garg, Owen, & Carlson, 1992; Jensen, 1987; Nelson, Lloyd, Menzel, & Gross, 2003; Yassi et al., 2001). Factors contributing to nonuse of hoists have included patient aversion, lack of availability or inconvenient storage, time and space constraints, inadequate training, and unsuitability of hoist slings for the patient’s condition, weight, or size (Nelson & Baptiste, 2004).

In addition, there has been reluctance to use mechanized equipment in physical therapy and rehabilitation due to concerns that it may impede therapeutic progress and reduce patients’ functional status and independence (Nelson et al., 2008). Nelson and colleagues point to a lack of evidence upon which to base such concerns. They encourage further development of mechanized methods to simultaneously administer physical therapy while reducing exertion and injury risk for therapy and rehabilitation personnel. Examples of such methods and ongoing research to evaluate their effectiveness are described by Baptiste, McCleerey, Matz, and Evitt (2008) and Rockefeller (2008).

Empirical Support for Ergonomic Interventions

Despite the challenges involved in implementing patient handling interventions, most studies conducted to evaluate their effectiveness have demonstrated cost-effective reductions in injuries and lost work time with the use of mechanized patient lifts and other assistive devices (Chhokar et al., 2005; Collins, Nelson, & Sublet, 2006; Collins, Wolf, Bell, & Evanoff, 2004; Engst, Chhokar, Miller, Tate, & Yassi, 2005; Evanoff et al., 2003; Evanoff, Bohr, & Wolf, 1999; Fujishiro, Weaver, Heaney, Harnick, & Marras, 2005; Hignett, 2003; Nelson et al., 2006, 2008; Nyran, 1991; Santaguida, Pierrynowski, Goldsmith, & Fernie, 2005; Spiegel et al., 2002). These studies, however, have focused on the use of standard-sized equipment for nonbariatric patients. Empirical research on ergonomic interventions for bariatric patient handling is still lacking.

The Need for Research

Most healthcare facilities do not have specific units dedicated to bariatric patient care, and most lack equipment and protocols for lifting and moving bariatric patients (Gallagher, 1999; Harrell & Miller, 2004; Reto, 2003). Consequently, lifts are improvised using manual methods or unsuitable equipment, posing high injury risk to workers and patients alike. Worker injuries specifically attributed to bariatric patient handling—some serious and disabling—
have been reported ad hoc (Muir & Gerlach, 2003; Warner, 1993). Data addressing these specific types of injuries are not yet available.

Despite the lack of research addressing bariatric patient handling, some recommendations for safe practices, primarily based on personal clinical experience and general knowledge of commercially available assistive devices for bariatric patient handling, have been published by knowledgeable professionals (Gallagher, 1999; Harrell & Miller, 2004; Hunt, 2007; Muir et al., 2007; Muir & Gerlach, 2003; Tizer, 2007; United States Department of Veterans Affairs [VA] VISN 8 Patient Safety Center of Inquiry, 2007; Whittemore et al., 2005; Wilson, 2006). The most comprehensive set of recommendations was developed by Nelson and colleagues at the VA VISN 8 Patient Safety Center of Inquiry, who are well-known for their research-based expertise in nonbariatric patient handling. The VISN 8 Safe Bariatric Patient Handling Toolkit (2007) includes information on assessment criteria and medical conditions affecting bariatric patients; a technology and equipment resource guide; a patient handling policy template; and algorithms to guide decisions about equipment, staff needs, and methods for various patient transfers and repositioning tasks. An article providing practical suggestions for using the VISN 8 bariatric algorithms has been published by Muir and Heese (2008). These authors note that their suggestions are based on opinions formed through experience with the algorithms; their article concludes that there is a need for evidence-based research on bariatric patient handling programs.

Overview of Planned Research
Additional research is needed to quantify bariatric patient handling hazards and related injuries and assess the effectiveness of bariatric-specific ergonomic interventions such as the VISN 8 toolkit. Our research group is initiating such a study, with the ultimate goal of specifying evidence-based practices for safe bariatric patient handling that can be used by workers in diverse healthcare settings.

A new study, “Best Practices for Bariatric Patient Handling,” is anticipated to begin in 2011. Approximately 10 hospitals will be recruited to participate in the study. Subsamples of hospitals using the VISN 8 Safe Bariatric Patient Handling Toolkit, as well as hospitals without formal safe bariatric patient handling programs, will be included. Analyses of retrospective and current data from hospital records, interviews, and worker surveys will be used to quantify bariatric-related hazards and intervention effectiveness. Attempts will be made to obtain data pertaining to bariatric patient handling in surgical, medical, diagnostic, and therapeutic settings. In addition to analyses of exposures (e.g., bariatric patient handling frequency), intervention factors (e.g., patient handling algorithms, equipment, barriers to using equipment, worker training), and health-related outcomes (e.g., perceived exertion, injuries to workers and patients), economic analyses also will be conducted to assess program costs and patient handling injury-related costs.

Results of the study will be used to develop recommendations for hospital-based bariatric patient handling that can be disseminated via training curricula, publications, websites, and conferences and workshops through partnerships with the American Society for Metabolic and Bariatric Surgery, VA Patient Safety Center, National Association of Bariatric Nurses, American Nurses Association, Service Employees’ International Union, and the Work Injured Nurses’ Group. Efforts also will be made to develop modified recommendations suitable for nursing homes and home healthcare settings.

Acknowledgments
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Assessment-Guided Therapy of Urinary Incontinence After Stroke

Isabella S. Herr-Wilbert, RN • Lorenz Imhof, PhD MScN • Margret Hund-Georgiadis, MD • Dirk Michael Wilbert, MD

Urinary incontinence (UI) frequently occurs after stroke and often remains an extensive problem for these patients and their relatives even after discharge from the hospital. Therapeutic interventions, such as behavioral training, can help manage UI. Recently, a multimodal application of nursing interventions was recommended (Wilbert-Herr, Hürlimann, Imhof, & Wilbert, 2006). The primary goals of the study discussed in this article were to introduce therapeutic interventions of UI management into clinical rehabilitation practice based on a structured process of interdisciplinary caregiving and test the treatment effect.

Forty-four patients who had suffered a cerebrovascular accident (CVA) were included in the study. Nursing interventions included distinction of stress or urge UI and the assessment of different forms of UI. The latter intervention was based on the functional independence measure (FIM Item G—bladder management), the protocol of micturition, urine dipstick, and ultrasound measurement of post-void residual urine (PVR). Interventions were applied according to the recommendations of the 3rd International Consultation on Incontinence. An algorithm of the interdisciplinary process was implemented, and the nursing staff received specific education regarding the interventions. Twenty-one (47%) of the patients in the study were diagnosed with UI; 67% of these patients achieved the targeted level of continence by individually tailored interventions, which consisted of a systematic nursing assessment and standards for prompted voiding, timed voiding, and habit training. Planned processes, including screening procedures, assessment, profile of continence, intervention, and education and evaluation, increase the likelihood of positive results of rehabilitation of patients after CVA. Additional intervention studies are suggested to investigate the effectiveness of the algorithm used in this study.

Urinary incontinence (UI) is not an uncommon occurrence for patients who have suffered a stroke and is an extensive problem for these patients and their families. UI affects patients’ well-being, increasing feelings of depression and isolation, and complicating their future medical and nursing care (Brittain, 1998). One study showed that 32%–79% patients who had suffered a stroke were incontinent when they were admitted to the rehabilitation hospital, and 25%–28% of those patients were still incontinent at discharge (Brittain, Peet & Castleden, 1998). In another study on family care, UI was identified as a crucial issue for family members providing care to a relative who has suffered a stroke (Kesselring et al., 2001). In a study looking at first-time stroke patients who had been admitted to a postacute inpatient rehabilitation program, only 6.3% of patients who were continent were discharged to a nursing home; 43% of patients who were incontinent were discharged to nursing homes (Kuijk, Linde, & Limbeek, 2001). A variety of therapeutic interventions, such as behavioral training, are available to treat UI, though the effectiveness of these therapies is not well documented (Wilbert-Herr, Hürlimann, Imhof, & Wilbert, 2006).

A review of the current literature on UI (Wilbert-Herr, Hürlimann, Imhof, & Wilbert, 2006) revealed that a multimodal approach (i.e., educating nurses, using a problem-solving process, and delivering care based on an assessment procedure and guidelines) is most constructive for promoting continence after stroke. According to Wikander, Ekelund, and Milsom (1998), assessment-guided therapy of incontinence can be successful. Validated assessments to discover incontinence are described by the International Continence Society (ICS; Avery et al., 2004) and the scientific committee of the International Consultation on Incontinence (ICI; 3rd ICI, 2005). In addition, the Netzwerk für Qualitätssicherung in der Pflege [German Network for Developing Quality in Nursing] (DNQP) recommends a standard of care, developed by experts in the field, to promote urinary continence in nursing care (DNQP, 2006). According to Donabedian’s criteria of quality (1980), the standard of care consists of three dimensions: quality in structure, process, and outcome. For that reason, the DNQP Standard was chosen as the basis of this study. Thomas and colleagues (2005) similarly concluded that structured assessment and intervention implemented early on during the rehabilitation process may reduce incontinence. Williams, Assassa, Smith, Shaw, and Carter (1999) and Newman and colleagues (2005) recommended targeted education to caregivers to promote continence. Although this recommendation was not specifically aimed at nurses, they are often responsible for caring for patients who have suffered
a stroke. Our study integrated the recommendations from the literature review (Wilbert-Herr et al., 2006) into clinical rehabilitation practice by developing a structured process for caregiving and evaluating its practicability.

Methods
From June 2006 to December 2006, 44 patients who had sustained an acute cerebrovascular accident (CVA) were admitted to the department of neurorehabilitation in the rehabilitation hospital Zuercher Hoehenklinik Wald, a major rehabilitation facility in Switzerland. Patients entered the hospital after leaving an acute neurocare unit. There were 19 female and 25 male patients with an average age of 75 (43–92) years. The average time postonset was 22 (8–66) days. The stroke involved the left hemisphere of the brain in 45% of patients and the right hemisphere in 48% of patients; 7% of patients had bilateral lesions.

According to the structured process created for this study to treat CVA patients, all patients are initially screened for possible incontinence. If incontinence exists, a detailed assessment is performed and the treatment is planned accordingly. A profile of continence is developed for each patient and interventions are planned. The nursing team involved in this study received a teaching program before the study began and an evaluation of the process was performed after the study concluded.

Multidisciplinary cooperation was established using an algorithm that included UI screening, extended assessment, and a guide of interventions (Figure 1). The algorithm identified areas of responsibility for nursing and medical staff. This algorithm was developed for this process.

Screening Procedure
The goal of the screening procedure was to identify any UI in the admitted patients. The screening was performed on the day of admission and included the nursing assessment for stress and urge incontinence (Bent et al., 2005; Donovan et al., 2005), allowing the nurse to establish an initial diagnosis of incontinence.

If the patient was suffering from aphasia or cognitive disabilities, the nurse assessed for signs of incontinence using observation and integrated the results into the assessment of the Functional Independent Measure (FIM™; Hamilton, Laughlin, Fiedler, & Granger, 1994), Item G (bladder management). The FIM (Hamilton et al.) is an 18-item, 7-level measure of physical functioning and social cognition domains. The FIM uses the level of assistance and the individual’s needs to grade functional status from total independence (7) to total assistance (1). A score of 1–5 indicates a form of incontinence that requires nursing care and treatment, and the level of nursing care for physical functioning and social cognition should be assessed. The FIM score is a reliable assessment tool, using everyday terminology to describe disability, and is sensitive enough to change over the course of rehabilitation.

Included in the screening is a urine dipstick to detect a urinary tract infection and an ultrasound examination of the bladder to measure postvoid residual urine (PVR). Initially, the ultrasound measurement of PVR was cross-tested with a postvoid single catheterization. If a urinary tract infection was detected or PVR exceeded 100 ml, the process of care was temporarily turned over to the medical practitioner for physician-initiated treatment.

Assessment
The nursing documentation included a detailed description of the patient’s incontinence and categorized the various forms of UI as well as the planned outcome profile of continence.

The International Consultation on Incontinence Questionnaire–Urinary Incontinence–Short Form (ICIQ-UI-SF) assessed frequency and extension of UI and its burden on everyday life from the patient’s perspective. The assessment is subdivided into three questions and uses a 0–20-point score (0 represents continence and 20 indicates that the patient feels a very high burden from the UI). Presently, the ICIQ-UI-SF is used for all groups of patients in this study (Avery et al., 2004; ICIQ, 2006). Additional questions concerned medications, which can influence incontinence, and assessed whether patients had accidently leaked urine before the CVA had occurred. Patients’ preferences for nursing interventions were

Key Practice Points
1. On admission to a rehabilitative institution, 32%–79% of stroke patients are incontinent, and 25%–28% are still incontinent after discharge; this has been identified as a significant problem for family care providers.
2. A variety of interventions for urinary incontinence therapy, such as behavioral training, are available, although their effectiveness has not been studied in detail.
3. Assessment-guided, multimodal therapy of incontinence has been successful in as many as 70% of treated patients.
4. Providing specific training to the therapeutic team regarding assessments and interventions is a major step toward achieving consistent results in treating urinary incontinence after a stroke.
included in the tailored plans of treatment. A protocol of micturition provided additional help for a differential diagnosis of UI and served as documentation of the course and evaluation of the outcome. The protocol of micturition is a 24-hour written record of any assisted or unassisted visit to the toilet.

If the patient suffered from aphasia or had cognitive disabilities, the nurse completed the ICIQ-UI-SF using observation or by obtaining information from relatives and running a protocol of micturition.

Profile of Continence

All of the screening and assessment information was adapted to a continence profile (DNQP, 2006) based on models presented by Fonda (1999) and Palmer, Czarapata, Wels, and Newman (1997). The possible profiles were: continence, independently reached continence, dependently reached continence, independently compensated incontinence, dependently compensated incontinence, and not compensated incontinence.

Process of Intervention

The interventions in this study were established to help patients maintain or reach a strived profile of continence. The sequence of interventions used in this study is based on the ICI Guidelines Initial Management of Neurogenic Urinary Incontinence (Figure 2) and Management of Urinary Incontinence in Frail Older Persons (3rd ICI, 2005).

A list of nursing interventions and continence devices was developed according to the recommendations from the literature review (Wilbert-Herr et al., 2006) and the ICS (3rd ICI, 2005) and the definitions and procedures for all of the interventions were based on international definitions. For instance, habit training is toileting assistance provided by a caregiver to adults with UI. It involves the identification of incontinence, a person’s natural voiding pattern, and the development of an individualized toileting schedule that preempts involuntary bladder emptying (Ostaszkiewicz, Johnston, & Roe, 2004).

Education

During training, the nursing team first learned about UI. A training catalogue had been developed that covered anatomy and physiology of the urinary tract, the urinary tract’s pathological conditions, and the various forms of UI (particularly neurogenic incontinence and UI in older, frail people) and treatment. The second part of training involved teaching clinical skills to identify risks and signs of UI, which included screening questions, urinalysis with dipstick, measuring the PVR urine with a mobile ultrasound system (BladderScan®, Verthon, Bothell, WA), assessing the patient using the ICIQ-UI-SF and the continence profile (DNQP, 2006), and using a guideline for interventions (Wilbert-Herr, 2006; 3rd ICI, 2005).

Evaluation

A questionnaire about the project was distributed to all staff nurses involved in the study after it concluded, which included 32 yes-no questions about the lessons from their initial teaching, the flowchart of the multidisciplinary process, the patient screening and assessment processes, the micturition protocol, the interventions, and the evaluation of the process of care. Written comments and suggestions

Figure 1. Algorithm of Continence Care Developed for This Multidisciplinary Process (Wilbert-Herr, 2007)
for improvement were welcomed. The medical practitioners received a different evaluation that included 15 questions and an interview.

**Results**

Forty-four patients were admitted to the rehabilitation hospital during the study and, on average, their length of stay was 33.5 (7–69) days. All patients were screened for UI. Micturition disorders (e.g., lower urinary tract dysfunction [LUTD]) were found in 25 patients based on the screening results; 21 of these 25 patients had UI. Patients with UI received a differential assessment of their incontinence situation. The remaining four patients without UI presented with different complaints of LUTDs. The incontinence profile, based on the assessment, was recorded for each patient, and all incontinent patients were prescribed a plan of care for maintaining or reaching a profile of continence, which was also documented. During the treatment interventions for UI, patients’ environments and devices, such as commodes, raised toilet seats, bars, and frames, and handheld urinals, were adapted to fit their care demands for continence promotion. The interventions were used systematically, and the most commonly used nursing care interventions were habit training and prompted voiding. The most common medical care interventions were administering anticholinergic medication and observing the PVR. In the DNQP’s *Modified Standard of Care* (2006), outcome E6 explains that the “profile of continence is reached. The possible level of continence with the greatest possible independence of the patient is guaranteed.” To achieve this outcome, all staff nurses were trained in systematically promoting continence with a defined target (or level of continence). Sixty-seven percent ($n = 14$) of patients had achieved continence according to the continence profile (DNQP, 2006), and 52% ($n = 11$) of patients had an FIM–Item G (bladder management) level of 6 or 7 (i.e., continence; **Table 1**) at the conclusion of the study. The ICIQ-UI-SF assessment showed that on average, patients had improved their feelings of burden by 3 points.

**Evaluation of the Nursing Training and Multidisciplinary Process**

Ten out of the 16 nurses involved in the study completed the questionnaire. In general, the nurses found the process to be positive, though they did express some constructive criticism. The teaching and multidisciplinary processes were regarded as

<table>
<thead>
<tr>
<th><strong>Table 1. Results of Continence Profile and FIM–Item G</strong></th>
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<tr>
<td><strong>Continence Profile (Fonda, 1999; Palmer et al., 1997)</strong></td>
</tr>
<tr>
<td>1. Full continence</td>
</tr>
<tr>
<td>2. Independently reached continence</td>
</tr>
<tr>
<td>3. Dependently reached continence</td>
</tr>
<tr>
<td>4. Independently compensated incontinence</td>
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<tr>
<td>5. Dependently compensated incontinence</td>
</tr>
<tr>
<td>6. Not compensated incontinence</td>
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<tr>
<td><strong>FIM–Item G, Bladder Management</strong></td>
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<tr>
<td>Level 6 + 7</td>
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<td>Level ≤ 5</td>
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Assessment-Guided Therapy of Urinary Incontinence After Stroke

helpful, as was the list of interventions. Conversely, nurses commented that the assessment and micturition protocol were too complicated for everyday use. Using the mobile ultrasound to measure PVR was universally regarded as an improvement and nurses felt it should be integrated into daily routine.

The two medical practitioners who were involved in the study also completed the questionnaire. They found that the flow chart was helpful for orientation; however, in practice, the interaction between the various professionals and patients was more involved than what appeared on the flowchart. Patients reported to nurses and medical practitioners about their micturition dysfunction. Medical interventions were initiated when the PVR was higher than 150 ml. When the PVR was higher than 100 ml, a control of the PVR was repeated. The medical practitioners commented that screening patients when they are admitted to the hospital places high demands on them because they undergo multiple additional assessments on the same day for rehabilitation planning. Consequently, it was recommended by the interdisciplinary care team that screening should occur on the second day after admission, critical PVR up to 100 ml should be limited, and PVR measurement for control of retention should be repeated.

Discussion
This study demonstrates the importance of UI assessment. It also stresses the necessity of screening for other micturition disorders, which can influence the course of rehabilitation.

Generally, the study was successful; 67% (n = 14) of patients achieved continence, according to the definition of their continence profile, within 30 days. This rate of continence is higher than results reported from traditional individualized therapy (Wilbert-Herr et al., 2006). When the study concluded, the entire team felt that they were working more effectively to manage UI. The plans of care for individual patients were more specific, but used a more standardized format. Staff members also found the use of standardized terminology to be beneficial because it facilitated the professional assessment. The various interventions in toilet training such as prompted voiding, timed voiding, and habit training improved the individualized promotion of continence. Nurses reported that using the mobile ultrasound system as a diagnostic tool was particularly valuable. The ultrasound appliance was used not only for screening but for controlling the urine volume in the bladder after removing indwelling catheters, allowing nurses to manage this task independently from medical practitioners.

The definitions of UI regarding the profile of continence outlined earlier in this article were used in nurses’ daily practice. For patients who had a functional dependence in care, the ICS definition of UI (i.e., any involuntary leakage of urine; Abrams et al., 2002) can be too limited. After a stroke, many patients are only continent with the help of caregivers. If there is no caregiver readily available, the patient presents with functional UI. The Standard of Experts (DNQP, 2006) discusses UI but neglects micturition disorders. Because the screening is based on the Standard of Experts the LUTDs, such as prostatic hyperplasia, are neglected. In the future, LUTDs need to be more specifically assessed, especially nocturia, which impairs night sleep and can disturb the rehabilitation process.

This study uses FIM (Hamilton et al., 1994) and ICIQ-UI-SF (Avery et al., 2004) to assess for UI. Sometimes, the ICIQ-UI-SF can be too limited for assessing patients after a stroke, particularly when they are suffering from cognitive disorders. In addition the ICIQ-UI-SF can be too extensive and impracticable. Considering the restricted staff resources and varied tasks involved in promoting patients’ independence in activities of daily life, future assessments should be shorter and bear in mind that rehabilitation outcomes are correlated with successfully treating UI. The various interventions for treating UI need to be defined precisely and nurses must receive systematic training to implement them.

Conclusions
Treating UI in a patient after he or she has sustained a stroke can be improved by instituting a structured process that consists of team education, assessments, and guidelines. Our study involved a small number of patients; a larger controlled trial should be conducted to corroborate the preliminary findings presented in this article. This study involved a thorough review of the literature and serves as a model of evidence-based medicine and nursing. Reducing the complexity of the process described in this article may increase the feasibility of its use in future clinical routine. As a result of our findings, screening of patients with CVA has been modified to include the global assessment for LUTDs.

Acknowledgment
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Opportunities for People with Disabilities in the Virtual World of Second Life

Stephanie Stewart, PhD RN • Terri S. Hansen, MSN RN • Timothy A. Carey, BA

The virtual world of Second Life® (SL) offers people with disabilities a chance to explore new worlds without being limited by their disabilities. Many people with disabilities use SL for information, support, and entertainment. SL is a computer-based simulated environment in which participants are represented by a human-like avatar. The avatar can move through the environment, manipulate objects, and participate in day-to-day activities that most people take for granted, such as walking, dancing, and communicating. In this article, the authors focus on the benefits that information, socialization, and community membership can offer people with disabilities and some of the resources that are available for them in SL. SL communities, groups, and activities also help increase self-worth and empower people with disabilities. Participating in a virtual world enriches the overall quality of life of people with disabilities and may enhance their physical, emotional, and social adjustment.

In the digital world of Second Life® (SL), people with disabilities have a chance to experience life beyond the limitations of their disabilities. In virtual worlds, computer-simulated environments host avatars, which are digital representations of a specific person. The avatar can manipulate objects and participate in day-to-day activities that most people take for granted, such as walking, dancing, and communicating. SL provides benefits to people with disabilities such as information, socialization, and community membership. SL communities, groups, and activities help increase feelings of self-worth and empowerment. Nurses caring for patients in a rehabilitation setting can use SL as an enrichment tool to help disabled, chronically ill, and convalescing patients improve their overall quality of life and enhance their physical, emotional, and social adjustment.

What Is Second Life?
Virtual worlds like SL have 3-dimensional (3-D) layouts in which multiple users can interact and communicate with one another. SL is a free online, computer-simulated environment where millions of real people are represented by avatars. A person is free to create an avatar that is similar in appearance and personality to himself or herself or one that is entirely different. People with disabilities can choose whether to have their avatars exhibit their disabilities. The individual user chooses a unique name for his or her avatar and can individualize hair color and length, eye color, body shape, height, and clothing. Personalization can be accomplished by using free features or Linden dollars (SL official unit of trade) to purchase more realistic skin and hair or designer clothing and furniture from virtual shops.

Avatars can walk, fly, or teleport (instantly appear in another location on command) to thousands of exciting locations and communicate with other real people from around the world through instant messaging or voice conversations. According to the SL website (www.secondlife.com), this 3-D virtual world is imagined, created, and owned by its residents.

Linden Lab, the privately owned company founded in 1999 that created SL, has established a code of conduct, but residents are responsible for maintaining their own safety by using intuition and discretion to determine the extent or accuracy of their communication and level of interactions with others. If an avatar is accosted or injured by another, an abuse report may be filed and Linden Lab will investigate and resolve the situation.

SL’s popularity has grown dramatically, with millions of users from all over the globe occupying a virtual land area of more than four times the size of New York City. SL is a tool for innovation, attracting artists and musicians, nonprofit organizations and entrepreneurs, universities and scholars, large commercial brands, and government agencies seeing the potential for collaboration, education, communication, business, and organizational development. For example, the University of Wisconsin–Oshkosh College of Nursing used SL to enhance its second-degree, accelerated online Bachelor of Science in Nursing program. This nursing school purchased land in SL and developed a virtual campus where faculty have established office hours in tree-house offices and conduct real-time class discussions with students who live all over the country. Faculty members and
students have customized avatars and stay connected using built-in voice conferencing, text chat, and group messaging systems. Students learn by watching demonstrations and attending virtual meetings. Faculty members have created avatars with specific illnesses and scripted responses so students can participate in safe simulations by interacting and caring for these patients, practicing skills, and role playing. In addition to the campus, this nursing college built a virtual public health office so students could gain experience in public safety and other aspects of public health. A disaster scenario at an industrial plant allows students to practice disaster preparedness, triage, and protocols.

Benefits of SL for People with Disabilities

Although many find it difficult to think of SL as more than an online gaming experience, SL is something very different for people with disabilities. In SL, people with disabilities are not limited by their disabilities. They can seek and build relationships and attend group therapy and rehabilitation services. Many people with disabilities feel as though they have escaped the confines of their disabilities in SL.

One of the coauthors (Figure 1), Timothy Carey (Tim), has Duchenne Muscular Dystrophy (DMD), which is caused by a genetic mutation resulting in the absence of dystrophin, a protein critical for the maintenance of muscle cells. DMD primarily affects young men and has progressive symptoms, such as muscles forming scar tissue and turning into fat. Loss of muscle mass results in muscle weakness of the legs and pelvis, which can spread to the arms, neck, and other areas. Reduced endurance, enlarged calf muscles, and difficulty standing may be early symptoms. As the condition progresses, muscle tissue wastes and leads to paralysis with increased sensitivity to touch. The heart and muscles of the lungs also become weaker, and eventually the affected individual will require a ventilator and possibly heart medication.

Tim was diagnosed with DMD at the age of 3 after his mother noticed he had trouble getting up from the floor toward the end of the day. He was aware that he was challenged because he could not run like the other children. Many children did not understand why he had trouble standing up or running. Until he needed a wheelchair at age 8, he avoided calling attention to his disability. As he got older, he grew fond of fast-flying airplanes and wanted to be a pilot. As the disease progressed and his physical ability declined, his future ambitions changed from pilot to air traffic controller, to architect, to landscaper, to solid-state electronics, and finally to computer programmer. He eventually earned a 2-year degree in computer programming from a local technical college and a 4-year degree in mathematics and computer science from a local university. In 1999 he started a website development business based out of his home.

Even though there are recreational activities available in SL, he does not consider SL a game. His avatar (Figure 2), Timm Short, is a pilot, builder and architect, inventor and innovator, programmer, and a man of charity who attends church. As a pilot, he provides free tours of SL in his airplane or helicopter (Figure 3). As an SL builder and architect, he designed his dream home and airport in the sky. Others were so impressed with his work that they enlisted him to help build their dreams as well. He uses his programming skills to help people with disabilities participate more easily in SL. For example, he is creating an SL object that allows an avatar to assist another avatar. This invention will allow a friend or a healthcare provider to help a person with a disability when he or she becomes fatigued and unable to use a mouse. Another SL device Tim is developing will help people who are hearing impaired communicate by enabling an avatar to use sign language.

At 36 years old, Tim’s disease has progressed to the point where he can only slightly move his fingers. He rarely leaves his home to socialize unless he is going to a doctor’s appointment or meeting with his parents or a healthcare provider. When he first logged on to SL, he had two thoughts: as a professional computer programmer and Web developer, he thought SL was the future of the Internet, and as a person with a disability, he was amazed at how liberating it felt to have his avatar walk, fly, and socialize.

For many people with disabilities, SL is an extension of their lives. Because people with disabilities have similar access to everything in SL that people...
Opportunities for People with Disabilities in the Virtual World of Second Life

without disabilities have, their disabilities are not readily apparent unless they choose to make them obvious. When a user discloses that he or she has a disability, others do not seem to react as they would in the real world because the disability does not exist in SL. SL provides opportunities for Tim to socialize, including taking field trips with friends, dancing, horseback riding, and windsurfing at the beach, and other activities (Figures 4–6). Tim is in charge of the dance and party committee for the Hope Village, which will soon be the nonprofit organization Bright Hope Community. He also participates in educational activities in SL that include furthering his knowledge of SL programming, transcribing books to be read in SL, and learning more about landscaping and cooking. Tim participates in these activities in SL for the same reasons others do in the real world; they enrich and add meaning to his life and give him the opportunity to meet people.

In 2008 Tim received a grant to create a website advocating for people with disability called DisabilityVoice (www.DisabilityVoice.us). The website helps inform people with disabilities about SL and the advantages of joining that community. The site offers original articles about people with disabilities and offers free advocacy pages to people who help people with disabilities socially, politically, or for public change.

Research Support for the Potential Benefits of SL

Research suggests that SL is beneficial for people with disabilities because it improves their quality of life and sense of self-importance. Just as Tim experienced, Kizelshteyn (2008) found that SL made it possible for people with disabilities to participate in day-to-day activities most people take for granted. They are able to walk, dance, and communicate with others in cafés, nightclubs, and other gathering places. Kizelshteyn’s ethnographic qualitative study involved 15 formal interviews and 50 informal conversations with SL residents about the socialization and support they received in the virtual world. Kizelshteyn concluded that the multitude of social and recreational activities available in the virtual world improved the quality of life for disabled, convalescent, and chronically ill people.

Antle (2004) identified social support from friends to be a significant factor associated with self-worth in 85 people with spinal cord injuries ages 8–23 years. The study also identified friendships as contributing to self-worth. In addition, Wilson, Washington, Engel, Ciol, and Jensen (2006) found that emotional support provided to youths with disabilities had a positive impact on their level of functioning. Wilson and colleagues examined the relationship between perceived social support, psychological adjustment, and functional ability in youths with physical disabilities. To obtain demographic and disability-related information, 37 youths with neuromuscular diseases and 33 with spina bifida completed a Child Health Questionnaire, Functional Disability Inventory, and Multidimensional Scale of Perceived Social Support. In the study, social support appeared to play an important role in the psychological adjustment and functional ability of this population. The relationship between social support, function, and adjustment may be moderated, to some extent, by age and gross motor functioning. SL offers people with disabilities
countless opportunities to socialize, obtain support, and develop friendships that help improve their emotional well-being and functional ability.

Communities in SL

There is a large community for people with disabilities in SL. Virtual communities provide a sense of connectedness (Antle, 2004) and empower people with disabilities (Mactavish & Iwasaki, 2005). A community was created in SL for people with disabilities and their caregivers. Elfline (2008) quotes the group’s cofounder, Kat Klata: “Here, I’ve developed close friendships, and I feel connected to the world… If I didn’t have SL, I would be staring at the wall or the TV” (p. 51). Elfline notes that people can explore personal identities in SL. For example, a person can be a different race, gender, or another slight variation of him or herself through the creation of an avatar. This concept is especially attractive to people with mobility issues because anyone can walk, fly, or teleport in SL. Another member of Klata’s support group, Maladrera Reymour, stated, “I couldn’t even walk to the end of my street, but SL brought the world to my door” (Elfline, p. 51).

One acquaintance of Tim’s, Huntress Catteneo (avatar name), shares how she feels about community life for people with disabilities in SL:

*In real life we struggle to meet people, never mind actually make friends. We can’t walk, see, hear, or speak without swearing or stuttering, and few people can understand our dark moods, odd behaviors, or phobias. We are all around, yet often go unnoticed, ignored, or shunned… It is hard to reach out to the ‘normals’ around us; we see their looks, hear the comments whispered as we pass, and we feel isolated and alone.

But it is different now; we have found something interesting that gives us a new lease on life, a better life, a ‘second life.’ I can fly here, high into the clouds, even up into space, and, even though I fear heights, I can handle it here. Flying here has even lessened my anxiety when riding those horrible glass elevators in the real world.

I have found groups of real people with problems just like mine whom I can talk to openly and honestly, and through our experiences we can help each other. We have a voice here even if we have none outside of this place. The small communities here join with all the wonderful individuals and become one very big community that spans our little blue planet.

It is easy to make friends here. People see me now. Even though my form changes, they no longer see my illness, my scars, my deformity, my disability—they just see me. I have a sense
of humor, an eye for beauty, a caring heart, and a brightly burning intelligence that just loves to be tested. There is so much I can do here that others appreciate and encourage. I can give back to the community that has inspired me and in return I grow, emerge, bit by bit, from my shell and realize I never need to be alone again.

I am real here in this unreal world, and I notice that, after talking to many others here, the community we have lost in our 'normal' lives is starting to return. I am not quite so invisible now. I am not the feared leper you think will infect you. I am your neighbor, your work colleague, and the person who travels on the same bus as you every day. I am no longer hidden. I am part of a community, and I love it.

Virtual Ability Community
Virtual Ability is one community in SL that helps people with disabilities move beyond the barriers that separate them from being a part of society (http://virtualability.org/default.aspx). Virtual Ability is an orientation site that integrates people with a wide range of disabilities into SL society and offers a place for support and mentorship. Members learn how to walk, shop, play, and have fun. Residents are offered information, encouragement, training, companionship, referrals to SL resources and groups, and ways to contribute to the community. In some circumstances, the group helps newcomers by referring them to sources for assistive hardware and software or offering individualized attention with training and orientation.

In February 2009, Virtual Ability had more than 200 members and a reputation for being the leader in helping people with disabilities in SL. People with disabilities learn about the benefits of virtual world communities through the Virtual Ability group’s Virtual Ability Island (VAI; Figure 7). Avatars can stay at Cape Able and find entertainment at the VAI Sanctuary. Virtual Ability, with the help of the SecondAbility Mentors group, is completing outreach work to inform people with disabilities, their doctors, and their caregivers of the benefits of virtual worlds. Virtual Ability maintains ties with a group called the VirtualGuidedog project (http://world.secondlife.com/group/b2debe82-5156-9dd2-2d27-5b9600b4e9a6), founded by Charles Mountain. He is working to perfect a guide-dog script that can help the blind, print-impaired, or those who are unable to use the standard interface in SL by telling them who or what is around them.

Gimpgirl Community
Jennifer Cole (SL username JennyLin Arashi) and other women with disabilities who felt the need for a community that understood women and their needs started another supportive community, Gimpgirl, in 1998. The Gimpgirl Community is a safe place where people with disabilities can express who they are and discuss important topics such as abuse, violence, sexuality, parenting, intolerance, health, and politics in a healthy and pressure-free environment. Women of all ages and sexual orientations with disabilities can find support at Gimpgirl, which welcomes partners of women with disabilities, researchers with written permission, and anyone who supports women with disabilities academically, personally, or politically. The community has weekly support group meetings for participants comfortable with discussing their issues from a personal perspective. The Gimpgirl Community also lists resources on their website, www.gimpgirl.com. The Gimpgirl Community hosts mailing lists, sponsors, and polls, and is active on Facebook, Flickr, MySpace, Eventful Calendars, Twitter, Livejournal, and LinkedIn.

A variety of activities (Figure 8) are available in the Gimpgirl community, including a skybox where weekly support meetings are held, a first-floor lounge, and a roof for dancing and hanging out by the pool. There is also a 60-avatar auditorium for large events, a main house with an art gallery, and an Affiliates Pavilion where other communities for people with disabilities can have a presence.

Dreams Community
SL also offers sites to promote health for people with disabilities. One of the goals of these health-promotion programs is to provide an opportunity
for leisure and enjoyment and enhance the overall quality of life by reducing barriers to good health. Dreams (Figure 9), an interactive health-related community, has an area for teaching and holding discussions and events. Dreams supports two main groups, ShockProof and Brigadoon Explorers. ShockProof offers support to stroke survivors and their loved ones and those afflicted with transient ischemic attacks. Members learn from each other and are educated about the warning signs of a stroke, vascular disease, and the recovery process. Brigadoon Explorers was started in July 2004 by John Lester (SL username Pathfinder Linden) and is a place for individuals with Asperger syndrome and autism (to congregate as a supportive community and for parents, teachers, and others to learn).

The Path of Support is located on VAI and has various billboards displaying words such as fibromyalgia, diabetes, multiple sclerosis, spina bifida, cystic fibrosis, dementia, cancer, and Alzheimer’s. The Path of Support was created by Drangea Lyndhurst (avatar name), a Virtual Ability member, as a place for people to find out about therapeutic peer support. Knoh Oh (avatar name), an informatics specialist, now manages the Path of Support, which would not exist without Virtual Ability support groups or SL communities like Gimpgirl Community and Dreams.

Conclusion
In addition to people with disabilities, nurses dealing with patients requiring physical, psychological, and cognitive rehabilitation or those who are chronically ill, convalescing, or homebound may find SL an inexpensive and useful therapeutic tool. SL accounts are free, and orientation to the virtual world takes approximately 2 hours. Those new to the virtual world immediately experience a sense of community. There are numerous mentors who help newcomers traverse the virtual world and introduce them to social and therapeutic opportunities.

SL could become part of a rehabilitation plan for people with disabilities, enabling patients to learn more about their own conditions, health and well-being, and resources available to enhance their quality of life. Participation in support groups and communities of people who understand what they are going through improves their sense of self-worth and augments their adjustment and functional ability by providing opportunities for socialization, encouragement, friendships, and fun. In addition, people with disabilities who are unable to work in the real world may be able to find work or volunteer in SL. SL offers people with disabilities a chance to explore new worlds without the limitations of their disabilities, offering them hope and promoting a higher level of emotional functioning. There are unlimited possibilities for how SL can be used in the rehabilitation of patients.

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Patient safety is everyone’s goal. Accomplishing compliance with a National Patient Safety Goal is especially challenging when it involves a change in patient condition. Early recognition of these changes and the response of healthcare providers are critical in improving patient outcomes.

Although nursing assistants (NAs) are already at the bedside and able to recognize patient changes and have been asked to “tell the nurse” about changes; we have neglected to inform the NAs exactly what nurses need to know. Through our Proactive Risk-Assessment Task Force, NAs were identified as key building blocks in the care process. We developed a low-cost, easy-to-implement tool for NAs to use, which has had beneficial effects for nurses and patients.

In October 2008 a Proactive Risk Assessment Interdisciplinary Team at Shaughnessy Kaplan Rehabilitation Hospital (SKRH) in Salem, MA, was assembled to assess compliance with National Patient Safety Goal (NPSG) 16: “Improve recognition and response to changes in a patient’s condition” (The Joint Commission, 2008). The team consisted of staff nurses, respiratory therapists, physicians, quality management, nursing education, and nursing leadership. Weekly meetings were scheduled for 1 hour during a 3-month period to assess current processes at SKRH and implement an action plan.

Using the Health Care Failure Mode and Effect Analysis™ (HFMEA) the team graphically described the step and subprocess processes that were used at SKRH for recognizing and responding to changes in patients’ conditions (DeRosier, 2002). Failure modes were identified for all subprocess steps. The process revealed that some NAs did not know what to report (such as a change in patient’s behavior). On the other hand, nurses might ignore the NA and therefore not respond accordingly. The team outlined an action plan for the failure modes that were determined to be frequent and high-risk events with potential adverse outcomes.

Brainstorming sessions to generate an action plan resulted in a low-tech solution with a big impact: A “what to tell the nurse” job aid/tickler. Interestingly, our sister facility, North Shore Medical Center, had also identified that NAs were not consistently reporting abnormal patient information. Together, we created a list of routine patient data that must be reported when out of range. These data included vital signs, blood sugars, intake and output, bowel movement, dressings, pain, mental status, and skin. The information was put onto a laminated badge that was attached to the name badge for easy access and quick reference. A housewide education plan was rolled out. Badge content, the appropriate action, and follow-up were discussed with both nurses and NAs. Expectations were clearly stated. Job aid/tickler badges were distributed to the NAs.

The ticklers accomplished two things: first, they gave NAs the correct information to report to the nurse; and second, they empowered NAs to report. Having the same information reported to the nurse resulted in a uniform standard of care throughout the facility. There was permission and a mutual understanding that NAs would report all abnormal findings. Another positive outcome was that the timeliness of reporting improved. Previously, NAs would wait until they finished measuring all vital signs, all blood sugars, etc., before reporting to the nurse.

With the implementation of the ticklers, NAs were compelled to immediately report any abnormalities. Immediate and accurate communication from NAs allowed nurses to intervene in a timely manner.

The expectation that NAs will “tell the nurse” promptly also creates the expectation that nurses will act immediately upon the information. The nurse is able to make an accurate assessment, apply critical-thinking skills, and intervene to prevent a crisis. Research supports the correlation between early intervention in response to clinical symptoms and a decrease in cardiopulmonary arrests. These expectations have also instilled a trust component in the nurse-NA relationship, as well as improved patient care. Patients benefit when there is clear communication and a trusting relationship between caregivers (Institute for Healthcare Improvement, 2007). For these reasons, both nurses and NAs have found the tickler badges to be a valuable and useful tool.

Initially, we thought the development of our Rescue Stat Protocol in response to National Patient Safety Goal 16 would be the key to our compliance. However, the “what to tell the nurse” tickler had a much broader application and benefit to patient care on a daily basis. From a small tool emerged big benefits. A common knowledge base was developed. Respectful communication, mutual trust, and collaboration were fostered. These concepts can be applied to other relationships across the organization, such as nurse-physician and nurse aide-nurse aide.
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Index of 2010 Articles

This index of articles is divided into two parts. The first part lists articles by topic in this format: title; author(s); tables and figures, if any; date; volume; issue; page range; and number of references. Continuing education articles are indicated by the abbreviation (CEU). The second part of the index lists the articles by author.

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Rheumatoid arthritis: coping with disability (Barber TL et al) 2010 Mar-Apr; 35(2): 75-79 (11 ref)

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Thank You!

Rehabilitation Nursing relies on the dedication of committed volunteers on the Editorial Board and Review Panel to maintain the high quality, timeliness, and variety of its editorial content. On behalf of the journal leadership team, I would like to offer our sincere thanks to the individuals listed below for contributing their time and expertise to ensuring the excellence of the issues published in 2010.

Sincerely,

Elaine Tilka Miller,
PhD RN CRRN FAHA FAAN
Editor
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- Drip and Ship Thrombolytic Therapy

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