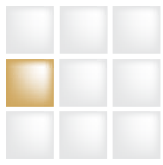


Safe Patient Handling in
your Healthcare Facility

Dr. Guy Fragala, Ph.D., P.E., C.S.P.



An Ergonomist's Look at Long Term Care and
the Results of Creating A Safer Environment



“Many organizations find that back strains and sprains account for an excess of 60% of direct costs associated with occupational injuries in healthcare.”

Introduction

As the long term care (LTC) industry grows and transitions for the future, there are many challenges to provide an ongoing high quality of care. An important issue contributing to these challenges, which is gaining more attention in today's environment of care, is that of workplace injuries to staff. The healthcare industry continues to be one of the worst performers when considering occupational injury experience. The pain and suffering to direct care staff, plus the workers compensation costs associated with these injuries, are placing a significant burden on the resources of many organizations. In addition to the shortages of direct care staff, an aging workforce and high turnover rates, organizations do not want to lose valuable workers through work related injuries. The impact of these occupational injuries can create a crisis for healthcare organizations.

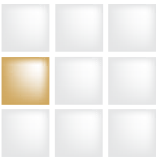


If one were to examine available data, back injury associated with resident handling tasks is the most significant occupational injury problem for the majority of healthcare organizations. Not only are there a high number of injuries reported, but these injuries are usually those, which result in significant lost time and disability, adding to financial implications. The majority of these back injuries suffered by caregivers are related to resident handling tasks. Although many organizations have made attempts to try to control this problem, it continues for many facilities without much improvement.

Many organizations are realizing that the high rate of musculoskeletal disorders experienced by workers in the healthcare industry remains a major problem and this problem has been well documented over the years. (Engkvist, 1992; Harber, 1988; Hignett, 1996; Jensen, 1992; Khuder, 1999; Ljungberg, 1989; Pheasant, 1992). If one were to review trends related to occupational injury experience, a steady decrease would be observed in total cases beginning in 1992. However, a closer review of these statistics, focusing on healthcare workers who are involved in direct resident care, does not demonstrate an improving trend.

Data & Statistics

Based on a review of recent data available from the **Bureau of Labor Statistics**, overexertion is noted as the cause of occupational injury incidence rates. Injuries from lifting produce results, which are 4 ½ times higher than the national average for all industry. In fact, LTC incidence rates for direct care staff rank near the top of the list when considering all of the



hundreds of industries that report information to the **Bureau of Labor Statistics** (*Bureau of Labor Statistics, 2000*). Back injuries among healthcare workers involved in direct resident care remain a major problem that must be addressed.

Aging Healthcare Workforce

The healthcare workforce is rapidly aging and critical shortages are predicted for the future (*Buerhaus, 2000*). The gradual aging of the workforce is not predicted to reverse until about 2020 when

older nurses begin to retire. When this occurs there may be critical shortages of nurses since less people are entering the profession.

The difficult task of moving and assisting dependent residents will provide even greater risks to the aging workforce. Through aging, muscle strength decreases and the magnitude of this decrease varies among muscle groups (*Chaffin, 1997*). Studies have shown that decreases in strength begin by age 40 and increase in rate as individuals approach age 50. It is also well documented that low back pain and injury prevalence rates increase in older populations (*Biergin-Sorenson, 1982*). Beyond the impact from a physical perspective, this reduction in muscle strength and ability to lift can also affect workers from a psychological perspective. Physical workload is one of the leading causes of physical stress and dissatisfaction in the workplace (*Deeb, 1997*). Many psychological problems can develop as a result of a decrease in the physical capacity of an individual. The aging healthcare workforce will not be equipped from a physical perspective to continue to manually lift and transfer residents and the problem will be compounded with increased stress in the workplace as a result of this decrease in ability.

Financial Implications

The cost for occupational injuries presents a significant burden to the healthcare industry. The impact of cost is even greater than many realize (*Garrett, et al., 1992; Williamson, et al., 1988*). Only the direct costs associated with these occupational injuries are considered when investigating cost impact. These direct costs include the cost for medical care and the compensation paid to injured workers. In addition to these direct costs, there are indirect costs related to occupational injuries. These indirect costs include replacement of the injured worker, additional training time by supervision and administration, loss of produc-

“By 2010 it is estimated that the average age of a registered nurse will rise to 45.4 years with 40% of the workforce older than 50.”



“Considering the associated indirect costs, a typical 100 bed skilled nursing facility could be losing approximately \$500,000 in direct and indirect costs as a result of occupational injuries suffered by their workforce.”

tivity, decreased morale and other related issues. It has been estimated that these indirect costs can exceed four times the amount of direct costs (Fragala, 1992).

Organizations will generally protect themselves from direct costs by transferring the burden of risk through the purchase of insurance. However, the impact of indirect costs must be absorbed in the operating revenue of each individual organization. A typical 100 bed skilled nursing facility might spend \$100,000 to purchase workers' compensation insurance. If they have a high injury rate history, the cost could be even greater. With the need to cut costs and operate more efficiently within today's climate, the reduction of occupational injuries and associated costs offers a significant opportunity for improvement.



Research Evaluation

After reviewing a sampling of thirty years of research study results, it can be concluded that traditional injury prevention programs, based on teaching proper body mechanics, and attempts to modify behavior of workers have not shown much success.

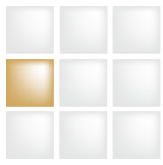
- There was little evidence to suggest that intensive training schedules had decreased back injuries over a thirty-five year period with respect to occupational back injuries related to patient handling tasks. (Brown, 1972).
- Results demonstrated that lifting instruction given to nursing aides had little or no effect upon the occurrence of back pain symptoms in a geriatric hospital (Dehlin, 1976).
- Although instruction on manual handling and lifting is widely believed to have prophylactic value, no scientific evidence was found that it is in fact effective in reducing the frequency or severity of back pain (Anderson, 1980).
- Following the introduction of a training program for nursing within a health authority in southeast England, there was a pronounced decrease in the number of reported back injuries. However, after this impressive start, the results turned disappointing. These studies raised the question as to whether existing training for the nursing profession with respect to manual handling is appropriate (Daws, 1981).



- There was no difference related to the history of previous training in lifting techniques, indicating that the amount of training received was not a factor separating those who had experienced low back pain problems (*Buckle, 1981*).
- Results showed that handling principles taught, that is working with a straight back and using legs, were not frequently used in the healthcare workplace. These results further suggested that actual training is not well-adapted to the handling of patients. The first problem was that what was taught in the actual training programs could not always be applied, and the methods taught could be questioned, particularly to the emphasis given to the use of legs (*St. Vincent and Tellier, 1989*).
- Although the most common approach to the prevention of back injuries has been education and training in the biomechanics of lifting techniques, little evidence was found to support this approach (*Owen and Garg, 1991*).
- Training at nursing school or on-the-job did not have a protective effect in preventing back injuries among new nursing graduates. Further implementation of engineering job redesign was suggested (*Harper et al., 1994*).
- Training courses are often useless when work organization and the number of nurses involved in patient care do not change (*Larese and Fiorito, 1994*).



We must understand the difficult lifting tasks that are required within our healthcare facilities. Access to residents can be very difficult because of small spaces, such as bathrooms. It can be very difficult for healthcare workers to position themselves properly when trying to assist a dependent resident with toileting activities. Healthcare rooms are often very crowded and awkward postures are often required when trying to gain access to a resident in a bed. We must also remember that lifting people is not like lifting boxes. People are live, dynamic loads and can do unexpected things. With a well-designed piece of lifting aid equipment, we can reduce many of the variables related to unexpected behavior and create a safer situation for the healthcare worker and the resident.



Traditional training program ineffectiveness

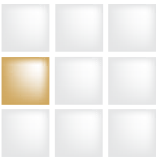
The previously cited references, as well as many others, indicate the lack of effectiveness of traditional training programs. Researchers are continuously telling us that traditional back injury prevention training programs have not yielded beneficial results when considering prevention programs aimed at reducing back injuries and back pain. Why have these traditional approaches been ineffective? A key reason is that in a classroom setting, participants are taught theoretical principles under optimum conditions. However, when they get out in the real work environment, because of the design of resident care areas and the equipment in use, it is often difficult to apply these optimum theoretical principles to real life situations.



The environment in which we care for residents can be very unpredictable and is constantly changing. If when a healthcare worker is assisting a resident from a bed to a chair the resident becomes weak and their legs buckle, the worker has neither the time nor opportunity to consider theoretical principles of lifting. A device that can assist in this transfer process can remove the opportunity for this unexpected event to occur.

As a final point of consideration regarding the value of traditional training programs, consider lifting and transferring heavy residents. The heavy weights involved and the posture that must be assumed while conducting these lifting tasks may result in an unsafe situation. Even if there are optimum lifting principles that might be applied, does the use of proper technique remove the risk for the healthcare worker? No, because of the heavy loads that must be lifted. Many organizations are spending much time and effort on their back injury prevention programs with little resulting improvement. With some guidance, injury prevention efforts could be directed to where existing resources are best utilized.

Accepting that changes must be made to approaches to injury prevention, how then should a healthcare organization approach the problem of back injuries related to resident handling tasks, in hopes of reducing the number of injuries experienced and the associated costs and impact?

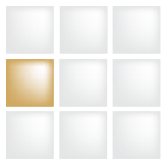


Discipline of Ergonomics

The discipline of Ergonomics is receiving heightened attention as an effective approach to controlling occupational musculoskeletal injuries. The concepts embodied in the science of Ergonomics warrant attention by the healthcare industry and can contribute to achieving some needed and valuable improvements. The **Occupational Safety and Health Administration (OSHA)** has provided

Nursing Home Ergonomic Guidelines in response to the number of musculoskeletal injuries being experienced in this country. **OSHA** has also issued citations under the General Duty Clause to nursing homes for exposing workers to the hazard of manually lifting and moving dependent residents. Ergonomics is a science that attempts to fit jobs and job tasks to workers rather than expecting workers to adapt to poorly-designed jobs. Designing counter tops and work surfaces to be at a comfortable height for the people who use them is an example of ergonomics. Other examples include making knobs and handles on controls easy to turn and making objects that must be lifted light enough for people or providing a mechanism to help lift when something is too heavy.

When considering ergonomics, high-risk jobs and job tasks are identified and analyzed in attempts to pinpoint risk factors in these high-risk activities. Once problems have been identified, action is taken to redesign and change these jobs or job tasks to either eliminate or minimize the impact of the risk factors. Lifting and transferring residents in the healthcare environment is a high-risk occupational activity because of the weight involved in the lifts and the posture, which must be assumed by workers when attempting to lift a resident. In addition, loads are not static but rather dynamic and unpredictable. If significant progress is to be made regarding reducing back injuries in the healthcare industry, prevention programs based on the concepts of Ergonomics are necessary.



“The philosophy of the CASE program is to help facilities and organizations create a culture of safety, integrated into every day operations, which will prevent accidents, control losses and contribute to improving quality of work life for workers and quality of care for residents.”

Introducing the CASE Program

With a heightened awareness surrounding the problem of healthcare staff back injuries, many healthcare organizations want to do something to address the impact and burden created by these occupational injuries but might not know where to start or how best to approach solutions to the problem. A new and innovative program entitled, “**Creating a Safer Environment**” or “**CASE**” is being made available to the healthcare industry from Joerns Healthcare as a resource to draw upon for assistance. The **CASE**



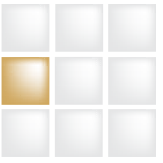
program begins by providing organizations with a simple and easily-implemented approach to safe resident handling. The vision is to expand the **CASE** program to address other safety issues present in the healthcare environment such as preventing resident falls. The philosophy of the **CASE** program is to help facilities and organizations create a culture of safety integrated into every day operations, which will prevent accidents, control losses and contribute to improving quality of work life for workers and quality of care for residents.

Safe Lifting Program Requirements

- 1 Necessary technology to minimize and eliminate manual lifting and moving of residents
- 2 Process to integrate these new methods for lifting and moving residents into the operational activities of delivering care

The Safe Patient Handling Module

A safe lifting program requires two major components in order to be effective. These components include the necessary technology to minimize and eliminate manual lifting and moving of residents, and a process to integrate these new methods for lifting and moving residents into the operational activities of delivering care. Also, everyone at the facility must be educated to recognize that manual lifting and moving of residents is a problem that requires change and improvement. Traditionally, caregivers have manually lifted and moved residents while providing care and assisting with mobility. As a result of this practice caregivers continue to be one of the most at risk occupations for musculoskeletal injuries.



Changing and Improving the Culture of the Organization

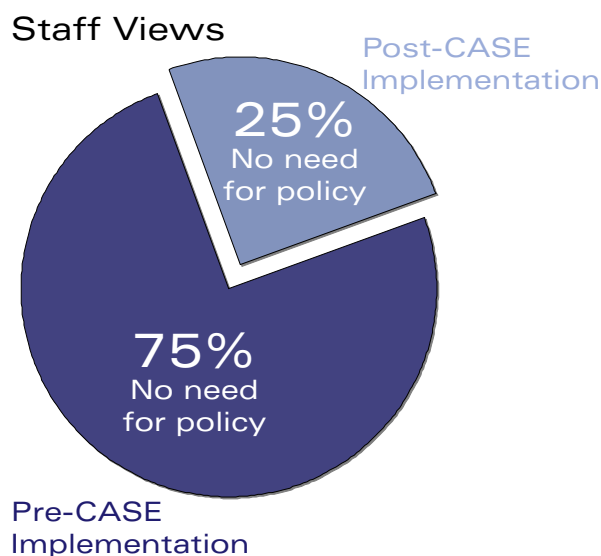
Establishing buy-in at all levels within an organization is very important to enhance the chance a program will succeed. **CASE** provides a method to construct a simple and straight-forward financial cost justification for the expense that might be incurred for any new equipment needs. This financial justification demonstrates to administration and senior leadership the quick return on investment realized with an effective safe lifting program. Management and supervision must also buy-into the concept of eliminating manual lifting of residents. The **CASE** program provides educational awareness early in the process to give them an understanding of how and why this program is important. Caregivers must also buy into these new methods that will be introduced to lift and transfer residents and there may be a need to overcome some resistance to change. Early involvement of the direct care staff will make it easier to establish their buy in. In addition, they will have ownership in the program.

During a recent study, Radius Mayflower implemented a no-lift policy, and at the time of the implementation, 75% of the staff felt there was no need for this type of policy. Caregivers felt that it would take too much time, and manual lifts would be easier. *“The results have been dramatic. The caregiver attitude has dramatically changed to favor the no-lift policy.”* Pamela Young C.A.S.E. Site Champion, Radius.

The **CASE** program incorporates simple interactive activity, which has been successfully used with many caregiver groups. Input is sought from caregivers by inquiring what they consider to be the most difficult and high risk activities they face each day when trying to assist dependent residents with movement and mobility. Seeking input from those who actually perform the lifts and transfers each day provides good information as to what some of the high risk activities are at each particular facility and creates the necessary buy in through this early involvement.

“The results have been dramatic. The caregiver attitude has dramatically changed to favor the no-lift policy.”

Pamela Young
C.A.S.E. Site
Champion, Radius





The philosophy of the CASE assessment process is to utilize the facilities current process for resident assessments and better consider and determine lift and transfer needs.

Identifying a Champion and the Team

As with any program within a facility, someone must take a leadership role. The **CASE** program promotes the idea of a facility champion and implementation support team to oversee and monitor program activities. When considering the champion and support team, the normal job responsibilities of this group should be closely aligned with the objectives of the **CASE** program. By considering this alignment, those given program responsibilities will not consider this to be a burden and added responsibility but rather a tool or mechanism to help them become more effective in their regular job responsibilities. In addition, key direct care staff should be identified who will become peer leaders acting as a resource for all caregivers on all shifts to help address questions and issues as the program is rolled out.



Figure A - Assist Handle

Determining Equipment Needs

If changes are to be made in the manner by which residents are lifted and moved, some new equipment might be required. The **CASE** program provides a method to assess the existing dependency classification profile of the resident population to estimate equipment needs. This estimate is adjusted and refined with input from facility staff. Equipment needs identified might include mechanical lifting devices, lifting aid devices and proper furnishings matched to particular resident needs. Some product accessories may include simple accessories such as bed assist handles or devices, as shown in figures A and B.

Training, Policies, and Procedures

Key to the introduction of any new tools and methods into the environment of care is an effective training plan. The **CASE** program considers an organization's training needs and a plan is developed with the facility's education staff for the initial roll out. As the training plan is developed, it is important to ensure that effective training will be sustained over time through proven train-the-trainer strategies.

All must share a consistent vision of the program and this is achieved with an effective policy and procedure. The **CASE** program guides facilities to develop a policy stating the position of the organization and developing procedures that will provide the guidance and methods necessary to achieve what is written in the policy statement.

Resident Assessment

The most important element of the **CASE** Safe Patient Handling Module is the method by which each resident is assessed and then the best and safest method determined to lift



and transfer that particular resident determined. This information must then effectively be communicated to all caregivers who will be involved in that resident's care. It recognizes that everyone is busy delivering care in a facility and using the existing assessment process will not tax staff with extra work. Normally all facilities regularly assess residents related to level of mobility. These assessments are expressed in classifications as set forth in the CMS Resident Assessment System, Section G, entitled, *Physical Functioning and Structural Problems*. By considering a resident's dependency classification and specific condition, each resident's lift and transfer needs can be effectively integrated into existing care plans.

Figure B - Assist Devices

Through this assessment process, equipment requirements are identified specific to a particular resident and solutions are matched to the lift and transfer problems associated with that resident. Through this approach, risk to both the resident and caregiver is minimized. (See figure C for resident assessment sample.)

Resident Lift/Transfer Assessment

Name: _____

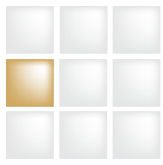
Location: _____

Dependency: _____

Date: _____

Transfer Type	Method of Transfer							
	Full Sling Lift	Stand Assist Lift	Stand Assist Aid	Gait Belt with Handles	Friction Reducing Aid	Unassisted	Manual Assist	Other (specify)
Bed to Chair		✓						
Chair to Chair Wheelchair to Toilet		✓						
Bathing and Weighing	✓							
Lateral Bed to Stretcher					✓		✓	
To Standing Position for Ambulation								
Repositioning in Bed					✓		✓	
Repositioning in Chair		✓						
Lift from Floor	✓							

Figure C - Resident Assessment Sample



The CASE program provides an opportunity and mechanism for healthcare facilities to truly integrate a culture of safety into their operational activities associated with delivering a high quality of care.

An example of how the resident assessment might proceed, related to determining lift and transferring needs, is as follows: Any individual resident whose mobility level is assessed as requiring supervision or limited assistance will require careful evaluation. It is necessary to provide the safe means to lift and transfer that resident while attempting to maintain independence and functional ability. Depending upon the resident's abilities and condition, stand assist aids may be appropriate. Such aids might be mounted onto beds in place of bed rails to give the resident a secure handle to grasp. (See figures A and B, on pages 10 and 11.) The electric height adjustment of a bed may also be used to assist these residents to a standing position.

Those residents requiring assistance with standing may also be unsteady on their feet and require a walker.

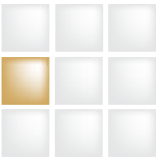


Figure D - Stand Assist Lift






Stand assist lifts, such as the **HoyerPro+® Ascend**, are gaining in popularity and provide an excellent tool to assist both the caregiver and the resident. Stand assist lifts are very useful to assist with toileting activities and can be maneuvered, in most cases, into tight spaces. Rehabilitation specialists are often concerned about the use of lifts since they want to maintain function and independence. Stand assist lifts, in some cases, might be able to increase functional abilities because getting the resident to a standing position will occur more frequently if it is easier to perform the assist. In addition, some stand assist lifts have removable footplates and can be used as a walker. (See figure D for the stand assist lift)

CASE Program Summary

The **CASE** program is designed to be easy to implement. With initial training and practice, the simple tools included will become an integral part of delivering care and your facility's environment. The **CASE** program is also designed to be implemented with the facilities own internal resources and does not require ongoing consultation. However, if a facility needs ongoing support, it is available.



Listed below are some basic key elements of the Safe Patient Handling Module of the CASE program:

-  A process to identify high-risk activities and assess residents.
-  A method to analyze your environment to determine where change is required.
-  A process to formulate recommendations to eliminate or minimize hazards.
-  A method to implement your process for improvement, which would provide educational awareness, buy-in, and training of employees in new work methods.
-  A method to measure the effectiveness of the program and encourage a process for ongoing improvement.

A CASE Pilot Study

In order to test the concepts of the **CASE** program and to better understand the process of implementation, a pilot study project was facilitated. Selection of the pilot study site was done in cooperation with an insurance carrier whose focus was providing workers compensation coverage to long-term care facilities. The insurance company, Atlantic Charter, provides workers compensation coverage for more than one half of the long-term care facilities in the state of Massachusetts. The manager of Safety and Health and a Senior Claims Representative assisted in the site selection process. The site selected for the pilot study was Radius Mayflower, located in Plymouth, Massachusetts. Radius Mayflower is part of Radius Management Services, which runs approximately 20 long-term care facilities in the state of Massachusetts. To begin the pilot study process a presentation was made to the director of operations for Radius, the administrator at the study site, and key staff members from the facility. Consistent with the CASE program philosophy it was necessary to establish buy-in, and the necessary commitment from senior leadership before the project would begin. At an initial program launch meeting an educational awareness program was presented and everyone from Radius Mayflower management was motivated to begin the project.

Once the facility decided to move forward with a **CASE** program, a pilot study unit was selected. The Allerton unit was selected as the study unit because the resident population on the unit presented a high level of risk to staff based on dependency level and the unit had experienced a high number of occupational injuries resulting in many lost workdays. Normal population on the Allerton unit consisted of 57 residents who were mostly severely cognitive and physically impaired. Almost all of the residents were totally dependent but



some did have limited weight-bearing ability. Upon applying the site assessment methodology of the **CASE** program to establish equipment needs, it was determined that four full swing lifts and one stand assist lift would be required for the resident lifting and handling needs on the unit. For purposes of conducting a pilot study, a control unit was also identified at the facility. The Eaton unit had a similar resident population and was selected as the control unit. (See Table 1 for a comparison of the Allerton and Eaton units.)



Annualized Occupational Musculoskeletal Injury Experience				
	Allerton Unit		Eaton Unit	
	Pre-Case	Post-Case	Pre-Case	Post-Case
Number of Resident Handlings	4	0	2	3
Lost Workdays from Claims	236	0	0	0
Restricted Workdays from Claims	2	0	0	5

Table 1: Allerton and Eaton Unit comparisons

CASE Program Implementation

Implementing a safe lifting program on the Allerton unit presented many challenges and obstacles. The resident population, all considered special-needs, had a high level of physical impairment requiring them to wear specialized orthotics and body jackets. The residents were totally dependent on staff for all their activities of daily living, including positioning and transfers. Staff caring for these individuals was required to perform many lifting tasks on a routine basis yet initially, was not receptive to the idea of using resident lifting equipment. This situation presented a very good test for the **CASE** program.

To launch the program on the unit, education and training sessions were scheduled for staff. At the initial education program, the concepts of safe lifting were presented and the new lifting equipment, which was to be introduced to the unit, was demonstrated. Following that educational session, a training schedule was set-up.

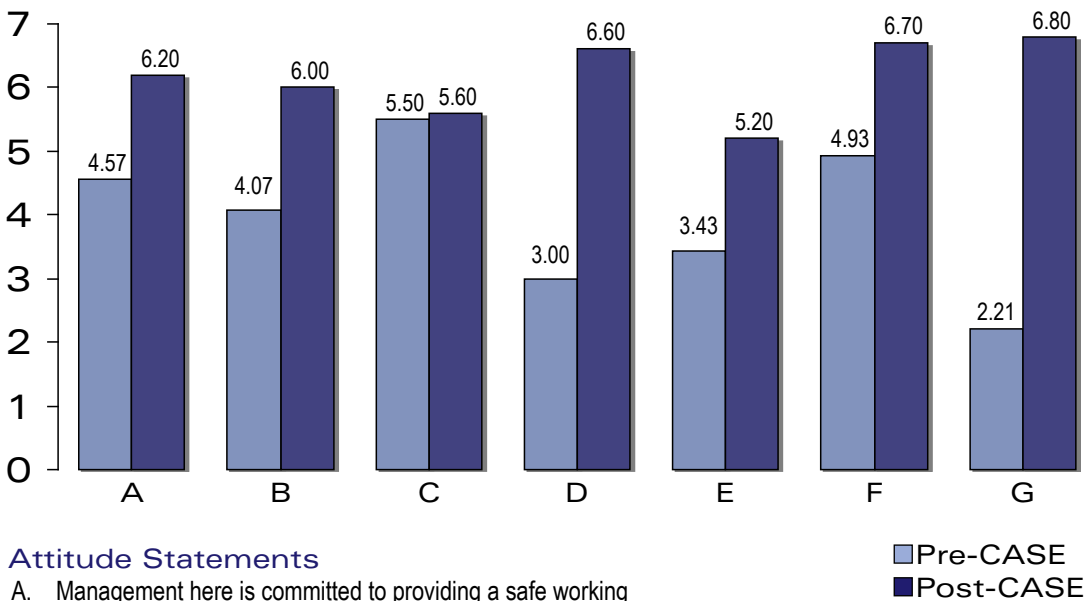


A Joerns Healthcare representative trained key individuals who then train other staff members going forward. In order to measure other value added benefits beyond injury reduction, a pre-intervention survey was conducted with staff members from the Allerton unit.

Questions were administered to measure aspects of staff satisfaction and opinions. The survey tool was administered pre-intervention and at the three-month point in the post-intervention measurement period. Staff were asked to respond to questions using a seven point scale with one corresponding to strongly disagree, two moderately disagree, three slightly disagree, four neither agree or disagree, five slightly agree, six moderately agree, and seven strongly agree. (Results are displayed in Table 2.)

Impact of CASE on Staff Attitudes

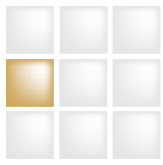
(Higher number indicates stronger agreement with attitude statement)



Attitude Statements

- A. Management here is committed to providing a safe working environment and the highest quality of care and service.
- B. I enjoy coming to work.
- C. I am trained adequately to safely lift and move dependent residents.
- D. I have proper equipment to safely lift and move dependent residents.
- E. Morale is better today than it was a year ago.
- F. Supervisors in my work group are concerned with my safety.
- G. Dependent residents should be lifted with mechanical lifts not manually.

Table 2: Staff satisfaction survey results.



CASE Program Value Added Benefits

The implementation of the **CASE** program had very positive results on staff attitudes.

- Post-intervention scores increased when measuring if staff enjoyed coming to work.
- Staff felt that the program had a positive impact on morale.
- Staff also felt that management and supervision were more concerned with their individual safety.
- New methods to lift and transfer dependent residents with new equipment had a very positive impact regarding staff attitudes
- Staff attitudes regarding the amount of training provided remain the same pre and post-intervention. However, post-intervention new and better methods to lift and transfer residents were being taught and implemented as part of revised training protocols.



As staff became familiar with using new equipment they learned that the use of lifts did not increase lift and transfer time but rather facilitated the process. In addition, use of lifts helped with other activities such as weighing of residents. Using lifts with a built-in scale eliminated many manual lifting tasks and simplified the process of weighing. Staff also observed that residents felt safer and more secure when being transferred with lifts.

Application of proper slings created a cuddling effect for the residents, which made them feel very comfortable and less anxious during the transfer process. Staff observed smiles, facial expressions of pleasure and a decrease in rigidity in the body of residents as they were being transferred with the lifts.

Reducing Impact of Occupational Injuries

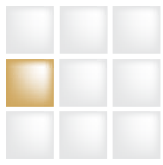
Beyond these improvements to the environment of care, impressive results were demonstrated related to occupational injury experience. Annualizing injury experience on the Allerton study unit, pre-intervention indicated that there were four resident handling incidents resulting in 236 lost workdays, and two restricted workdays. Post-intervention there were no reported resident handling injuries to staff on the Allerton unit over a ten-month period. For the control unit, injury experience remained close to the same for the pre-intervention and post-intervention period. (See Table 2 on previous page.)



Guy Fragala, Ph.D., PE, CSP

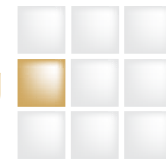
Dr. Guy Fragala has over 35 years of experience as an Occupational Safety and Health professional and is currently the Senior Advisor for Ergonomics at the Patient Safety Center of Inquiry, Tampa, Florida and the champion for Creating the Safer Environment Program for Joerns Healthcare. He recently served as Director of Compliance Programs with Environmental Health and Engineering in Newton Massachusetts. He is retired from the faculty and previously served in the position as the Director of the Environmental Health and Safety Department at the University of Massachusetts Medical Center in Worcester, Massachusetts. He has consulted to a wide range

of American industries and government agencies and authored numerous publications on the subjects of Ergonomics and Environmental Health and Safety. He has delivered many presentations on the subject of Application of Ergonomics to the healthcare industry. He has worked with the Patient Safety Center in Tampa, the Occupational Safety and Health Administration (OSHA), the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), and the National Institute for Occupational Safety and Health (NIOSH) on safe patient handling issues. His book entitled, *Ergonomics: How to Contain On-the-Job Injuries in Healthcare* has provided the foundation for much of the work going on today in safe patient handling. Ideas from his five-step risk management process have been integrated into many successful programs.

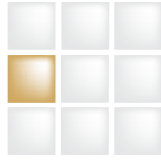


References and Bibliography

- Anderson, J. A. D., Back Pain and Occupation. In the Lumbar Spine and Back Pain. 2nd Edition (Edited by M. I. V. Jayson) (London: Pitman Medical Ltd.) 1980: 57-82.
- Bell, F. Ergonomic Aspects of Equipment. Patient Lifting Devices. *International Journal of Nursing Studies*. 1987: 24(4), 331-7.
- Biergin-Sorenson, F., Low Back Trouble in General Population of 30-, 40-, 50-, and 60- Year Old Men and Women. *Danish Medical Bulletin*. 1982: 29(6), 289-299.
- Brown, J. R., Manual Lifting and Related Fields, an Annotated Bibliography. Labour Safety Council of Ontario. 1972. Bruening, J. Keeping Healthcare Workers Healthy. *Ergonomics News*. Mar/Apr. 1996: 20-21.
- Buckle, P. A., Multidisciplinary Investigation of Factors Associated with Low Back Pain, Ph.D. Thesis, Cranfield Institute of Technology. 1981.
- Buerhaus, P. I., Staiger, D. O., Auerback, D. I., Implications of an Aging Registered Nurse Workforce. *JAMA*. 2000: 283:2, 948-2,954.
- Bureau of Labor Statistics (BLS) U. S. Department of Labor. Table R9. Number of Nonfatal Occupational Injuries and Illnesses Involving Days Away from Work by Occupation and Selected Natures of Injury or Illnesses. Washington, DC. 2000.
- Chaffin, D., et al., Age Effects in Biomechanical Modeling of Static Lifting Strengths. *Designing for an Aging Population*, 1997: 61-64.
- Charney, W., The Lift Team Method for Reducing Back Injuries: A 10 Hospital Study. *AAOHN Journal*. 45:6, Jun. 1997: 300-304.
- Charney, W. et al., The Lifting Team: A Design Method to Reduce Lost Time Back Injury in Nursing. *AAOHN Journal*. May 1991: 39(5) 231-234.
- Daltroy L., A Controlled Trial of an Educational Program to Prevent Low Back Injuries. *The New England Journal of Medicine*. 1997: (337) 322-328.
- Daws, J., Lifting and Moving Patients, a Revision Training Program, *Nursing Times*. 1981: 2067-2069.
- Deeb, J. and Drury, D., Perceived Exertion in Isometric Muscular Contractions Related to Age, Muscle, Force Level and Duration. *Designing for an Aging Population*. 1997: 49-53.
- Dehlin, O. et al., Back Symptoms in Nursing Aids in a Geriatric Hospital. *Scandinavian Journal of Rehabilitation Medicine*. 1976: (8) 47-53.
- Empowering Workers Helps Nursing Home Find Answers to Injury Problem, Cut Costs BNA Workers' Compensation Report. 7 (1996): 483.
- Engkvist, I. L., Hagberg, M., Linden, A. et al., Over-Exertion Back Accidents Among Nurses' Aides in Sweden. *Safety Science*. 1992: (15) 97-108.
- Fragala, G., Ergonomics: The Essential Element for Effective Back Injury Prevention for Healthcare Workers. *American Society of Safety Engineers*. Mar. 1995: 23-25.
- Fragala, G., Ergonomics: How to Contain On-the-Job Injuries in Health Care. *Joint Commission on Accreditation of Healthcare Organizations*, Oakbrook Terrace, NY: 1996: (6) 55-57.
- Fragala, G. and Santamaria, D., Heavy Duties? *Health Facilities Management*. May 1997: 22-27.
- Fragala, G. and Shelton, F., Assessing Risks of Healthcare Lifting Tasks and Making Improvements. *Rehab & Therapy Products Review*. Jan/Feb. 1998: 52-59.
- Fragala, G. Injuries Cut With Lift Use in Ergonomics Demonstration Project. *Provider*. Oct. 1993: 39-40.
- Fragala, G. and Shelton, F., Applying the Concepts of Ergonomics to Improve Healthcare Bed Design. *Rehab and Therapy Products Review*. May/June 1998: 34-38.
- Fragala, G., et al. Backs to the Drawing Board. *Health Facilities Management*. May 1995: 24-28.
- Fragala, G., Implementing Ergonomic Approach Promotes Workplace Safety. *Provider*. 1992: 18(12), 31-34.
- Garrett, B., Singiser, D., & Banks, S., Back Injuries among Nursing Personnel: The Relationship of Personal Characteristics, Risk Factors and Nursing Practices. *AAOHN Journal*. 1992; 40(11), 510-516.
- Gaze, H., Occupational Health: Get Back on Track. *Nursing Times*. Oct. 1997: 93(40), 1-7.
- Harber, P., Billet, E., Gutowski, M. et al., Occupational Low-Back Pain in Hospital Nurses. *Journal of Occupational Medicine*. 1988: (27) 518-524.
- Harber, P., Pena, L., et al., Personal History, Training and Worksite as Predictors of Back Pain of Nurses. *American Journal of Industrial Medicine*. 1994: (25) 519-526.



- Health Science Center at Winnipeg, Manitoba Canada. Giving Health-Care Workers a Helping, Mechanical Hand. CTD News. 73-77.
- Hignett, S., Work-Related Back Pain in Nurses. Journal of Advanced Nursing. 1996: (23) 1238-46.
- Hospital Employee Health. How to Build a Case for Ergonomic Intervention. Apr. 2002.
- Jensen, R., Nextor, D., Myers, A. et al., Low-Back Injuries Among Nursing Personnel: An Annotated Bibliography. Baltimore, MD: The Johns Hopkins University. 1989.
- Khuder, S. A., Schaub, E. A., Bisesi, M. S., Krabill, Z. T., Injuries and Illnesses Among Hospital Workers in Ohio. A Study of Workers' Compensation Claims from 1993 to 1996. Journal of Occupational and Environmental Medicine. 1999: 41 (1):53-59.
- Lagerstrom, M., Hagberg, M., Evaluation of a 3 Year Education and Training Program for Nursing Personnel at a Swedish Hospital. AAOHN Journal. 1997: (45) 83-92.
- Larese, F., Fiorito, A., Musculoskeletal Disorders in Hospital Nurses: A Comparison Between Two Hospitals. Ergonomics. 1994: 37:7-1205-1211.
- Lifting Teams Can Help Hospitals Eliminate Costly Back Injuries to Nurses. Hospital Employee Health. 13:7, Jul. 1994: 81-87.
- Ljungberg, A. S., Kilbom, A., Hagg, G. M., Occupational Lifting by Nursing and Warehouse Workers. Ergonomics. 1989: (32) 59-78.
- Logan, P., Moving and Handling. Community Nurse. Apr. 1996: 22-24.
- Marras, W. S. et al., Quantification of Low Back Disorder Risk and Spinal Loading for Patient Handlers Performing Various Patient Transferring and Repositioning Techniques.
- Owen, B., Fragala, G., Reducing Perceived Physical Stress While Transferring Residents. AAOHN Journal. Jul. 1999:(47) 7 316-323.
- Owen, B. D., Garg, A., Reducing Risk for Back Pain in Nursing Personnel. AAOHN Journal. 1991: (39) 1:24-33.
- Owen, B.D., Garg, A., Jensen, R., Four Methods for Identification of Most Back-Stressing Tasks Performed by Nursing Assistants in Nursing Homes. International Journal of Industrial Ergonomics. 9, 213-220.
- Perrault, M., Investing in Ergonomics. OH&S Canada. Sep/Oct. 1995: 39-45.
- Pheasant, S., Stubbs, D., Back Pain in Nurses: Epidemiology and Risk Assessment. Applied Ergonomics. 1992: (23)226-232.
- Pontani-Bailey, L., Steps in Implementing an Effective Ergonomics Program. Poster session presented at the American Occupational Health Conference, Orlando, Florida. Apr. 1997.
- Prezant, B., Demers, P., Strand, K. Back Problems, Training Experience and Use of Lifting Aids among Nurses. Trends in Ergonomics/Human Factors IV. 1987: 839.
- Sacrificial Lamb Stance is Killing Healthy Backs. Hospital Employee Health. Mar. 1999: 29-33.
- Snook, S.H., A Study of Three Preventive Approaches to Low Back Injury. Journal of Occupational Medicine. 1978: (20) 478-481.
- St. Vincent M., Tellier, C., Training in Handling: An Evaluative Study. Ergonomics. 1989: 32(2)191-210.
- Stensaas, L., Wyoming State Training School. November 10, 1992.
- Stubbs D. et al. Back Pain in the Nursing Profession II. The Effectiveness of Training. Ergonomics. 1983: 26(8) 767-779.
- Stubbs, D. A., et al., Back Pain in the Nursing Profession I– Epidemiology and Pilot Methodology, Ergonomics. 1983: 26(8): 755-765 & 767-779.
- Venning, P. J., Walter, S. D., Stitt, L. W., Personal and Job-Related Factors as Determinants of Incidence of Back Injuries Among Nursing Personnel. Journal of Occupational Medicine. 1987: 29(10) 820-5.
- Villeneuve, J., The Ceiling Lift: An Efficient Way to Prevent Injuries to Nursing Staff Journal of Healthcare Safety, Compliance & Infection Control. Jan. 1998: 19-23.
- Waters, J., Reducing the Risks from Lifting. Nursing Times. Dec. 1997: 93(50) 52-(4) 10-16.
- Werner, S., Department of Mental Health, Mental Retardation and Substance Abuse Services. Fairfax, VA, October 22, 1992.
- Williamson, K., Turner, J., Brown, K., Newman, K., Sirls, A., & Selleck, C., Occupational Health Hazards for Nurses Part 2 Image. The Journal of Nursing Scholarship, 20(3), 162-8.
- Zhuang, Z., Biomechanical Evaluation of Assistive Devices for Transferring Residents. Applied Ergonomics. 1999 (30) 285-294.



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