How to Conduct a Risk Assessment: A 5-Step Ergonomic Workplace Assessment of Rehabilitation Patient Care Environments

Chapter 2

Introduction

Ergonomics is the science of matching job tasks to workers' capabilities. Through the principles of ergonomics, jobs can be redesigned and improved to be within reasonable limits of human capabilities. The basic principles of ergonomics seem to offer the best solution for improving occupational musculoskeletal disorders in nursing. However, in order for ergonomics to be effective, a well planned management program must be implemented.

In rehabilitation settings in which patients experience both temporary and permanent loss of function, the challenges are unique. It has been a long-standing practice to encourage patients to participate in their own care at their highest level of ability. In nonmobile activities of daily living (ADLs) such as eating, this works well. Repetition and practice in this case benefits the patient and does not put the caregiver at risk for injury. However, in mobile activities such as a transfer without assistive equipment, the patient's limited participation puts the caregiver at risk for injury.

The purpose of this chapter is to present a strategic plan for conducting an ergonomic assessment of rehabilitation patient care environments. This approach represents one facet of safe patient handling and movement, and is a step toward the goal of decreasing the incidence and severity of occupational injuries in nursing practice.

Potential Benefits of an Ergonomics Program

Some groundwork may be necessary to establish the need for an ergonomics program and secure commitment from top management. A review of occupational injury statistics and associated direct and indirect costs is probably the most important factor in establishing this need. These data can then be used to identify the areas with the highest level of risk, thereby establishing a baseline from which to evaluate the effectiveness of the interventions. As with any program, goals and objectives should be developed.

Each facility needs to select targets that are meaningful; for example, a 30% reduction in lost workdays related to patient-handling and movement tasks could be one target goal. The following are other examples of goals for a comprehensive ergonomic program:

- Reduce the incidence of employee injuries related to patient-handling and movement tasks by ___%.
- Reduce the number of lost workdays related to patient-handling and movement tasks by ___%.
- Eliminate ___% of all manual patient transfers.
- Reduce injury-related costs by ___%.
- Decrease nursing turnover by ___%.
- Decrease musculoskeletal discomfort in care providers by ___%.
- Utilize patient-handling and movement equipment in a therapeutic way to achieve mobility goals.

There are also opportunities to improve quality of care through ergonomics. For example, the following patient benefits can be realized:

- Increase patient comfort, security, and dignity during lifts and transfers
- Enhance patient safety during transfers by a decrease in patient falls,

skin tears, and abrasions
- Promote patient mobility and independence
- Enhance toileting outcomes and decrease incontinence
- Improve quality of life for patients.

Lastly, ergonomic programs can address several organizational objectives, including

- become an employer of choice (e.g., improve recruitment, retention, safety, and satisfaction of staff).
- enhance regulatory compliance.
- improve staff efficiency.

Ergonomics Systems Approach

The key to effective injury prevention programs is the use of ergonomics-based approaches that analyze job tasks and identify primary risk factors, with the goal of changing unacceptable job demands. Ergonomic approaches are used to

- design jobs and tasks to fit people, rather than expecting people to adapt to poor work designs.
- achieve a proper match between the worker and the job by understanding and incorporating human limits.
- take into account that problems result when job demands exceed the limits of workers.
- comply with regulatory requirements.

Manual patient-handling tasks are intrinsically unsafe, because they often exceed the physical capabilities of the general workforce. Therefore, traditional injury-prevention programs based primarily on training and behavior modification have not been successful.

As with any program within an organizational structure, top management must be committed to the implementation of an ergonomics-based systems approach aimed at occupational injury prevention. Without this support, chances for success will be limited. Some managers may be well aware of the problems with musculoskeletal injuries within their organizations, and others may not be aware of the magnitude of the problem or may place the issue low on their priority list. Rehabilitation facilities must identify their unique needs when developing an ergonomic-based approach to injury prevention.

Next, the personnel who will work on this problem within the organization must be identified. In a large organization, it may be assigned to an appropriate operational area. In a smaller organization, a committee or task force may be organized to work on the problem. In a rehabilitation setting, an interdisciplinary team is critical to the implementation of an effective injury-prevention program. And because some physical therapists (PTs) in rehabilitation settings have shown some opposition to the use of assistive equipment (American Physical Therapy Association, Association of Rehabilitation Nurses, & Veterans Health Administration, 2004), it would be particularly important for PTs to be represented on the interdisciplinary team. With this foundation in place, the organization is now prepared to embark on the implementation of an ergonomics-based system. The following is a summary of the ergonomic workplace assessment protocol for patient care environments:

- Step 1: Screening
- Step 2: Assess and analyze risk factors on high-risk units
- Step 3: Formulate recommendations
- Step 4: Implement recommendations/involve end users in selecting equipment
- Step 5: Monitor results, evaluate program, and continuously improve safety.

Step 1: Screening

Collect Baseline Injury Data

There are several methods for collecting baseline injury data, including a retrospective review of incident reports and OSHA 300 logs. Unfortunately, it is often difficult to understand the injury etiology using retrospective data collection methods. For example, incident reports may not include critical information about staffing levels, whether equipment was being used, and other contributing factors. Prospective data collection, defined as collecting data as each injury occurs, allows an organization to ascertain specifics while the affected person is able to easily recall details. However, prospective data collection can be a time-consuming process.

Injury data should focus on injuries related to patient handling and movement. Each clinical area and discipline should gather and record its own information. The diagnosis or disability of the patient should be noted. Data should briefly capture a description of the incident, including the patient-care activity that was being performed at the time of the injury (bathing, repositioning, transfer from bed to chair), cause of injury (pull, push, reach, struck), type of injury (sprain, strain, contusion), time of the incident, location where the incident occurred, body part(s) affected, days of work lost, and modified duty days. Typically, at least 1 year of data are collected and analyzed to identify trends. Analysis should first be performed at the area level to characterize each area and then aggregated across areas to assess a facility. Area analysis will minimally address the incidence, severity (defined as lost and modified duty days), primary task(s) involved, and the primary cause(s) of injuries in the area. Those areas, patient diagnoses, or disabilities with high incidence and severity of caregiver injuries, will be classified as high-risk areas. (Note: depending on whether the rehabilitation setting admits patients to diagnoses- or disability-based areas, the high-risk areas may or may not be area based). These areas, patient diagnoses, or disabilities, should be the initial focus of ergonomic interventions. Identifying the primary cause(s) of injuries and tasks performed when injuries occur will provide direction for ergonomic recommendations.

Caregiver opinions on factors contributing to injuries can be obtained through the use of staff surveys. A simple, open-ended staff survey asking such questions as, "What is contributing to the injuries occurring in your area?" may identify significant issues such as lack of equipment, poor equipment maintenance, and repair, storage, staffing, or problems with modified duty assignments. Management interviews may also bring up pertinent issues that cannot be identified from injury data. Ideally, such a management interview would take place during a walk-through of the area.

The easiest method to determine relative cost associated with injuries is to calculate the number of lost and modified duty days. It is easy to assume that the higher the number of lost and modified duty days, the higher the total costs. Injury costs can be estimated though by multiplying the lost and modified duty days by the average daily salary of the injured employee. Another source of cost data is facility office workers' costs. These data are readily available; however, because of their general scope, their usefulness is quite limited here. As opposed to facility-wide cost data, area cost data collection requires the development of a comprehensive cost data tool. Cost data analysis by area requires prospective analysis and therefore is time consuming. Such analysis is complex and should be undertaken only by an expert. **Figure 2–1** is a sample form for collecting baseline data from the OSHA log, nurse manager files, facility accident stats, and facility office workers' costs.

For more details on evaluation, please refer to chapter 11 of the *Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement* (www.visn8.med.va.gov/patientsafetycenter/resguide/ErgoGuidePtOne.pdf; U.S. Department of Veterans Affairs, 2005). It is important to integrate data collection into existing data sets available at your facility.

Identify High-Risk Areas or Diagnoses/Disabilities

Using baseline data on the incidence and severity of injuries, identify the high-risk areas or diagnoses/disabilities at your facility. Although you will eventually want to conduct an ergonomic assessment for every area, prioritizing time and resources is often necessary. High-risk areas or diagnoses/disabilities will likely have the highest incidence of patient-handling injuries, the most workdays lost, and the highest concentration of staff on modified duty.

Obtain Data on High-Risk Areas Prior to Site Visit

An ergonomics evaluation team will perform an ergonomics analysis of each area to determine what improvements can be instituted to decrease risk. These recommendations will be made based on a site visit to each area, interviews with management and other staff, and an evaluation of area-specific information. This area-specific information should be collected and submitted to the ergonomic evaluation team prior to their visit to ensure a smooth and productive site visit.

Generally, the ergonomics evaluation team will assess injury data, equipment issues, space requirements, storage availability, and maintenance/repair issues. Area design, (i.e., long hall, x configuration with the nursing station in the middle, plans for relocation or different patient focus, etc.) should also be assessed. Other factors such as patient population (diagnoses/disabilities) and staffing information are needed to determine which area characteristics will influence intervention needs.

The following data collection tools will aid in obtaining this information. To allow adequate time to locate and compile information, these tools should be given to the interdisciplinary team's manager at least 1 week prior to the site visit. **Figure 2–2** is the Area Profile Prior to Site Visit data collection tool. Part I of this tool describes the area and includes information on space, storage, structure, and maintenance/repair issues. Part II collects information related to the patient population and staff.

While most of the questions in Figure 2-2 are self-explanatory, one area, percentage of dependent patients, may need additional explanation. Definitions for levels of dependency are included in Figure 2-2.

In addition, each patient should be assessed for such factors as mental acuity, ability to comprehend instructions, ability to cooperate in lifts and transfers, combativeness, weight, upper extremity strength, ability to bear weight, and specific medical conditions that may affect the selection of an appropriate means for lifting and transferring. The other factors mentioned will be considered when determining the appropriate method of patient transfer.

Step 2: Assess and Analyze Risk Factors on High-Risk Units

Next, it is important to identify and assess staff perceptions of high-risk tasks. The tasks with the highest risk are likely to vary between areas, depending on patient characteristics, availability of equipment, physical layout, and work organization. For example, some studies have indicated that bathing tasks, toileting tasks, and transfers from beds to chairs are high-risk tasks for patient handlers. Other areas may prioritize lateral transfers from bed to stretcher, or turning patients from side to side in bed.

Through job observation, employee questionnaires, and brainstorming sessions with patient handlers, individual sites should determine which activities are high risk within their organization. **Figure 2–3** is a tool that can be used by nursing staff to identify and prioritize high-risk tasks.

You may consider using this tool as part of the data collection process prior to the site visit. However, it is important to include as many direct patient care providers as possible in delineating high-risk tasks. Keep in mind that there are likely to be variations by nursing area, discipline (PT and OT), and shift.

Conduct Team Site Visit for Ergonomic Assessment

Following identification of high-risk areas or diagnoses/disability categories from historical injury data, the ergonomics assessment team should convene to conduct an on-site evaluation. This on-site evaluation serves to identify the many direct and indirect factors that may contribute to risk potential and, with staff input, identify potential solutions that could minimize risk of injury to caregivers and patients. The following process should be completed for each area and treatment area (e.g., rehabilitation gym, treatment rooms) being evaluated.

Team members must understand the philosophy of ergonomics and its processes specific to patient care environments. Therefore, appropriate training, as offered in this tool, must be completed. Ergonomics assessment team members include persons with training in the ergonomics process such as industrial hygienists, occupational medicine practitioners, certified occupational health nurses, certified safety professionals, and ergonomics specialists. At least one nursing service safety appointee should receive training and participate as a member of this team. During the site visit to each area, the nurse manager (or designee from that area) and therapy supervisors will join the team to answer area-specific questions. Additional staff involvement is suggested and important to accurately characterize an area; therefore, nursing staff members and therapists from each area should also be invited. At a minimum, additional staff members should participate in the data-collection process prior to the site visit. These staff members will offer information through group and individual interviews. Available nursing staff should participate to broaden the scope of understanding on certain areas.

Each area should begin the site visit process with an opening conference and possibly end with a closing conference. These meetings include ergonomics evaluation team members and other designated nursing staff and therapists. The actual site visit walk-through takes place after the opening conference. The opening conference discusses and clarifies information obtained from the data collection tools used prior to the site visit and gathers additional information through interviews with nurse managers and nursing staff. If used, the closing conference summarizes information captured for accuracy and is helpful in prioritizing issues.

Key staff from the area, including the nurse manager, supervisor, therapy managers, site coordinator, and the back injury resource nurse will meet with the ergonomics team to discuss operational issues and review data that was gathered in preparation for the site visit. This meeting may last from 30 minutes to 1 hour. Operational issues discussed should include

- future plans of the area: whether the area is to be expanded or reduced, whether to increase or decrease staffing, and changes in the type or number of patients.
- patient transport issues: whose responsibility it is to transport patients for consults and treatments.
- general equipment condition, including storage and preventative maintenance programs (if any).
- staffing considerations: staffing levels, scheduling practices, and patient assignments are revisited to learn more about typical patient census, staffing levels by shift, unique shift patterns, typical number of staff on modified or light duty assignment, staff turnover, peak workload periods, workload distribution using special teams such as shower or lift teams, and tasks that are least favored.

When the staff group has convened, staff input pertaining to ergonomic risks related to patient care activities should be solicited. Samples of general questions that may assist in this activity are outlined below:

- What conditions or situations put you at risk for back strain and injuries?
- Which lifts or transfers are the most difficult to use and present the highest risk?

- What are the factors that make a lift or transfer a high-risk activity?
- What types of patient conditions contribute to high-risk situations?
- What do you think can be done to reduce or minimize a high-risk situation?
- How can we use lifting aid devices more effectively?
- What are the important features to look for in a lifting aid device?

With a more complete understanding of operational issues specific to the area, the ergonomics evaluation team should perform a guided tour of the area, which may take approximately 30 minutes to 1 hour. During this tour, the team should pay particular attention to: the availability, size, and configuration of storage space; showering processes and equipment, whether private or communal; toileting processes and equipment; patient room sizes and configurations; provision and condition of equipment for patient transfer, including mechanical lifts, stand assist lifts, and lateral transfer aids; whether the pieces of equipment used in the therapy departments are the same pieces used in the nursing area and vice versa.

Information derived from the site visits are compiled into a summary data sheet by area (refer to **Figure 2-4**). On this data sheet, the patient population and area type are described, along with miscellaneous pertinent information, such as future plans of the area. Availability and condition of equipment on hand is noted. Problems identified by the ergonomics team are recorded in detail, allowing for the development of proposed solutions.

Risk Analysis

Risk analysis involves careful review of the historical injury data, data collected prior to the site visit, identification of high-risk tasks, and observational data from the site visit. Through risk analysis, high-risk situations or job tasks are identified. Risk factors specific to the healthcare industry might include: reaching and lifting with loads far from the body; lifting heavy loads; twisting while lifting; unexpected changes in load (patient) demand during the lift; reaching low or high to begin or complete a lift; moving/carrying a load a significant distance; and static posture tasks. Environmental hazards are also identified, such as cluttered patient care areas, confined space in bathrooms, or broken equipment.

Step 3: Formulate Recommendations

Recommendations should be achievable and simple. When developing recommendations, it is necessary to factor in constraints, such as fiscal resources, administrative support, and space limitations. Generally, solutions fall into two categories: engineering controls or administrative controls. Brief descriptions of each follow.

Engineering Design Solutions

These solutions usually involve a physical change to the way a job task is conducted or a physical modification to the workplace, which may require patient care providers to perform a job task in a new way. Examples of engineering design solutions might include the introduction of lateral transfer aids, mechanical lifting aids, height adjustable beds to match with stretcher heights, or the use of wheelchairs that can be converted into stretchers.

Through engineering controls, which are usually permanent solutions to problems, changes are made in job design to minimize or eliminate risk factors. They may have a higher initial cost but may have a lower cost over the long term as a result of injury-associated cost reductions realized from the implementation of the changes.

Consider the following high-risk patient-handling task, with the goal of changing the high-risk components of the job. Tasks involving a bed-to-chair or chair-to-bed transfer can be very difficult. First, consider moving someone out of a bed and into a chair. The difficulty of the task will vary relative to the dependency level and weight of the person to be moved. Considering a totally dependent person, staff members must reach across an obstacle (the bed) to access

the person they need to assist. This involves excessive reaching, and it is usually not possible to position oneself with bent knees since the caregiver is usually leaning up against a bed. The patient needs to be physically lifted, and the loads involved in the lift are biomechanically unacceptable.

Transferring the patient into a chair involves moving the person to a different height level, and there is usually some carrying involved. The unacceptable risk factors of this job task involve reaching, lifting a heavy load, suboptimal lifting postures, and carrying a load a significant distance. To redesign this task effectively, the optimum solution would be to eliminate these high-risk activities. When task elimination is not an option, lifting aid devices can be used. Lifting aid devices include full-body slings, which are very useful for the totally dependent patient. In addition, the bed-to-chair transfer can be converted into a bed-to-stretcher transfer. Through the use of convertible wheelchairs that bend backward, convert into stretchers, and have height-adjustment capabilities, a slide transfer rather than a lift may result.

If the patient is not totally dependent, a transfer such as bed-to-chair may be done by first assisting the patient into a sitting posture. Again, the amount of assistance required will depend upon the patient's status. Once in a sitting posture, a stand-and-pivot transfer can be conducted. Some healthcare workers are highly skilled in this transfer technique and have done it many times without suffering any occupational injuries. However, loads involved are heavy, and if the patient does something unexpected, such as collapse from a weakness in the legs, the healthcare worker must react; oftentimes these unexpected occurrences can result in occupational injuries. Again, through the proper application of lifting aid devices, the risk associated with this type of transfer can be minimized. A device that could be considered in this situation would be a sit-stand lift, which is a lifting device for patients with some weight-bearing capability.

Administrative Solutions

These usually involve changes to the ways tasks are performed and do not involve a physical change to the workplace. Appropriate changes are apparent by watching how the work is conducted or how caregivers perform their jobs. Examples might include changing schedules, minimizing the amount of times a patient or resident must be transferred, involving more people in the process of transfers, or the introduction of lifting teams.

Administrative solutions are usually implemented relatively quickly and easily and may have a low initial cost. However, implementation requires continual enforcement and reinforcement and, although short-term successes may be realized, it is difficult to achieve long-term change and improvement.

Administrative controls may be applied to patient-handling tasks. For example, the number of patient transfers may be reduced through more effective scheduling of procedures that patients may require over the day. Rather than transferring a patient from a bed to a wheelchair or transport device for a particular procedure or diagnostic test and then bringing the patient back to his or her room, putting him or her back to bed, and redoing the transfer for a number of other procedures during the day, scheduling could be planned more efficiently. Scheduling might be done so that the patient will be transferred out of bed, brought from place to place for various necessary procedures, and then returned to his or her room.

The following is a real-world example of how administrative controls involving rescheduling have been implemented to minimize a high concentration of lifting activities for direct patient care staff. It takes place at a state facility for the developmentally disabled that houses highly dependent patients in need of much assistance when being moved.

One of the most demanding times for patient transfers involved the part of the day when staff members were preparing patients to be picked up in buses and transported to their daily activities. Because of the way activities were scheduled and how the buses ran, staff members

were rushing and highly stressed to prepare patients for transport in a short time period. Lifting aid equipment was considered and did improve the situation. However, the short window of time to get patients out of bed and prepared for transport was creating the problem.

This was not an issue that patient caregiving staff could solve themselves. It involved many people throughout the entire facility, including those responsible for scheduling patient activity programs and meals, as well as the organization that had been contracted to provide transport services. Other than the direct patient care staff, the other groups were unaware of the problems encountered with the short time window provided to prepare patients for transport. After an initial meeting was held with the other operational groups at the facility, they understood the problem and were more than willing to consider options to improve the situation. Scheduled activities were adjusted and methods of transport pickups were also changed. This resulted in distributing the number of required transfers over a larger period of the workday and allowed for better use of lifting aid equipment. The implementation of this administrative control required some careful planning and presentation of the problem as well as cooperation from a wide segment of many operational groups within the facility. The end results were positive to all involved including the patients, who received better care. This was due to the fact that direct patient care staff had more time to prepare for the transport process and they could give more individual attention to patients.

Allocation of Resources

The evaluation team must consider many issues when determining the best and most appropriate use of available funds, including the following:

- Are appropriations best utilized to acquire new technologies or upgrade or replace old equipment? Assuming that an effective maintenance program is in place, equipment will have a long operational life. Certainly, technological developments lead to substantial improvements in patient-handling equipment, which can lessen the burden on caregivers. If existing equipment is functioning properly, then the cost of upgrades, other than those required through an FDA audit, might be cost-prohibitive. Therefore, funds may be best spent on the acquisition of new technologies rather than on the replacement of old equipment.
- Should you purchase or lease patient-handling equipment? The answer to this question lies in demand. If a product is needed for frequent use, then purchasing the products outright should yield the best return on capital investment. For equipment that is less in demand, such as bariatric care products, leasing may suffice. As a general rule, if the anticipated costs of periodically leasing a product in a 4-year period exceed the purchase price of the product, then purchasing is probably the most cost-effective, long-term solution.
- Is it better to purchase ceiling-mounted lifts or portable floor lifts? Laboratory-based studies at the Tampa Veterans Administration Medical Center (VAMC) have shown that ceiling-mounted lifts require 55% less physical effort for patient-lifting tasks than portable floor lifts. In the clinical setting, use of floor lifts typically decreases the number of patient-handling injuries by 30% over a 12-month period while ceiling-mounted lifts reduced injuries in one, 60-bed nursing home by 100% in the same timeframe. The costs for these two types of lifts are comparable, but more ceiling lifts may need to be purchased to provide adequate coverage for an area.

- Should you provide ceiling-mounted lifts throughout the area? Not necessarily. We have discovered that appropriate coverage for an area is equal to the number of totally dependent patients. At minimum, this provides for adequate coverage for those patients whose care is most demanding on nursing staff. Forty percent of the patients in a typical medical-surgical area may be dependent. If this area has an average daily census of 40, 16 beds would need ceiling lifts. Therefore, four ceiling lifts would need to be installed, or one for each four-bed room.
- What features are needed for ceiling lifts? In laboratory and field studies conducted at the Tampa VAMC, staff preferred the two-function (up/down) lifts. When offered the multifunctional systems with powered tracking, we found that the nurses actually worked against the motor because the powered tracking was too slow. Furthermore, the absence of powered tracking requires that the caregiver manually move the patient around the room. This requires minimal effort but means that the nurse has hands-on involvement with the patient at all times, which makes the patient feel more secure and is in compliance with VA policy. The slight additional capital investment in H-track or transverse-track systems provides much greater flexibility for tasks than the single-track systems. However, this can pose some logistical problems with existing light fixtures and privacy curtains.
- A number of accessories are available for lifting systems. These accessories can add significantly to the overall cost. We have found that when patients are weighed frequently or daily, there is worthwhile benefit in adding scales to the lift systems. The availability of this technology replaces a task that is stressful to the nursing staff and places the patient at risk for falls; it also allows the caregiver to spend more time addressing other patient needs.
- Aging or inadequate quantities of battery packs can affect the availability of powered lifting systems. When existing equipment is not fully utilized due to battery problems, purchasing additional or replacement battery packs might be a very wise investment. An actual schedule or procedure may be necessary to assure a reliable system for switching and recharging batteries. Depending on the types of batteries and charging technologies used by the lifting systems, additional battery packs might be warranted. For example, if the type of battery requires total discharge before recharging, then the system would be out of commission while the battery is being recharged. An additional battery pack would be warranted in this case. Engineering staff are available to assist in this determination. In one clinical setting, there was an increase in injuries for the night shift staff. Investigation revealed that the batteries for the patient lifts needed to be recharged overnight, and the lifts were therefore not available to staff on this shift. A backup battery was purchased to allow use of the lift 24 hours a day. This resulted in a significant reduction in injuries.
- Slings for ceiling, floor-based, and stand-assist lifting systems are available in a variety of configurations. There are designs for amputees, for example, as well as designs for special applications, such as bathing. Careful consideration needs to be given to the number, sizes, and types of slings selected for each lifting device. Laundering procedures may necessitate the purchase of extra slings if laundering is accomplished off the area and delays access to a set

number of slings. Infection control policies may mandate separate slings for each patient. Insufficient numbers of slings is one reason staff members do not use existing lifting equipment.

- Lateral transfer of dependent patients, e.g., from bed to stretcher or convertible dependency chair, is a problem within the healthcare industry that is beginning to receive recognition. Prior to the availability of powered lifts, the risk of injury associated with lateral transfer was moderate compared with the major risk of manual lifting. Now that patient lifting is being properly addressed with advanced powered lifting systems, the issue of lateral transfer is emerging. In laboratory studies at the Tampa VAMC, we have discovered that the forces required to perform an unassisted lateral transfer using a draw sheet equate to approximately 70% of the weight of the patient. Even if three nurses perform this task, the risk of cumulative injury to the back is unacceptable. To address this problem, new technologies are readily available. These technologies include a variety of friction-reducing devices and mechanical and powered lateral transfer equipment. Although some mechanical lateral transfer devices minimize the forces, they are transferred to weaker joints, such as the shoulders. This is an unacceptable solution. The high cost of powered lateral transfer technologies may be warranted when a high volume of lateral transfers are regularly performed on an area. It is worth noting that up to 30 low-cost friction-reducing devices may be acquired for the same price as one with powered lateral transfer technology.
- The quantity of various assistive devices should be determined after evaluating patient needs and concurrent responsibilities of nursing teams. If, for example, several teams require the availability and continuous use of a particular product during the morning shift, then sufficient quantities must be acquired to satisfy this need. When not in use, the product should ideally be stored in a location that is central to all operations, such as a storage room or a room located midway along the length of the area.
- Since bed rails were eliminated due to being a high-risk entrapment hazard, the concern of patient falls from beds has risen. In addressing this problem, some areas have adopted low beds and fall injury prevention matting, which is placed on the floor. Both solutions are commendable, but in addressing patient injury concerns, risk of injury to nursing staff has been grossly ignored. When low beds are used, they must have the capability to be raised to an acceptable working height. Nursing staff must be encouraged to utilize this function rather than addressing patient needs at a low level. When mats are used, nurses might either first move the sometimes heavy mats before addressing patient needs, or walk across the mats, which causes instability. Furthermore, these mats must be frequently moved by housekeeping staff for cleaning purposes. More stable, lighter mats are now becoming available, but this is an interim solution until the larger issue of patient fall risk can be adequately addressed without restraint.

STEP 4: Implement Recommendations/Involve End Users in Selecting Equipment

Implementation of recommendations will involve changes to the workplace. To enhance chances for success, a well thought out process for the implementation of recommendations needs to be developed. If engineering solutions such as new patient lifting equipment are to be introduced, programs for educational awareness and detailed training are necessary. An implementation team must be recruited. This team will formulate a plan in which each member of the team understands his or her role. Refer to Chapter 1 of *Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement* for team composition suggestions (www.visn8.med.va.gov/patientsafetycenter/resguide/ErgoGuidePtOne.pdf; U.S. Department of Veterans Affairs, 2005)

STEP 5: Monitor Results, Evaluate Program, and Continuously Improve Safety

A system for monitoring and evaluating results should be developed to determine what successes and failures have occurred so that appropriate adjustments can be considered, as necessary. The monitoring and evaluation system is also critical to maintaining an adequate level of interest and attention for the patient-care ergonomics program. The monitoring function also requires a system for data collection, similar to risk assessment. It must be determined what information will be useful in the evaluation process. Chapter 11 of *Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement* outlines the evaluation process in detail (www.visn8.med.va.gov/patientsafetycenter/resguide/ErgoGuidePtOne.pdf; U.S. Department of Veterans Affairs, 2005).

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