

**Reducing Bed Mobility Injuries of ICU Nursing Staff
Through Body Mechanics Retraining**

Human Factors in QAS
Spring 2008 Term Project

Professor James Clauson
CSUDH

Submitted by
Victoria McCann

Table of Contents

1. Introduction
2. Factors Influencing Injuries
 - 2.1. Nursing Shortage
 - 2.2. Patient Demographics and Illness severity
 - 2.3. Intensive Care Unit Organization and Functions
 - 2.4. Body Mechanics Training at AMCO
3. Work Related Injury Statistics
 - 3.1. National Data
 - 3.2. Aurora Medical Center Data
4. Changing Trends
 - 4.1. Human Factors Engineering Perspectives
 - 4.2. Body Mechanics Training
5. Summary
6. Intervention Strategy
7. Conclusion

Reducing Bed Mobility Injuries of ICU Nursing Staff Through Body Mechanics Retraining

Introduction

“Oh, my aching back”, a lament echoed daily in the corridors of health care facilities throughout the nation and the world. The very nature of the business creates the situation of repetitive injury risk, due to the need to transfer, lift, reposition and physically support patients with motion restrictions, variable weights and heights, and variable ability to self-support/assist the care giver. Hospitals provide service to a subgroup of the population defined as the ill and injured. The service includes surgical interventions, pharmaceutical support and management, disease management, and physical support (bed rest, nutrition, mobility assistance, prevention of additional illness, such as: transmittable infections, pressure sores, friction or shearing injury or blood stasis of the legs), The people that support the patient twenty-four hours a day throughout a hospital stay are the nursing staff. The ongoing national nursing shortage and changing patient demographics contribute to the fact that health care had the highest numbers of work-related injuries than any other industry in 2006 (Dept. of Labor Statistics [DLS], Nov. 8, 2007). We’ve not come a long way in improving nursing conditions since Florence Nightingale’s time in 1845, at least, not the physical consequences of the work.

Factors Influencing Work Related Injuries

1. Nursing Shortage

The United States is in the midst of a nursing shortage that is expected to intensify as baby boomers age and the need for health care grows. According to a report released by the American Hospital Association in July, 2007, hospitals need 116,000 nurses to fill vacancies nationwide. The Council on Physician and Nurse Supply noted, in March 2008, an expansion of 30% over the current number of nurse graduates are needed annually. It is estimated that 1 million new and replacement nurses will be needed by 2016, as reported by the Bureau of Labor Statistics in November, 2007 (American Association of Colleges of Nursing [AACN], April, 2008). The very nature of the work demands many hours of bending, pulling, pushing, turning and twisting motions for the worker. It is a labor-intensive job. Combining that fact with the nursing shortage, the number of personnel in meeting the job demands is spread thin.

2. Patient Demographics and Illness Severity

Patients admitted to the ICU are the most critical cases. They require intense support and interventions to recover. Generally, these patients fall into either cardiac or pulmonary disease categories. They tend to be 50 years of age and older, and have co-morbidities that hinder recovery, such as diabetes, hypertension or renal failure. The fastest growing co-morbidity is the increasing rate of obesity in the US. In 2006, not a single state had less than 15% of their population defined as obese. Two states, Mississippi and West Virginia, had counts greater than 30%. The state of Wisconsin

had a dramatic increase since 2002 (CDC.gov). The link below demonstrates a time elapse trend of changing rates of obesity per state from 1985 to 2006,

<http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps/> .

Appendix A illustrates the admissions to Wisconsin hospitals for 2006 (full table modified by author). The highest rankings are primarily diseases seen and cared for in the ICU in the acute stage. Also note the median age for these diseases. These illnesses result in overall muscle weakness and fatigue, which leads to an inability to care for one's self. Physical, emotional, nutritional, spiritual, psychological support as well as pharmaceutical intervention is required. Not only are the patients weak, they are older and overweight.

Obesity is defined as having a very high amount of body fat in relation to lean body mass, or Body Mass Index (BMI) of 30 or greater. Body Mass Index is a measure of an adult's weight in kilograms divided by the square of his or her height in meters. Obesity is a movement limiting condition. While obesity is not the primary diagnosis for admission, the sequelae of disease is: heart disease, hypertension (high blood pressure), renal failure, atherosclerosis, pulmonary disease (sleep apnea, hypoventilation syndrome), congestive heart failure and diabetes.

The uninsured and under-insured do not see physicians on a regular basis. They tend to access health care service only when they are more seriously ill. The patient demographics of the ICU are the sickest of the sick: they are weaker, older, and heavier and have multiple health problems. This increases the lifting load for the already strained staff.

3. Intensive Care Unit (ICU) Organization and Functions

The ICU staffing ratio of nurse to patient is 1:2. The most critical patients receive 1:1 nursing. The ICU at Aurora Medical Center-Oshkosh (AMCO) has a bed capacity of twelve (12). Each room is single patient. The unit has two central nursing stations separated by the medication and utility rooms between them. Patient rooms line the perimeter of the unit in a U shape that surrounds the central areas. Due to staffing shortages and increased admission rates, these nurses usually have a 1:3 patient ratio. This scenario makes it very difficult to get lifting or turning help when needed; there is usually a delay. Nursing and patient safety standards require patients be turned every two hours. Patients frequently scoot down in bed and often need to be moved up into a position that is conducive with the bed positions, raising the head or foot of the bed. The severity of illnesses prevents most patients from repositioning themselves. Patients are also hesitant to move because of IV lines or other medical paraphernalia attached to them. Full assistance is not an uncommon occurrence in any intensive care unit.

4. Body Mechanics Training at AMCO

Body mechanics training for staff occur at time of hire, during the orientation period. This training is conducted by the Physical Therapy department manager. The scope of training is thirty minutes for general presentation on information and fifteen minutes of specific techniques for bed mobility and transfer demonstrations. The employees also receive a thirteen page document on body mechanics/ergonomic information to take with them. The manager did not specify whether the employee

participates in the fifteen minute demonstration portion or whether a skill checklist/competency is included (Corso, 2008).

Work Related Injury Statistics

The Bureau of Labor Statistics (BLS) maintains the statistical data for the US regarding workplace injuries and illnesses. The figures are separated by fatal and non-fatal cases among private industry employers. In 2006, injury and illnesses occurred at a rate of 4.4 cases per 100 equivalent full-time employees. This represents a slight decline from 4.6 cases in 2005. Those industries that employ more than fifty (50) workers had the highest number of instances. General medical and surgical hospitals reported more injuries and illnesses than any other industry in 2006 – more than 264,300 cases. Wisconsin ranks higher in relation to the national average in total recordable cases per 100 full-time workers (NEWS, BLS, October 16, 2007). This costs the industry a lot of money. Key findings for 2006 non-fatal occupational injuries and illnesses requiring *days away from work* were 49,480 days for nurses, aids, and orderlies, at a rate of 526 cases per 10,000 workers, which was more than four times the total for all occupations. Four out of ten days away from work were sprains or strains. Musculoskeletal disorders (MSDs) accounted for 30% of the injuries (BLS, November 8, 2007).

Aurora Medical Center Data

Aurora Medical Center – Oshkosh (AMCO) reportable OSHA figures for patient handling injuries among staff were relatively low. There were six injuries in 2006 or

1.5% of the 400 workers. In 2007 there were eight total injuries or 2% (Ross, 2008). These numbers are well below the national average.

Changing Trends

Injuries among nursing staff are a concern around the world. England addressed this in 1992, requiring a best practice of a 16 kilo weight limit for nurses. New Zealand enacted Patient Handling Guidelines for all medical facilities in 2001 (New Zealand.gov). The states of Washington, Texas, and Massachusetts have passed similar laws. The American Nurses Association (ANA) developed and implemented a “Handle With Care” Campaign in 2003; a multi-faceted plan to promote the issue of safe patient handling and the prevention of musculoskeletal disorders among nurses (New Jersey Nurse). In 2006, the Association of Occupational Health Professionals (AOHP) and OSHA allied to develop the educational materials relating to patient handling. Their program is called Beyond Getting Started: A Resource Guide for Implementing a Safe Patient Handling Program in the Acute Care Setting (AOHP.org). All of these efforts aim to identify and define risk behaviours and promote proper HFE practices.

Aurora Health Corporation hired a Safe Lifting Coordinator in 2007 to develop training materials, identify best practices and survey available assistive devices, initially for the Milwaukee/Southern region of the system. The information is filtering out to all other hospitals that are part of Aurora. The cornerstone of this program is a “no-lift” environment for direct patient care staff. Mary Cucchi, the Lifting Coordinator, noted the operating margin of one of the larger hospitals in the system pays for the Worker Compensation carrier’s annual fee for the organization (Cucchi). In today’s competitive

healthcare market and tight budgets, finding better ways to use the financial resources is good business. It will also promote a safer environment for staff and patients.

Body Mechanics Training

Proper body mechanics for care givers is a myth. Early findings of body mechanics were based on static loads (i.e., boxes with handles). This does not translate well to nursing practice (ANA.org). Patient handling tasks are more complex than manual materials handling. Tasks are accomplished in a lateral rather than a vertical plane. The patient's weight is not evenly distributed and the mass is asymmetric, bulky and cannot be held close to the body. Patient handling tasks are unpredictable; patients can be combative, experience muscle spasm, loss of balance due to illness, or be comatose. Also, the amount of assistance a patient can offer at any point may vary. The room design makes access difficult, with equipment clutter, bedside tables and chairs and other supplies. This makes proper positioning by the nurse very difficult (New Zealand.gov).

Non-mechanical assistive devices are available in every patient care area at AMCO. Recent observations confirm consistent use of these devices in moving patients. The part that is missing is the training of all staff in the use of the devices, because improper body placement and uncoordinated lifting is seen.

Analysis

The reduction of work related injury risk is being addressed but is applied in a piece-meal fashion. There is inequity in training among patient care staff. Assistive

equipment is available but still requires pulling and pushing by staff in moving a patient. The equipment is not uniformly used by staff; the time-crunch of work load and the staff's own willingness to sacrifice their bodies in the effort to provide excellent care, place nurses at risk for back injury and other musculoskeletal disorders.

Intervention

A three pronged comprehensive program is recommended to minimize or eliminate workers' exposure to injury. The most important element starts with management commitment to a paradigm shift- a human factors engineering perspective versus a separate response to specific issues. An organizational approach, addressing every at-risk employee, would help create a culture of safety for the work force and the patients served. The organization needs to adopt *Control Strategies*.

Control Strategy 1

Work practices need to be addressed, including "proper" body mechanics training and the use and availability of a comprehensive array of assistive devices designed to eliminate or reduce lifting (AOHP). Staff would benefit from actual practice training guided by the physical therapy or occupational therapy departments. These specialists could assess individual skills needed to maintain safety; such as addressing the person's height, strength, grip, stretch limitations, and general physical health (see Appendix B). Included in this strategy would be hands-on exposure and use of assistive devices, to familiarize staff with device use. Additionally, periodic skills testing would help reinforce the training.

Control Strategy 2

Administrative controls need to be developed and implemented throughout the hospital and the Aurora Health Care organization. This would include the enforcement of health and safety policies, and training procedures to assure continuity of the culture of HFE (AOHP).

Control Strategy 3

Engineering controls need to be applied to the patient room design. Elimination of clutter, extraneous equipment and furniture placement should be considered from the perspective of easing access to the patient. There are a multitude of tools for patient handling tasks. These include power and non-power full-body sling lifts, stand-assist lifts, lateral transfer devices, ceiling lifts and friction reducing devices (AOHP). Some of the products on the market are the MaxiSlide[®], a friction reducing sheet made with parachute material, the Patran[®], a transfer sheet that can be carried in the pocket, unfold to six feet in length and have no weight limit (Cucchi), and the HoverMatt[®], an air mattress that uses low pressure air from the small air supply and will inflate the mattress. At the same time the air is supporting the patient, the air is escaping from the perforations in the underside of the HoverMatt[®]. The escaping air acts as a lubricant to reduce friction, which facilitates effortless transfers (HoverTech). See Appendix C, Recommended types of Equipment.

Conclusion

Health care had the highest numbers of work-related injuries than any other industry in 2006. There are many factors contributing to that high statistic; worker shortages, changing patient demographics, illness severity, work design, environment

design, lack of consistent training and retraining, and unavailability of useful assistive devices. Recognition and response to these issues is gaining ground in the industry but an overall culture of creating a human factor engineering environment is still lagging behind. Soaring medical costs may be cited as the reason, yet, a working environment that prevents injury and time away from work, would reap the dollars spent on worker compensation claims and insurance. Worker protection would be a viable marketing tool, enhancing the image of the hospital to patients and potential employees. Senior leadership needs to step up and adopt the control strategies outlined and promote a safety first culture in the organization.

Appendix A. Hospital Admissions for Wisconsin, 2006

State statistics - 2006 Wisconsin

Statistics for U.S. community hospital stays, principal diagnosis based on CCS (Clinical Classifications Software), 2006									
Rank (by N)	Diagnoses (CCS category number and name)		Number of discharges	% of discharges	Mean Charges (dollars)	Mean Length of Stay (days)	% Died	% Male	Mean Age
3	101	Coronary atherosclerosis	20,025	3.1%	37,730	3.0	0.6%	64.0%	66
4	122	Pneumonia (except that caused by tuberculosis and sexually transmitted diseases)	19,109	2.9%	15,230	4.6	3.7%	49.1%	64
6	108	Congestive heart failure, nonhypertensive	15,213	2.3%	20,636	4.5	3.7%	48.9%	75
8	106	Cardiac dysrhythmias	13,140	2.0%	20,058	2.8	1.0%	51.8%	70
12	100	Acute myocardial infarction	10,588	1.6%	40,716	4.6	6.5%	59.0%	69
16	109	Acute cerebrovascular disease	8,812	1.4%	24,375	5.3	10.0%	46.5%	72
23	127	Chronic obstructive pulmonary disease and bronchiectasis	7,208	1.1%	13,336	4.1	2.2%	46.8%	71
25	50	Diabetes mellitus with complications	6,665	1.0%	19,205	4.5	0.6%	53.0%	53
29	226	Fracture of neck of femur (hip)	5,753	0.9%	27,168	5.5	2.8%	28.6%	80
31	157	Acute and unspecified renal failure	5,183	0.8%	20,219	5.6	6.0%	48.6%	71
38	131	Respiratory failure, insufficiency, arrest (adult)	4,305	0.7%	43,823	8.9	20.5%	48.6%	65
49	103	Pulmonary heart disease	3,606	0.6%	19,240	5.1	2.9%	45.6%	63
61	129	Aspiration pneumonitis, food/vomitus	2,890	0.4%	23,599	6.8	13.5%	57.9%	73

Appendix B. Physical Demand Description Form.
Manitoba, Canada. Safe Works.

PHYSICAL DEMANDS DESCRIPTION (PDD)

Date		Analyst							
Department		Job Title					Shift		
PHYSICAL DEMANDS	Not Component	* FREQUENCY				LOAD (object/tool)		COMMENTS	
		Seldom	Minor	Required	Major	Maximum (kg)	Usual (kg)		
STRENGTH	Lifting								
	Carrying								
	Pushing								
	Pulling								
	Handling								
	Throwing								
	Gripping	Power Grasp							
		Pinch Grasp							
	Reaching	Above Shoulder							
		Below Shoulder							
To the Side									
POSTURES	Shoulder	Abduction							
		Flexion							
	Hip	Abduction							
		Flexion / Extension							
	Wrist	Radial / Ulnar Devn							
		Pronate / Supinate							
	Trunk	Flexion							
		Extension							
		Side Bend							
		Twist							
	Neck	Flexion							
Extension									
Side Bend									
Twist									
MOBILITY	Sitting								
	Standing								
	Walking								
	Climbing								
	Crawling								
	Crouching								
	Kneeling								
	Balancing								
	Foot Action	One Foot							
		Both Feet							
	Fine Finger Movements								

* FREQUENCY

SELDOM = Not always performed during completion of job
 MINOR = Performed less than 25% of job
 REQUIRED = Frequent Repetition for 25% -50% of job
 MAJOR = Frequent Repetition for more than 50% of job

Appendix C. 1. Types of Equipment by Hospital Department (AOHP).

Beyond Getting Started A Resource Guide for Implementing a Safe Patient Handling Program in the Acute Care Setting

Potential Types of Equipment by Hospital Department

Department	Task	Safe Patient-Handling Device
Emergency Department	<ul style="list-style-type: none"> ✓ Lateral transfers ✓ Vehicle to wheelchair or stretcher ✓ Wheelchair to exam table 	<ul style="list-style-type: none"> ✓ Lateral transfer devices including friction reducing devices, air powered transfer mattress, lateral transfer device ✓ Lift that will remove patient from vehicle ✓ Floor lift ✓ Non-powered sit-to-stand devices
Operating Room	<ul style="list-style-type: none"> ✓ Lateral transfers ✓ Sustained positions with instrumentation or maintenance of body part 	<ul style="list-style-type: none"> ✓ Lateral transfer devices – air powered transfer mattress, roller bars ✓ Slings to maintain body part suspension
Obstetrics	<ul style="list-style-type: none"> ✓ Lateral transfers 	<ul style="list-style-type: none"> ✓ Lateral transfer devices including friction reducing devices, air powered transfer mattress, lateral transfer device ✓ Non-powered sit-to-stand devices
Intensive/Critical Care	<ul style="list-style-type: none"> ✓ Lateral transfers ✓ Bed to chair ✓ Repositioning ✓ Transporting patients in bed ✓ Making an occupied bed 	<ul style="list-style-type: none"> ✓ Lateral transfer devices including friction reducing devices, air powered transfer mattress, lateral transfer device ✓ Motorized bed moving equipment ✓ Beds that convert to a chair ✓ Ceiling lifts
Orthopedics	<ul style="list-style-type: none"> ✓ Lateral transfers ✓ Ambulation ✓ Bed to chair & back to bed 	<ul style="list-style-type: none"> ✓ Gait belts with handles ✓ Sliding boards ✓ Lateral transfer devices including friction reducing devices, air powered transfer mattress, lateral transfer device ✓ Sit-stand devices with ambulation option
Radiology	<ul style="list-style-type: none"> ✓ Lateral transfers ✓ Chair to table 	<ul style="list-style-type: none"> ✓ Lateral transfer devices including friction reducing devices, air powered transfer mattress, lateral transfer device ✓ Sit-stand device
Rehabilitation	<ul style="list-style-type: none"> ✓ Bed to chair transfers ✓ Toileting ✓ Showering 	<ul style="list-style-type: none"> ✓ Sit-stand devices ✓ Shower chair with wheels ✓ Hi-low shower chair with wheels ✓ Pivoting devices
Medical-Surgical	<ul style="list-style-type: none"> ✓ Repositioning ✓ Toileting ✓ Lateral transfers ✓ Bed to chair & back ✓ Ambulation 	<ul style="list-style-type: none"> ✓ Lateral transfer devices including friction reducing devices, air powered transfer mattress, lateral transfer device ✓ Floor lift ✓ Sit stand device with ambulation option ✓ Ceiling lift ✓ Non-powered sit-to-stand devices
Out-patient	<ul style="list-style-type: none"> ✓ Car to wheelchair/stretcher to treatment/therapy ✓ Back to car 	<ul style="list-style-type: none"> ✓ Vertical lift (portable)

Note: Consider weighing option with equipment if beds do not weigh patients.

Appendix C.2. Specific Type of Equipment in Use at Aurora Health Care.

A better way to transfer patients

PATRAN™
transfer sheet

Reduces Injuries

Low Cost


Single Patient Use (disposable)

Portable

Safe and Comfortable

Latex-free


No Weight Limit



PATRAN™ sheets offer nurses and caregivers *a better way* to transfer or reposition patients who are unable to do it themselves.

- Small enough to carry in your pocket, PATRAN™ sheets unfold to 6 feet long and have no weight limit.
- Low cost and latex-free, disposable PATRAN™ sheets provide single-use transferring without the need to clean or sanitize. Plus, there is no danger of cross-contamination.
- Ease of use reduces patient injuries during transfer and helps prevent caregiver fatigue and stress.
- PATRAN™ sheets are soft and comfortable – not felt by the patient.

To learn more about how to get PATRAN™ transfer sheets, call (000) 000-0000.



Aurora Health Care®
www.AuroraHealthCare.org

X31436 (12/07) ©AHC

Resources

Agency for Healthcare Research and Quality. State Statistics-Wisconsin, 2006.

Accessed April 3, 2008 from

http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=B0B7C2BC11A4A5C3&Form=SelDXPR&JS=Y&Action=%3E%3ENext%3E%3E&_DXPR=PreRunDCCHPRE

Beyond Getting Started: A Resource Guide for Implementing a Safe Patient Handling Program in the Acute Care Setting. Association of Occupational Health Professionals. Accessed March 31, 2008 from

<http://www.aohp.org/About/documents/GSBeyond.pdf>

Corso, David. Ergonomics Training, AMCO. Manager Physical Medicine and Rehabilitation. Aurora Medical Center-Oshkosh, WI. Electronic communication received April 3, 2008.

Cucchi, Mary. Safe Lifting Coordinator. Aurora Lakeland Medical Center. Elkhorn, WI. Personal communication March 26, April 1, 2008.

Guideline for Preventing Musculoskeletal Injury. Appendix A. Division of Health and Safety. Manitoba, Canada. Accessed April 1, 2008 from

<http://www.gov.mb.ca/labour/safety/pdf/guidelines/musculoskeletal.pdf>

“Handle With Care” Campaign Fact Sheet. New Jersey Nurse. May/June, 2006.

Accessed April 3, 2008 from

http://findarticles.com/p/articles/mi_ga4080/is_200605/ai_n16537336/print

HoverMatt.HoverTech International. Accessed April 7, 2008 from

<http://www.hovermatt.com/>

Nursing Shortage. Fact Sheet, April 2008. American Association of Colleges of Nursing. Accessed April 4, 2008 from

<http://www.aacn.nche.edu/Media/FactSheets/NursingShortage.htm>

Patient Handling Guidelines. Accident Compensation Corporation. New Zealand.

<http://www.acc.co.nz/injury-prevention/safer-industries/health/patient-handling-guidelines/index.htm>

Ross, Annmarie. AMCO Injury Statistics. Employee Health Nurse. Aurora Medical Center-Oshkosh, WI. Personal communication. April 1, 2008.

Workplace Injuries and Illness 2006. Department of Labor Statistics. US Government.

<http://www.bls.gov/iif/oshwc/osh/os/osnr0028.pdf>