

An Integrated Approach to the Prevention of Back Injuries in Health Care Workers

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“Two of my good friends, who are top critical care nurses, can no longer work in that area because of back injuries. We can’t afford to lose them.”—Nurse Practitioner at a large medical center.

Retention [and recruitment] of health care workers for most health care organizations has become a top priority.¹ Several factors are contributing to what many perceive as a “nursing shortage crisis,”² including an aging workforce, low enrollments in studies related to care giving, an array of employment options for traditional care givers, demographics of the “baby boomers’ moving through the system with a smaller employment pool behind, an ever-aging population with an increased acuity of health problems, strong regulatory requirements, rising health care costs, and increased fiscal constraints. As of 1998, the average age of working nurses increased from 37.7 to 41.9 years old.³ Madeline Wake, dean of Marquette University’s nursing school states “Right now there is a serious problem, but nothing like what it is going to be in a few years. Fifty percent of the current nursing work force will reach retirement age in the next 15 years.”

Some studies are showing that there is a direct relationship between caregiver staffing and quality of care.⁴ Michael Hodgson, the Director of the VA occupational health program states “The cost of [staff] injuries and illnesses represents money taken away from patient care and the families of employees.”⁵

Scope of the Problem

The incidence rate of back and shoulder injuries in health services continues to be significantly higher than in private industry, with a rate of 80 for back injuries as compared to a rate of 46.9 for private industry and 14.2 for shoulders as compared to 10.4.⁶ “Health care workers, representing a growing industrial sector, have increasing rates of nonfatal injuries and illnesses.”⁷ They face health exposures that include needle stick injuries, latex allergies, on-the-job stress, and musculoskeletal disorders. According to NIOSH, “although it is possible to prevent or reduce health care worker exposure to these hazards, health care workers actually are experiencing increasing numbers of occupational injuries and illnesses. Rates of occupational injury to health care workers have risen over the past decade. By contrast, two of the most hazardous industries, agriculture and construction, are safer today than they were a decade ago.”⁸ Back injuries may not be the most frequent injury to caregivers, but they are the most costly. Injury. Lifting and moving patients accounted for 34-36% of the number of injuries in hospitals and 66-69% of costs.^{9, 10}

“When I go home at night I feel bad that I can’t lift my children when they greet me at the door. The first thing I have to do is have a soak in the tub,”—a Critical Care nurse.

Owen and Garg identified the most high-risk tasks for back injuries in health care workers. Their data indicated the following tasks, in order of difficulty for staff: transferring patient from toilet to chair, transferring patient from chair to toilet, transferring patient from chair to bed, transferring patient from bed to chair, transferring patient from bathtub to chair, transferring patient from chair lift to chair, weighing a patient, lifting a patient up in bed, repositioning a patient in bed side to side, as well as lifting a patient from the floor. Transfer tasks all averaged greater than 3430 N of force to L₅S₁.¹¹ Compressive forces on the spine have been shown to be over the action level recommended by the NIOSH Lifting Guidelines.¹² “In laboratory studies at the Tampa VAMC, they have “discovered that forces required to perform an unassisted lateral transfer using a draw sheet equate to approximately 70% of the weight of the patient.”¹³

The knowledge that health care workers are at risk for back injuries has been accepted for many years in the health care arena with “body mechanics” and “using two staff to perform manual lifts” taught in schools of nursing for at least 40 years (personal experience) and continuing. Some have changed the name to “ergonomics training” but by whatever name, training cannot overcome an inherently unsafe task. Teaching good body mechanics may increase the knowledge of safe behavior, but there is a growing recognition that this type of training does not prevent back injuries. Dr. Audrey Nelson has identified the myth of “Education and training are effective in reducing injuries,” among other myths about safe patient handling and movement.¹⁴ A powerful general-industry based study reported in 1997, “[this] large-scale, randomized, controlled trial of an educational program to prevent work-associated low back injury found no long-term benefits associated with training.”¹⁵ Another commonly accepted practice is the use of two people to perform a lift rather than one. A recent study by Ohio State researchers indicates that even when using two people to perform a patient lifting and moving task the back stress was only reduced by about 10%.¹⁶

While some health care facilities have recognized and placed an emphasis on dynamic lifting, static postures that increase the risk of back injuries are equally important and may be overlooked.¹⁷ Engels found that nurses were performing tasks in a bent position 24% of their total working time.¹⁸ Postures involved in showering/bathing, feeding, performing a treatment for a patient while in bed, and certain toileting procedures for spinal cord injured patients are among those that require the care giver to work in a bent position.

Hierarchy of Controls

Safety/health/ergonomic professionals have looked to the classic hierarchy of controls to mitigate hazards in the workplace. Four of the hierarchy of controls and health care examples are as follows:

Eliminate the hazardous task. As an example, weighing patients can be eliminated as a separate task by using lifting equipment that also contains a scale, or by eliminating a transfer from a wheelchair to a bathing lift to a tub, by only lifting from the bed with one unit that then goes into the tub or the shower and then takes the patient/resident back to bed. Another example is eliminating the lifting required to place a sling under a seated

dependent patient by using a sling design that tucks under the patient and around and between the legs. Another example is using *one* unit to lift/hold/transfer the patient as the staff perform procedures such as wound care, removing pants or soiled incontinence pads, travel to the shower room, and showering.

Modify the hazardous task. As an example, instead of using a draw sheet to lift and move a patient up in bed or to drag them to the top of the bed, low-friction sheets can be used under the patient to reduce friction and make the task an easier one to perform. Experience indicates that the task of repositioning in bed is a frequent and stressful one for caregivers. The use of low-friction rolling tubes assists caregivers with the transfer from bed to gurneys.

Engineering the hazardous task. Mechanical lifts designed for a range of patient abilities have been ergonomically designed to eliminate the lifting tasks associated with the care of dependent patients and those requiring maximum to minimum assistance. Some devices are even designed for patients who have the ability to pull themselves to a standing position, but don't have the stability or stamina for extensive walking.

Apply administrative controls to the hazardous task. Some hospitals have been successful with using "lift teams" and equipment, both with and without full unit/shift coverage.¹⁹ Training is also an administrative control and has its place in ergonomic programs. It is an essential piece of learning to use back-saving devices. However, as indicated above, training is of modest value in "learning body mechanics relative to manually lifting." Another example of an administrative control would include increased staffing for high-care portions of the day.

Matching the Tool to the Task

There have been mechanical lifts available for over forty years with the original design to lift all patients as though they were totally dependent. Until about 12 years ago, that one lift was the mainstay in health care facilities and little technological advancements were made. Since that time there is an understanding that different patient abilities dictate the use of different equipment and that lifts should provide the minimum amount of assistance necessary, again, compatible with caregiver safety. The primary goal of patients and residents is to improve health and mobility or at least to maintain it.

In 1987, the first advanced sit-to-stand device came on the market. It was innovative because it addressed the high-risk activity of toileting patients/residents who needed maximum assistance but who were weight bearing and did not need a "total" lift. Subsequent designs have allowed more and more individuals to "get on their feet." The needs of assisted living resulted in a simple, non-mechanical piece of equipment designed for people with upper body strength who could get themselves into a standing position with something to hold on to.

Low-friction sheets made of ballistic nylon are proving very helpful in easing the fatigue and strain caused of repositioning patients in bed. They are lightweight and easy to use. A more sophisticated device uses a bed of air to "lift" the patient so that caregivers can then move patients from one lateral surface to another. Another product "grabs" the sheet and mechanically moves the patient from one lateral surface to another.

Lift walkers are available to assist with getting a patient to a standing position and then supporting them when they take first steps toward independent walking. Gait belts with multiple handles assist caregivers with providing support to patients who are ambulating but unsteady. Innovative products are available that convert stretchers to chairs and innovative beds convert to chairs. Various bathing systems and showering equipment are now available to bring these tasks to the height of the caregiver and to reduce static postural loading. A new high-low treatment chair that reclines and also serves as a shower/commode chair has recently become available.

Ceiling lifts are quite popular in Canada and especially in Quebec.²⁰ Various configurations of these units are coming more and more into use in the United States and are a good solution for many dependent lifting tasks.

In short, ergonomics and technology are rapidly making the jobs of caregivers easier and safer. As in any operations, the thought process of “we’ve always done it this way” is prevalent in many facilities. Effective use of the hierarchy of controls requires careful rethinking of tasks as well as knowledge of the technology available.

Integrated Ergonomic Approach to Back Injury Prevention

(In te grate) – to form, coordinate or blend, into a functioning or unified whole.²¹

Nurses in particular have a values system that places patients at highest priority. When they understand that the use of ergonomically designed tools is safer and more comfortable for their patients, as well as safer for them, they are more likely to support the program. Owen documented that, in long-term care, over 98% of lifts are done with two caregivers using the “under the axilla” lifting technique.²² That approach is painful for patients. When other patient safety factors are added in, such as lifting consistency, and comfort and security for the patient or resident, a persuasive case can be made for the use of appropriate mechanical devices.

There is a growing acknowledgement that an integrated ergonomic approach offers the best solution for protecting the health of our health care workers.²³ Research has shown that well-designed equipment and devices to assist staff with patient handling and repositioning is a critical part of an effective back injury prevention program, but equipment alone, does not solve all of the back injuries health care givers. The following is an approach to a more comprehensive and integrated approach to the prevention of back injuries in health care workers.

Approximately ten years ago there was recognition that, in many situations, providing lifting equipment alone did not achieve the back injury reduction goals expected. After a thorough equipment assessment and impact analysis was developed one manufacturer developed a manual, *The Back Injury Prevention Manual (BIPP®)*, to assist customers with implementing effective measures through the use of equipment. The manual contained basic program guidelines and has evolved since that time. Current editions of the manual contain the following sections: (1) steps to implement the program, including the need for internal “key coaches,” (2) the assessment of the facility’s patient handling and repositioning needs, (3) patient assessment flow charts, equipment selection and use, (4) selection and use of baseline data for subsequent program effectiveness evaluation, (5) an implementation schedule, in-servicing forms, equipment-specific competency skill checklists, and other useful forms, (6) sample policies, laundering instructions, and procedures

for handling contaminated slings, as well as training requirements, (7) various support materials including instructions, assessment icon stickers, equipment parking signs, and (8) equipment brochures. The program proved to be very successful for many health care facilities. In some, due to high turnover and lack of sustained support, the program was not as successful as had been anticipated. In the end, equipment, devices and manuals are only metal, cloth and paper – no matter how well designed. Without sustained and strong internal support for implementation and maintenance focused on the goal of a cultural change of “no manual lifting,” many facilities will falter in their efforts of protecting their caregivers.

Recently, an additional clinical/management consultation component has been made available that offers a more comprehensive facility approach toward long-term success. Health care clinicians with varying professional backgrounds including occupational health nursing, physical therapy, occupational therapy, and others provide monthly facility visits. Their primary responsibility is keeping focus on the program and the goals that the facility set out to achieve with the back injury prevention program. Specific responsibilities include: meeting with management on the programs progress, reviewing incidents involving patient handling and repositioning, providing equipment competency training programs and management coaching training that will be needed for success, problem-solving difficult process issues and challenging lifting situations, one-on-one unit training, support for key coaches, and evaluations relative to goals that were set at the beginning of the program.

In the rush of day-to-day responsibilities, front line managers are often pressured and unwittingly transfer their frustrations to direct care staff. An Ontario policy document indicates that nurses who feel supported by their managers and colleagues tend to remain committed to their jobs, and money becomes a major issue only in the absence of other sources of satisfaction.²⁴ Experience has shown that helping them understand their critical role in the program’s success has been of value. This is best illustrated by the following interchange between the consultant and one nursing assistant.

Consultant: “You are too valuable to your patients for us to let you risk your back by manually doing this task.”

Caregiver: “I don’t feel valuable.”

As careful as ergonomic assessments are, they need to incorporate a thorough and comprehensive review. One of Covey’s 7 habits of effectiveness is “Begin with the end in mind.”²⁵ Time spent in the beginning of establishing an integrated ergonomic program is time well spent. The following are essential components:

Assessment of the unique equipment and other needs of all departments/units that are directly or indirectly involved in-patient handling and positioning, to include:

- Architectural characteristics of the unit relative to accessibility of equipment.
- Unit patient characteristics that might require a high ratio of equipment to staff.
- Patient handling/moving tasks inventory of tasks staff actually perform on the unit.
- Staffing patterns including the ratio of the staff to patients, use of “float” staff and/or temporary “agency” staff, shift patterns, and style of patient care may all result in adjustments to equipment recommendations.

- Management styles and goals that are in concert with the program requirements.
- Management beliefs about staff safety/health/back injuries as preventable.
- Unit accountability that insures that what is perceived as important on the unit will be implemented.
- Unit cohesiveness. Units that have a friendly, helpful, collegial spirit seem to adapt to ergonomic strategies easier.
- Historical injury data. Units that have historically high rates of staff injuries will likely have addition challenges in implementing a successful ergonomic program.
- Infection control requirements. MRSA and other nosocomial infections may dictate disposable slings and/or different policies and procedures relative to sanitation.
- Communication channels that are effective in transmitting dynamic knowledge about patients' care.
- Stakeholder input, including the ability to "try out" the equipment. Without participation, "buy-in" becomes difficult. Staff uniquely understands the needs and uniquely understands the solutions.
- Specialty units such as bariatric, traumatic brain injury, etc.
- Other patient handling areas/needs such as radiology, operating room, rehabilitation, long-term care, lift teams, gastroenterology, physical therapy, occupational therapy, and out-patient surgery.
- Presence of ancillary units such as laundry, housekeeping, bio-medical engineering, engineering, etc. Discussion about program plans and the advise of ancillary departments is essential for successful program.
- Initial and ongoing training capabilities.
- Proposed changes to units, i.e. closing beds, renovations, etc.
- Adequate, but not excess, equipment recommendations.

Planning once a decision has been made in order to have a smooth "roll out" of the program:

- Participation by all stakeholders in the selection and decision-making.
- Written program policies, guidelines and aides such as equipment selection charts, algorithm's, and flow charts. Algorithm's are in the BIPP® program and a set have been developed by the Tampa VA.
- External clinical consultation to assist with development and incorporation of polices, procedures, and processes. Not all facilities require expert outside assistance, but they often bring an objectivity that can bring key staff together to provide effective inter and intra departmental solutions.

- Support resources including program manuals, videos, and other reference and training materials. Easy to read and understand operational manuals, videos for quick brush-ups on technique and other reference materials greatly enhance programs.
- Selection of internal clinical support team. Day-to-day implementation requires effective internal champions working on the floors. In some units they are called “back injury resource nurses (BIRNS)²⁶ and in others they called “ergo-rangers” or “key coaches²⁷.” These individuals require advanced equipment training and interpersonal and coaching skills to assist with changing the behavior of colleagues.
- Selection of internal coordinator to serve as point person for the program and as a resource to the internal clinical support team
- Continuing equipment sales support to assist with in servicing, working out processes, and making equipment mix adjustments.
- Responsive service network. When policies call for “no lift” and when staff is trained to use the equipment and none is available because of service issues, the program suffers serious degradations.
- Guarantees of injury reduction. Various manufacturers offer various types of guarantees. Obtain details of their plans.
- Setting of data baselines for ongoing evaluations.

Implementation

- Pre “roll-out” meeting with all management stakeholders to discuss expectations, establish management baseline knowledge, and to develop timelines.
- Communication strategies to promote the program, including newsletters, posters, “teaser” documents, buttons, etc.
- Scheduled implementation progress reviews with the system coordinator
- Written policies/procedures/protocols for assessing patients, communication of assessments, use of equipment, storage and care of equipment, infection control measures, laundry procedures, equipment servicing
- Emphasis on management actions that will help to insure program success
- Written reports for senior management
- Training of internal unit clinical champions
- Baseline training of staff and provisions for staff unable to attend initial training
- Plans for staff practice on equipment and signing of equipment-specific competency skills checklists.
- New employee and temporary employee orientation plan to include training on policies, procedures and equipment.
- Orientation/training for direct-line supervisors and middle-management

- Specialized training with rehabilitation therapists
- Initial assessments of patients and methods for reassessing and communicating changes
- Method and procedure for ongoing education of patients and families
- System for investigating accidents and capturing prevention-oriented information.

Evaluation

- Consider measurement all through the process of selecting and implementing and maintenance of a back injury prevention program.
- Select meaningful outcome measures for staff, for patients, and for management
- Devise an evaluation tool with various criteria of interest for the selection process, that might include ease of use, tasks equipment will address, durability, comfort, ease of cleaning, ease of maintenance, staff acceptance, and even appearance if that is important to your environment.
- Determine what implementation objectives are important to measure and evaluate the success of meeting those objectives
- Identify learning objectives for various levels of training and select appropriate tools to measure
- Select financial outcome measures
- Establish a quality assurance model for infection control
- Measure maintenance activities relative to the equipment

Behavioral Change Process

Schools of nursing, today, continue to teach manual lifting techniques with little information about health care ergonomics and available equipment. The process of changing caregivers thinking to one of not putting themselves at risk requires nothing less than a cultural change. The ultimate goal is to not consider performing a lift without the appropriate ergonomic tool. If a manual lift were required it would be a clear exception to the rule and thought out well before hand. The process of behavioral change to develop a new culture is time consuming and requires strong leadership. One process to achieve behavioral change uses the steps described below.²⁸

- (1) Targeting the high-risk behaviors
- (2) Pin-pointing the most at risk behavior
- (3) Observe present behavior
- (4) Set goals for behavioral change
- (5) Measurement progress
- (6) Provide non-punitive feedback
- (7) Reinforce desired behavior
- (8) Evaluate results
- (9) Implement changes needed
- (10) Celebrate success

First-line management must encourage, provide positive reinforcement, and assist their staff with getting over the learning curve for performing a task in a new way. Positive reinforcement is especially important as an incentive to care givers to change behavior. Repeated often enough, the new reinforced behavior becomes a habit and then only requires very occasional external reinforcement or may have sufficient internal rewards to result in a permanent change. That is the goal of for caregivers in protecting their backs.

Success Stories

Fragala, Garg, Charney, Collins (NIOSH), and OSHA have published or presented a number of success stories relative to ergonomically designed patient-handling and repositioning programs.²⁹,³⁰,³¹,³²,³³ They show dramatic reductions in both the frequency and the severity of losses. See Table 2-1.³⁴

Summary

We can no longer afford to lose a single competent nurse, nursing assistant, or other direct caregiver as the result of a [preventable] back injury. An integrated ergonomic program for caregivers that provides management support and reinforcement, appropriate equipment and devices that have been selected with the user's input and devices, thorough training at all levels, and concurrent evaluations of progress are an effective way to reduce the frequency and severity of back injuries in health care workers.

TABLE 2-1: SUMMARY TABLE OF ERGONOMIC INTERVENTION CASE STUDIES

Facility	Intervention	Post Intervention Results
Northern Virginia Training Center (Werner, 1992)	Mechanical lifts on 4 high-risk units	73% reduction in injuries
Wyoming nursing facility (Stensaas, 1992)	Lifting aid devices	60% reduction in injuries
Nursing home (Fragala, 1993)	New lifting devices	Only 2 strains/sprains in 6 months vs. 12 pre-intervention; Provider acceptance high.
Kennebec Health System ("Empowering Workers," 1993)	Ergonomic management program; engineering controls, including lifting devices	Lost workdays dropped to 48 from 1,097. Experience modification factor dropped from 1.8 (worse than average) to 0.69 (better than average). Insurance premiums dropped from \$1.6 million to \$770,293.
Texas hospital (Fragala, 1995)	Lifting equipment	Workers' compensation costs for back injuries declined from \$111,159 to \$743.
Long term care facility in CT (Fragala, 1996)	Ergonomics-based back injury prevention program, including lifting devices	74% reduction in back injuries over a 3-year period. Workers' compensation costs \$4500 vs. \$174,412 pre-intervention. Lost workdays reduced from 1025 to 81.
United Kingdom (Logan, 1996)	Equipment for manual handling, ergonomics program for all aspects of hospital work systems	Reduction in injuries among caregivers; 84% decrease in lost work hours. Absenteeism due to lifting and handling reduced 98%.
Surrey Memorial Hospital (British Columbia) (Bruening, 1996; Perrault, 1995)	Ergonomics based program; no lift policy	Reduced injuries by 95%.
Health Sciences Center (Manitoba, Canada) (In CTD News)	Ergonomics program, lifting aid devices, staff training on device use	Back injury incidence rates decreased by 23% Lost time hours dropped by 43%.
Lawrence and Memorial Hospital (Fragala and Santamaria, 1997)	Lifting aids on two high-risk units	Occupational injuries improved approximately 80%. Lost work days decreased from 69 to 0. Restricted workdays decreased from 133 to 6.
Quebec nursing facility (Villeneuve, 1998)	Ceiling mounted lifts	Number of lost-time injuries dropped from 26 to 6.5 per year; Annual average lost days dropped from 983 to 67.
Maine facility ("Sacrificial Lamb Stance," 1999)	Policy for no manual lifting	Drop in medical and indemnity costs from \$75,000 to \$5,600.

¹ Manning, Joe, *Worker Shortage gets critical*, The Milwaukee Journal Sentinel, September 6, 2001

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- ² Buerhaus, Peter I., PhD, RN; Staiger, Douglas O, PhD; Auerbach, David I., MS. *Journal of American Medical Association*, Volume 283, No. 22, June 14, 2000
- ³ Buerhaus, Peter I. (2001), Nurses in an Aging Society: Long-term implications. *Reflections on Nursing LEADERSHIP*, First Quarter 2001, 35-36
- ⁴ The Aspen Institute, Washington, DC, January 2001
- ⁵ Hodgson, Michael, MD, MPH, Director, Occupational Health Program, Veterans Health Administration, Presentation *Patient Care Ergonomics a national perspective*, Safe Patient Handling and Movement Conference, January, 2002.
- ⁶ Bureau of Labor Statistics, *Incident rates of nonfatal injuries and illnesses involving days away from work, 1994-1999*
- ⁷ NIOSH, *Surveillance Strategic Plan, Goal 3*, March 3, 2001
- ⁸ NIOSH, <http://www.cdc.gov/niosh/healthpg.html>
- ⁹ Technical Guide for Hospitals, Wausau Insurance Companies, 1995
- ¹⁰ Meittunen, Eric J., MS, et al, *Evaluation of patient transfer tasks using multiple data sources*, Journal of Healthcare Safety, compliance & Infection Control, Volume 4, Number 1, January 2000, 13-16
- ¹¹ Owen, B., Garg, A., *Reducing risk of back pain in nursing personnel*. AAOHN Journal 39 (1), 24-33.
- ¹² Owen, B., Garg, A., *Reducing risk of back pain in nursing personnel*. AAOHN Journal 39 (1), 24-33.
- ¹³ Patient Care Ergonomics Resource guide: Safe Patient Handling and Movement, developed by the Patient Safety Center of Inquiry (Tampa, FL), Veterans Health Administration and Department of Defense. October, 2001
- ¹⁴ Patient Care Ergonomics Resource guide: Safe Patient Handling and Movement, developed by the Patient Safety Center of Inquiry (Tampa, FL), Veterans Health Administration and Department of Defense. October, 2001
- ¹⁵ Daltroy, Lawren H., Dr.PH, et al, *A Controlled Trial of an Educational Program to Prevent Low Back Injuries*, The New England Journal of Medicine, July 31, 1997, 322-328
- ¹⁶ Marris, William, et al, *Lifting Patients Poses High Risk for Back Injuries*, www.osu.edu/units/research/archive/resthome.htm
- ¹⁷ Knibbe, Nico and Knibbe, Hanneke, *Postural Load of Nurses during Bathing and Showering of Patients: Results of a laboratory Study*, Professional Safety, November, 1996, 37-39
- ¹⁸ Engels, J.A., et al, *Physical Work Load and Its Assessment Among Nursing Staff in Nursing Homes*, Journal of Occupational Medicine, 36(1994):338-345
- ¹⁹ Charney, William, Editor, *Essentials of Modern Hospital Safety, Volume 3*, Lewis Publishers, CRC Press, Inc., 1994, 358-361
- ²⁰ Villeneuve, Jocelyn, *The ceiling lift: An efficient way to prevent injuries to nursing staff*, Journal of Healthcare Safety, Compliance & Infection Control, January 1998, 19-23
- ²¹ Merriam-Webster, Incorporated, 2001
- ²² Owen, Bernice, PhD, RN, presentation “*At-Risk*” *Nursing Tasks that Contribute to Injuries*,” university of Wisconsin-Madison, School of Nursing.
- ²³ Patient Care Ergonomics Resource guide: Safe Patient Handling and Movement, developed by the Patient Safety Center of Inquiry (Tampa, FL), Veterans Health Administration and Department of Defense. October, 2001
- ²⁴ *Commitment and Care: The benefits of a health workplace for nurses, their patients and the system – A Policy Synthesis*, The Canadian Health Services Research Foundation, 2001
- ²⁵ Covey, Stephen R., *The 7 Habits of highly Effective People*, Simon and Schuster, 1989
- ²⁶ Patient Care Ergonomics Resource guide: Safe Patient Handling and Movement, developed by the Patient Safety Center of Inquiry (Tampa, FL), Veterans Health Administration and Department of Defense. October, 2001
- ²⁷ *Back Injury Prevention Program Manual*, Arjo, Inc., 2001
- ²⁸ Haney, Linda, MPH, RN, and Anderson, Maureen, MSN, RN, *Behavior Based Safety – A Different Way of Looking at an Old Problem*, AAOHN Journal, September, 1999, 424-432
- ²⁹ Fragala, Guy, presentation, *Safe Patient Handling and Moving Conference*, Clearwater, FL, 2002.

³⁰ Fragala, Guy, *Injuries cut with lift use in ergonomics demonstration project*, Provider, October, 39-40. 39-40

³¹ Charney, W., *Reducing back injury in nursing: A case study using mechanical equipment and a hospital transport team as a lift team*, Journal of Healthcare Safety, Compliance, and Infection Control 4(3), 2000, 1

³² Collins, James W., et al, Presentation , *Safe Patient Handling and Moving Conference*, Clearwater, FL,

³³ OSHA, [OSHA Nursing Home Initiative Success Stories](#)

³⁴ Patient Care Ergonomics Resource guide: Safe Patient Handling and Movement, developed by the Patient Safety Center of Inquiry (Tampa, FL), Veterans Health Administration and Department of Defense. October, 2001