Managing Occupational Musculoskeletal Injury in Healthcare Workers –
The Ongoing Battle for Prevention, Protection, and Rehabilitation

by

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ABSTRACT

The management of occupational musculoskeletal injury in healthcare workers is an ongoing problem in healthcare delivery systems. Work related musculoskeletal disorders (WRMSDs) can be related to acute injury or cumulative, repetitive tasks. The largest group of WRMSDs experienced by healthcare workers are back injuries and this represents the biggest costs in prevention, protection, and rehabilitation expenses. The multifactorial risks associated with WRMSDs require multifaceted intervention efforts by the occupational and environmental health nurse (OEHN). One of the biggest risks identified in healthcare workers is patient care handling and lifting tasks. The OEHN can be instrumental in minimizing or eliminating identified lifting hazards, establishing programs to assess the health, educating employees at risk for WRMSDs, and providing the appropriate health surveillance and case management of affected employees. The OEHN is the conduit for change, implementation of interventions, and promotion of health and safety of healthcare workers (HCWs) performing patient care handling and lifting activities.
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CHAPTER I
INTRODUCTION

Workers performing patient care handling activities have greater risks for work related musculoskeletal disorders (WRMSDs) than workers in other industries performing manual handling tasks. Healthcare workers (HCWs) represent 11.2 million people with 5 million employed in hospital systems (Khuder, Schaub, Bisesi, and Krabil, 1999), many of whom have experienced a WRMSDs. The estimated annual costs associated with WRMSDs and work related low back pain (LBP)/injury is 49 billion dollars in the United States (Trinkoff, Brady, and Neilson, 2003). Healthcare workers (HCWs) are nurses, medical doctors, lab workers, orderlies, etc, with nursing professionals as the majority of subjects that are discussed in this paper. Occupational and environmental health nurses (OEHNs) working in healthcare delivery systems should be a key member of the team that develops an ergonomic program to protect HCWs. There is continuing discussion to determine if the prevention, protection, and rehabilitation of WRMSDs require additional identification of risks, interventions, and enhanced outcomes.

By definition, musculoskeletal disorders (MSDs) can be defined as any illness or injury that affects one or more parts of the musculoskeletal system (Ergoweb, 2004). A common type of health problem in healthcare workers is low back pain (Smith and Leggett, 2003). Reported occurrences can also include neck, upper extremities, and shoulder. The
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multifactorial definition and the many body parts involved, weaken the ability of researchers to know the true prevalence of WRMSDs. As many as 60 to 80% of individuals in the general population experience low back pain at some point in their life (Smith and Leggett, 2003). This paper will address low back pain (LBP), back disorder, and low back disability, as the WRMSDs most common to healthcare workers. References to WRMSDs can be occupational low back pain (OLBP), back disorder, and back disability.

The occupational risk factors associated with LBP require discussion. Efforts to prevent WRMSDs require additional knowledge about associated risk factors which include patient handling activities, organizational culture, individual characteristics, identification of the hazards to be controlled or eliminated. Strategies to protect workers include engineering and administrative controls, referral for accurate diagnosis and treatment, and disability management when workers require medical intervention.

Major stakeholders in the prevention of WRMSDs are the injured worker and his/her family, coworkers, employer, healthcare providers, and insurers. Each stakeholder will consider a different angle in the broad perspective of managing WRMSDs. Each stakeholder may have a different understanding of how to define and manage WRMSDs. Agreement on common threads for defining and managing WRMSDs is important. This includes limiting exposure to risk factors for WRMSDs,
eliminating the causes of WRMSDs, utilizing available prevention and protection strategies, and adopting the best practices for rehabilitation to minimize or eliminate disability (Waddell and Burton, 2000). In addition to reducing the injury and cost burden associated with work-related back pain, legislative efforts are also designed to create change and improve working conditions that cause or help to sustain WRMSDs back injuries. For example, in the United Kingdom, the Health and Safety Advisory Committee (HSAC)(the advisory committee of the United Kingdom's enforcement branch Health and Safety Executive), in 1992, helped to influence change for safe handling practices. This legislation provided guidance for material handling, specifically for inanimate objects, but it also provided for safer lifting practices for nurses (Wilson, 2001).

Multifaceted risk associations complicate establishing successful ergonomic program components. Previous lifting recommendations made available in 1969 and revised in 1991 (Kavanaugh, Stefan, and Klachan, 2001) were designed to address the materials handling of an inanimate object with handles, and lifted by males from the floor vertically. However, material handling and lifting recommendations need to focus on healthcare handling issues because they and currently are not representative of the patient handling tasks associated within healthcare delivery systems (Mital and Penathur, 1999).

HCWs are predominately female and they perform many lateral transfers in awkward close settings, with unequally weighted, sometimes
unpredictable patients (Nelson, 2001). In order to be effective, training has to be specific to the tasks and have worker buy in. Individual risk factors include psychosocial, age, gender, physical condition, and co-morbidity issues. Other risk factors include repetition, force, posture, environment, and culture.

Risk associations for WRMSD require integrated intervention strategies which include:

- cultivate a safety culture
- identify, control, and manage jobs and tasks associated with the hazards by performing Job Safety Analysis (JSA) or Job Hazard analysis (JHA).
- form an ergonomic team to establish training and program development
- review accident records to uncover trends and patterns of injury.
- provide appropriate treatment of WRMSDs to the injured worker.

Cultivating a safety culture is a key part of any injury prevention program (Shepherd, 2001). Culture differs from a program that has a start and a finish; rather it is an ongoing way of life that is distinct to a particular organization or community. Hazards can be identified and managed by conducting JSAs or JHAs. This process of data collection provides insight to the right solutions for HCW protection.

"Forming an ergonomic team to establish training and program development is a common and effective approach" (ErgoWeb, 2004, p.4).
Team members bring different experiences and expertise to solve problems and implement interventions. In addition to data collection regarding job and task information, reviewing accident records can uncover trends and patterns of injury. Intervention efforts can be maximized in the high-risk areas. Finally, the appropriate treatment of WRMSDs must be made available to the injured worker. The OEHN is in a key position to provide care and make appropriate referrals for medical care, develop health promotion and surveillance components tailored to WRMSD management, and to manage early and appropriate return to work programs that minimize disability associated with WRMSDs or OLBP.

The purpose of this paper is to provide an overview of WRMSDs low back injury risks and the prevention, protection, rehabilitation of those workers affected. The role of the OEHN includes the coordination of activities for prevention, protection, and rehabilitation of injured workers.
CHAPTER II
WORK RELATED MUSCULOSKELETAL DISORDERS IN HEALTHCARE WORKERS

Articles of interest for WRMSDs are plentiful and readily available. Unfortunately, much of the information has not been applied to a healthcare setting or communicated as information specific to patient handling tasks. The review of literature for the last 35 years yields very little hope that training and education alone are effective for reducing injuries associated with WRMSDs (Nelson, et al., 2003). Nelson also comments that myths must be dispelled to encourage change in the healthcare delivery systems. These myths include use of mechanical lifts eliminates the risks involved in manual lifting, mechanical lifts are not affordable, if you buy lifting equipment the staff will use it, and if you write a no-lift policy nurses will stop lifting (Nelson, et al., 2003).

In the last 15 years legislative efforts, influenced by the recognition of increased costs and greater emphasis on worker safety, have impacted changes. As mentioned previously, legislation in the United Kingdom helped to influence change for safe handling practices. In the United States (US) a failed attempt in 2000, for an ergonomic standard to be promulgated by the Occupational Safety and Health Administration (OSHA), would have provided for a comprehensive ergonomic program. While the standard was rescinded in 2001, ergonomic guidelines have been introduced which offer a detail comprehensive intervention
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strategies. In addition, efforts to keep legislation alive remain in some state OSHA plans. Washington and California have passed legislation to further define the way an employer handles ergonomic measures at the worksite (State Plans, 2004).

As recently as 1995, emerging changes, addressing HCW specific risks are apparent. Improvements for patient handling tasks and nursing practice and training are areas of focus (Nelson, 2003). The precursors to these changes can be identified in the effective ergonomic interventions documented from 1992 to 1999 that include the implementation of ergonomic-based injury prevention programs. OSHA has taken an active role to produce guidelines specific to healthcare including an on line e-tool and a guideline that reproduces information useful for nursing homes (Ergonomics, 2004).

Many research studies identify multiple variables and confounders that provide results identifying risk factors and interventions that are interrelated. Treatment and diagnosis variables also emerged adding to the complexity of tracking the incidence and prevalence of the problem. Another outcome of the information review is the new approach to an old problem. The new approach used in the Veteran Hospital Administration (VHA) patient resource guide is a recommendation to do a patient assessment, determining the physical dependency rating and equipment needed for safe patient handling prior to performing the handling task (Nelson 2001). The physical dependency patient assessment is a
systematic approach to assess the capability of the patient to assist with
physical tasks involving walking, standing, sitting, and mobility to perform
these activities with or without assistance. Assessment of the patient, prior
to transfers or mobility activities, minimizes risks associated with a
patient’s inability to participate in the physical work involving movement.
This is an added advantage to a successful plan for intervention and
prevention of healthcare worker injury. Additionally the literature
addresses the characteristics of the biophysical risks associated with
injury, such as repetitiveness, force, and posture (Ergo-Web, 2004).

Definitions

HealthCare Workers

Healthcare workers can be any worker providing patient care
delivery. This paper will address healthcare workers involved in patient
handling and lifting tasks. However much of the research narrows job
roles to fall under three categories, registered nurses (RNs), licensed
practical nurses (LPNs), and certified nurses aides (CNAs)(Ergonomics,
2004). Occasionally orderlies, patient caregivers, or other workers are
study subjects and the same handling and lifting tasks are evaluated. The
frequency in which “nurses” perform patient handling and lifting activities
considered to be high risk, is the determining factor in using the term
“nurses” as interchangeable for healthcare worker.
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**Work Related Musculoskeletal Disorders/Back Pain/Injury**

Definitions for terms related to low back pain (LBP) vary in the literature. Labels that are consistent would benefit the medical community as research is performed. Evaluation of prevalence studies for back pain is difficult as the definition, severity, and diagnosis of a LBP episode is widely variable (Walker, 2000). Indexes that use several key words to define back pain have been used in an attempt to acquire the most information for comparison in some articles. Articles that use definitions that are referenced will be incorporated into the paper.

“The musculoskeletal system is made up of the soft tissue and the bones of the body. Musculoskeletal disorders (MSDs) can be related to sprains, strains, inflammation, degeneration, tears, pinched nerves or blood vessels, bone splinting, and stress fractures” (Ergo-Web, 2004, p.3). Cumulative trauma, repetitive trauma, and overuse syndrome can also be found listed as MSDs. Ergonomic programs are designed to prevent, evaluate, and manage WRMSDs. WRMSDs will be the focus of any MSDs discussed in this paper. However MSDs are multifactorial in origin and may be associated with a combination of work and non-work related risk factors. This distinguishing factor (combination of work and non-work related risk factors) for the discussion of causal factors produce variable outcomes. In the work setting, whether MSDs are deemed causally related or not, the outcome requires the employer to consider modification of the tasks assigned, the environment, or the worker’s
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physical capabilities based on the identified physical demands of the job. The employer is responsible for evaluating all of these factors and providing a safe work environment based on the solution to each risk factor identified. Thus WRMSDs become “work-related” and a relationship is established. WRMSDs, (back pain/low back injury), “is any back pain originating in the context of work that is considered clinically to have been probably caused, at least in part, or exacerbated by the workers’ job” (Frank, Kerr, Brokker, DeMaio, Maetzol, and Shannon, 1996, p. 2). These authors continue to say that 97% of all LBP is non-specific or labeled as strain /sprain by doctors, as the source of the pain is unknown. Several research studies noted in the review article discussed the suggestion that a large proportion of patients, have no clear history of trauma or sudden injury, but a history of rather slow onset, which results in no easily traceable exposure or event. The terms MSDs, WRMSDs, and occupational low back pain (OLBP) will be used interchangeably in this paper to relate to low back.

Scope of the Problem

Incidence

Incidence is one component of measuring and documenting the frequency and distribution pattern of the occurrence of illness, injury, or health outcome in a population (Rogers, 2003).

“Incidence rates take on more meaning for an employer when the injury and illness experience of his or her firm is compared with that
of other employers doing similar work with workforces of similar size." (Occupational Health and Safety, 2004, p.1).

Incidence rate is defined as the rate in which new injuries arise in an at risk population. OSHA calculates incidence rates per 100 full-time workers over a given period of time. OSHA considers a full-time worker to work a 40 hour week 50 weeks per year. This provides the standard base for calculating incidence rates (Occupational Health and Safety, 2004).

The non-fatal occupational injury/illness incidence rate for hospital personnel reported by the Bureau of Labor Statistics in 2001 based on 293,600 nonfatal occupational injuries and illnesses to personnel. Among U.S. industries with 100,000 or more injuries and illnesses, hospitals have the second highest rate of nonfatal injury or illness cases. Only eating and drinking places have more injuries and illnesses. The incidence rate [non fatal work related injury] for hospitals is 9.2 injuries and illnesses per 100 full-time workers. The incident rate [non fatal work related injury] for industry as a whole is 6.1 injuries and illnesses per 100 full-time workers (Curtis, Lamson, and Brown 2004, p.1).

"Injuries involving healthcare worker related WRMSDs were reported as 54,973 incidents. The nature of the injury reported includes sprains, tears, back pain, hurt back, soreness, pain, hurt, except back" (Survey of Occupational Injuries, 2003, p.3). According to the Bureau of Labor Statistics employees in nursing and personal care facilities suffer over 200,000 work-related injuries and illnesses a year. Workers in
nursing homes are twice as likely as other workers to be injured on the job (Curtis, et al., 2004).

**Prevalence**

Prevalence is a useful measure of the extent of the problem in the population. Prevalence measures how many persons have the problem at a given time, which can be at any specified point. Prevalence snapshots over time may give temporal information showing whether low back pain is increasing or decreasing (Walker, 2000). Walker indicates that standardization of the methods used in prevalence studies of low back pain should be a priority. Prevalence of LBP continues to be related to patient handling activities (Hignett, Crumpton, Ruszala, Alexander, Fray, and Flether, 2003). There is the possibility that injured workers perform more frequent and more unassisted patient lifting tasks than other workers, or the injuries may not be related to employment (Khuder, et al., 1999). The tracking of prevalence rates in relationship to employment and LBP, can be influenced by who is tracking the data. A factor considered is that information obtained from workers' compensation (WC) data may be underreported by 60% and may be due to fear of retaliation or future employment issues (Khuder, et al., 1999).

**Morbidity and Mortality**

Rates of disease are called morbidity rates and rates of death are called mortality rates (Rogers, 2003). The literature addressing morbidity for WRMSDs and LPB sometimes relate the incidence of disease as
related to the presence of a modified duty program or components related to an early return to work program. Also examined are the injured individuals who are at risk for factors associated with chronic pain syndromes.

Costs of medical care should not be used for the determination of severity because only seven percent of injured workers lose time from work and that accounts for up to 70% of the expenses spent on medical care and salary replacement (Tate, Yassi, and Copper, 1999). The results of the study by Tate, et al., suggest that even though there were a number of variables considered (pain perception, disability perception, prior back injury, program participation), the most critical factor was the perception of disability. The perception of disability variable impacted the time lost which was the basis for determining severity of the injury. This could be misleading from a clinical standpoint, as predictors for time lost appear to be based on subjective complaints of the worker (pain perception, disability perception) rather than objective findings of functional incapacity. Also the findings reported demonstrated evidence of work-based intervention programs as being effective in reducing morbidity resulting from back injury (Tate, et al., 1999).

**Trends**

Findings from studying WRMSDs global trends were addressed in the article by Frank, et al., 1996. Age-adjusted disability has been on the rise for 30 years as well as increases in inactivity due to musculoskeletal
problems. In healthcare delivery, manual patient lifting has been a risk factor for injury in HCWs and a risk of injury to patients during transfers. The trends noted in the 1980s – 1990s showed incidence for back injury climbed 40% in HCWs performing patient handling activities. For a short period of time in the early nineties a decrease of total back injury was noted. However from 1994 – 2000 reported injuries in nursing occupations rated WRMSDs as 66% of the total (1,664,018) reported injuries with 24,528 RNs; 10,834 LPNs; and 74,205 CNAs /orderlies) (Nelson, Fragala, and Menzel, 2003).
Chapter III
MULTIFACTORIAL RISK FACTORS FOR MUSCULOSKELETAL LOW BACK INJURY IN HEALTHCARE WORKERS

Work Related

There are multiple risk factors identified in WRMSDs in HCWs. Five significant work-related risk factors including repetition, force, posture, environment, and culture will be discussed.

"Lifting is defined as moving or bringing something from a lower level to a higher level" (Bernard, et al., 1997, p. 6-13). There can be a combination of physical efforts or muscle exertion producing stress on the spine when lifting occurs. These physical efforts can be influenced by the transfer of a patient while the HCW is in an awkward position, the frequency of the transfer, and the amount of weight lifted. Additional information reveals that there is strong evidence that low back disorders are associated with work-related lifting and forceful movements. Groups, such as nurses, with an increased frequency of exposure are at a higher risk. Of the 90 studies reviewed by NIOSH funded researchers, a weighted analysis of the results demonstrated an overall increase in LBP in nurses who lifted patients more frequently (Bernard, et al., 1997). “Data from the 1994 Bureau of Labor Statistics Annual Survey of Occupational Injuries and Illnesses demonstrated that the industry with the highest rate of time-loss injuries due to overexertion was nursing and personal care facilities” (Bernard, et al., 1997, p.6-19). In 2002 the incidence rate
remains 12.6 time-loss injuries per 100 in nursing and personal care facilities (Survey of Occupational Injuries, 2004).

Repetition

Repetition can be described as a series of motions-performing movement that can produce fatigue and muscle-tendon strain. If performed without adequate recovery in an awkward position, or with the addition of forceful movements, an additional risk of musculoskeletal tissue damage may result (Cohen, Gjessing, Fine, Bernard, and McGlothlin, 1997). Repetition can be defined as "performing the same motions repeatedly." "The severity of risk depends on the frequency of repetition, speed of the movement or action, the number of muscle groups involved, and the required force" (Ergo-Web, 2004). "There is limited and contradictory evidence that the length of exposure to physical stressors (cumulative risk) increases reports of back symptoms or of persistent symptoms" (Waddell and Burton, 2000, p. 9).

The extension of shifts, rotation of shifts, and on call requirements have the potential to contribute to the risk of injury in nurses by contributing to fatigue (Orford, Kapil, Lindesmith, Kelafant, Forte, 1998). The continuation of fatiguing activities, without appropriate recovery periods, contributes to overexertion and increased risk of WRMSDs (Cohen et al., 1997).
Force

Lifting is comprised of three types of force; compressive, shear, and torsional (Bernard, Putz-Anderson, Burt, Cole, Fairfield-Estill, Grant, 1997). Compressive force occurs when the discs of the spine are squeezed together by flexion or extension of the spine. Shear forces occur when the spine is rotating or twisting while moving. Torsion refers to the twisting of the spine in a non-neutral position. The difference between shear and torsional lifting is that shear force represents the displacement of one disc over another, and torsional is when the discs are twisted in the opposite direction (Hedge, 2004). Static evaluations of the trunk demonstrated that lifting results in large compressive forces of the spine. “Compressive forces exert the most influence on low back injury risk” (Hedge, 2002, p. 2). Additionally, biomechanical investigators have performed research to include the loading and disc tolerances associated with asymmetric loading of the trunk.

Many tasks performed by HCWs contain movements that are asymmetric. For example, patient handling and lifting occurs when repositioning a patient, dressing, or during toileting activities, not just when moving the patient from one surface to another. Marras and others (2002), demonstrated in laboratory experiments, that dynamic trunk motion components of lifting have been associated with greater spine loading which is pressure on the spine (Nelson, et al., 2003). Increased trunk motion during lifting activities has been associated with increased trunk
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muscle activity and intra-abdominal measures. Some laboratory studies have shown that lateral shear forces make trunk motions more vulnerable to injury than a compressive loading situation.

The lateral shear forces pose more of a risk when flexion and twisting result in an awkward position. Marras, et al, (2002) also demonstrated in vitro (in an artificial environment) (Merriman-Webster, 2004) evidence that the viscoelastic properties of the spine may cause increased strain during increased speed of motion. In the study by Fathallah, Marras, and Parnainpour, (1998) an electromyogram-assisted free-dynamic lifting model was used to quantify patterns of complex spinal loads in 11 male subjects performing various lifting tasks. This assessment was to demonstrate high and low lifting risk conditions that matched those observed in industrial settings. According to the authors combined loading on the spine has been implicated as a major risk factor in occupational low back disorders. However, there is a void in the literature regarding the role of these complex spinal loads during manual lifting. The results showed that complex dynamic motions similar to those observed in risky industrial tasks generated substantial levels of combined compressive and shear loads. This study providing an assessment of the effects of combined motions in the internal loading of the spine. The authors conclude asymmetric lifting conditions can be avoided by appropriate ergonomic workplace modifications (Fathallah, et al.,1998).

Nelson, et al., (2003) identified nine patient handling activities that
places HCWs at risk including; bathing a patient, making an occupied bed, dressing a patient in bed, transferring from bed to stretcher, transferring from bed to wheelchair, transferring from geri-chair to bed, pulling patient up in a chair, pulling patient up to head of bed, and applying anti-embolism stockings.

Study participants were divided into a control (standard lifting procedures used to perform at risk tasks) and intervention (redesigned at risk tasks) group to evaluate these nine biomechanical tasks. The intervention group showed that the tasks bathing a patient, transferring from bed to wheelchair, transferring from geri-chair to bed, and pulling patient up in a chair resulted in reduced lumbar forces from 25% up to 60% (using lumbar electromyogram monitored lifting) (Nelson, et al., 2003).

The combination of duration and repetitiveness of the force exhibited during patient handling activities may intensify the risk of injury. The nature of the multifactorial premise of WRMSDs and the lack of measurable quantitative and qualitative biomechanical information related to patient handling activities limits useful assessment results particular to HCWs (Bernard, et al., 1997). Mital and Penathar (1999) also described that repetition is associated with musculoskeletal disorders and injury, but as it relates to upper extremities. The authors say that repetitive motion involves forceful exertions and awkward movements, and the acceptable combinations of these factors is unknown.
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Posture

The posture required to perform many patient handling activities results in awkward, stressful positions. As much as 20-30% of the time nurses are in a forward bent or twisted trunk position, according to research cited by Nelson (2001).

Static postures are positions where very little movement or cramped posturing occurs, which loads the muscles. Prolonged sitting and standing are examples. Sustained, overexerted muscles fatigue more easily and are at greater risk for increased WRMSDs. One of the risks in HCWs would be in the operating room while scrubbed to assist in surgery. This sustained exertion requires HCWs to stand in one position, for up to eight hours a day, passing instruments during surgery. NIOSH reviewed ten studies concluding that static posture had the potential to be one of multiple risk factors but these studies offered inadequate evidence of the association of static postures and LB disorders (Bernard, et al., 1997).

Environmental Factors

Work Surfaces

Environmental factors that have been identified as hazardous are cluttered, wet, or uneven work surfaces where patient handling activities are performed (Fragala and Read, 1995). Potential slips, trips, and falls, may occur as a result of these conditions not being recognized and may result in injuries (Ergonomics, 2004).
Space

Another risk factor to consider is space. Inadequate walkways, equipment, and poor lighting contribute to potential hazards in the work environment. For example adequate space, proper equipment, and the ability to perform patient handling tasks with adequate number of HCWs reduce the risk of injury (Ergonomics, 2004).

Inadequate room, toilet, or facility space in patient care areas contributes to an unsafe work environment. Patient handling and lifting tasks require adequate room to maneuver equipment, adequate staff to meet the physical demands of the lifting tasks, and the ability to minimize the awkward positioning found if lifting is performed in inadequate space (Ergonomics, 2004). The physical work area must be examined to determine if the right amount of space is available for the equipment used. Bathrooms, shower stalls, and private patient rooms are areas that require assessment. Areas where limited lighting exists (i.e. bathrooms or shower area) may contribute to the spatial (surroundings) hazards identified. Walking surfaces that are wet or poorly lit, or uneven without non-skid characteristics also must be assessed prior to performing a patient handling activity (Ergonomics, 2004).

Organizational Culture

The organizational culture or characteristics of the organization may be an obstacle to either protecting healthcare workers or adding to the stressors associated with increased risk. Work demands, specifically
time pressures, have been cited by nurses as contributing to job
dissatisfaction, and causal in nurses leaving the profession. An
observational study conducted by Leggat (2003), showed that less than
2% of the nurses used lifting devices when the job demands were felt to
be too extreme. Staffing levels, scheduling, and the national nursing
shortage have been cited as increased risks for nurses that choose to stay
in healthcare and the reason younger nurses are hard to recruit. Yassi, et
al, (2001) followed 346 nurses for a five-year period. The nurses were
divided into three groups, the control group, the safe lifting group, and the
no strenuous lifting group. Self-perceived work fatigue, back and shoulder
pain, safety, and frequency and intensity of physical discomfort associated
with patient handling tasks were improved in both intervention groups, but
staff with the mechanical equipment use showed greater improvements.
Musculoskeletal injury rates were not significantly altered. The "no
strenuous lifting" group received the benefit of combined training and
assured availability of patient handling equipment. This resulted in the
most effectively improved comfort with patient handling, decreased staff
fatigue, and decreased physical demands. Attention to staffing and work
organizational factors that impact injuries is essential (Yassi, et al., 2001).

Karahan and Bayratar's (2004) explorative study was designed to
identify the use of body mechanics in clinical settings and the occurrence
of low back pain in nurses. Fifty-six medical, surgical, emergency, and
intensive care nurses participated. Data were collected through
observation and interviews. Results of the study showed that the majority of the nurses (87.5%) experienced low back pain at some time in their lives. Among the contributing factors for back pain, the relationship between wearing high heels, heavy lifting, and back pain was significant statistically. The nurses observed body mechanics showed incorrect behaviors while sitting (53.6%), standing (14.3%), carrying (35.7%), pulling or pushing (20.6%), moving the patient to the side of the bed without an assistant (53.4%), moving the patient to a sitting position in bed (28.6%), and assisting the patient to a standing position (33.4%). Observations revealed that 57.1% of the nurses lifted and 82% perform extension activities incorrectly. The conclusion from this research was that some of the nurses do not use body mechanics correctly and the majority of the nurses observed (87.7%) experienced low back pain after starting their professional careers in nursing.

Individual

**Psychosocial Risk Factors**

Psychosocial risk factors arise from the interaction of the individual (psychological) and the business' culture and attitudes toward employees (sociological) (Ergo Web, 2004). Lipscomb and others (2004) report that changes in healthcare have an adverse impact on the health of a nurse and must be addressed to prevent further injury in nursing personnel. More than 1000 nurses reported experiencing difficult work conditions and believe there is a negative impact on their health over and above the
psychological and physical job demands. Sixty-five percent of the nurses reported an increase in patient loads and 68% reported an increase in patient acuity. Only 25% of the nurses reported their job as "very satisfying" and [job] "security is good". This suggests that an organizational approach to improving healthcare delivery and quality of care is "critically needed". A reported 3-fold increase in neck and back musculoskeletal disorders suggest changes in workload and work complexity need to be addressed.

Specific psychosocial risk factors in a healthcare setting include work commitment, lack of social support, and lack of stimulation. This even poses an additional threat of persistent WRMSD related symptoms and disability. In addition, according to Smith and Leggett (2003), the relationship between job strain and WRMSDs increases the perception of WRMSD symptoms. Physical factors (e.g., repetition, force, and posture) are more familiar than the concept of psychosocial factors which include job dissatisfaction, work intensity, monotonous work, job control, and social support. The psychosocial factors represent large numbers of factors that fall within three separate domains: job and work environment, extra-work environment, and individual characteristics of the worker. Interactions among factors within each of these domains constitute what is referred to as a "stress process" (Bernard, et al., 1997).

Included in the domain of job and work environment are a host of conditions, sometimes referred to as "work organization factors," which
include various aspects of job content (e.g., workload, repetitiveness, job control, mental demands, job clarity, etc.); organizational characteristics (e.g., tall versus flat organizational structures, communications issues); interpersonal relationships at work (e.g., supervisor - employee relationships, social support); temporal aspects of the work and task (e.g., cycle time and shift work); financial and economic aspects (e.g., pay, benefit, and equity issues); and community aspects (e.g., occupational prestige and status). These work and job environment factors are often thought of as demands, or "risk factors," that may pose a threat to health as described by Hurrell and Murphy (1992). Extra-work environment parameters typically include factors associated with demands arising from roles outside of work, such as responsibilities associated with a parent, spouse, or children. Finally, individual worker factors are generally of three types as described by Payne 1988 corresponding to: genetic factors (e.g., gender and intelligence); acquired aspects (e.g., social class, culture, educational status); and dispositional factors (e.g., personality traits, and characteristics and attitudes such as life and job satisfaction) (Bernard, et al., 1997).

The importance credited to psychosocial factors is the predictability for disability. Much of the discussed information in recent articles points to psychosocial factors over physical variables in predicting prolonged disability, including "increased levels of somatic awareness, heightened levels of fear-avoidance beliefs, and abnormal coping strategies" (Fritz,
Wainner, and Hicks, 2000, p.1928). Fritz, et al., presented Dr. Gordon Waddell's (an orthopedic surgeon) work that identified abnormal illness behaviors, as maladaptive overt illness related behavior which is out of proportion to the underlying physical disease and more readily attributable to associated cognitive and affective disturbances (2000). Dr. Waddell has developed clinical tools designed to indicate the presence of abnormal illness behavior by identifying physical signs or symptom descriptions that are non-organic in nature (Figure 3.1) (Main and Waddell,1998). Positive answers to these questions and exams have been identified and recommended for use in the evaluation of patients with LBP. Fritz, et al., continues to agree with Waddell, “In addition to helping identify psychosocial factors of risk, these signs and symptoms are believed to be highly associated with aspects of distress and illness behavior more than physical pathology in patients with chronic LBP” (2000, p. 1928).

Fritz, et al., (2000) conducted a longitudinal cohort study of 69 patients with acute (less than two weeks duration of work related) LBP after a referral for physical therapy treatment. Consecutive patients were examined for the presence of non-organic signs and symptoms before initiating physical therapy treatment. The outcome measure used was the ability to return to work without restrictions within four weeks of the initial evaluation. Out of a possible 12 (5 non-organic signs and seven non-organic symptoms) 24 % (1.1 out of 5 non-organic signs, and 2.8 out of 7 non-organic symptoms) positive responses were identified. At the
Figure 3.1
Waddell Non Organic Signs and Symptoms

<table>
<thead>
<tr>
<th>Exam Sign performed on patient</th>
<th>Patient Exhibits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional disturbances</td>
<td>&quot;wide spread&quot; sensory changes to a large region</td>
</tr>
<tr>
<td>Superficial non/anatomic tenderness</td>
<td>hypersensitivity to skin touch</td>
</tr>
<tr>
<td>Axial Loading Rotation</td>
<td>axial loading pain with pressure or rotation</td>
</tr>
<tr>
<td>Distraction Straight leg raises</td>
<td>inconsistent straight leg raises results sitting vs. lying down</td>
</tr>
<tr>
<td>Overreaction</td>
<td>Disproportionate facial, verbalizations, and body movements to exam</td>
</tr>
</tbody>
</table>

Number | Symptoms*
---|---
1  | Do you get pain in the tail bone?
2  | Do you get numbness in the entire leg? (front, back, side, at the same time)
3  | Do you get pain in the entire leg? (front, back, side, at the same time)
4  | Does your whole leg give away?
5  | Have you had any time during this episode when you have had little back pain?
6  | Have you had to go to the emergency room due to pain?
7  | Has all the treatment to the back made it worse?

(Main and Waddell, 1998)

"Positive response to symptom questions more highly associated with aspects of distress and illness behavior than organic/anatomical problem" (Fritz, 2000, p. 1928).
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Conclusion of four weeks treatment, 68% were back to full duty, and 32% continued to have modifications to their duties. One of the conclusions the authors indicated was additional screening tools are needed to identify patients at increased risk of delayed return to work.

**Age**

Age is an important personal variable as it relates to morbidity and mortality (Rogers, 2003). Age is identified as an easy variable to measure but a difficult variable to have a thorough understanding in relationship to LBP (Dempsey, Burdorf, Webster, 1997). Various factors (disease, hazardous exposures, accidents) can be confounders with age and make conclusions concerning the role of age in the development of LBP difficult. The spine naturally degenerates with age and the extent of degeneration is different across individuals. The confounding relationship of cumulative spine trauma and aging still requires research (Dempsey, et al., 1997). Older workers have the potential to have a higher number of low-back episodes. Exposures to physical stressors vary in all ages. Brown and Thomas, (2003) collected data via a retrospective chart review. Data showed that the advancing age was a notable characteristic of the 223 injured employees studied from 1998 – 2000. Sixty-two percent of the medical center employees reported their first injury at 45 years or older and the mean age for the population studied was 45 years old. This characteristic is representative of the sample demographics and of past research (Bernard, et al., 1997). Brown and Thomas (2003) concluded
that continued study of employees that are older is warranted.

**Gender**

Spinal loading research has reported differences in gender tolerance. According to Marras et al., (2002), 140 subjects were studied, in two separate experiments, to quantify and understand how differences in anthropometry between genders might influence muscle recruitment and subsequent spine loads for sagittal plane lifting. The two experiments consisted of 35 men and 35 women performing lifts in which motion was isolated to the torso and 35 men and 35 women completing whole-body free-dynamic whole body lifts. An electromyography-assisted model was used to evaluate spine loading under these conditions. In this comprehensive biomechanical evaluation, men exhibited larger absolute spine loads than women. Body mass (normalization) differences in spine loading between genders were believed to be a result of increased demand for control over the kinematics of movement. In normalized conditions, women generally experienced greater relative spine compression loads. Lifting styles of women used more hip–pelvic motion. Men performed the lifts using more trunk motion. Results indicated that differences in spine loading between genders is a function of the anatomic differences in trunk muscle sizes. Women also are believed to be more at risk relative to their loading tolerance values (Marras, et al., 2002).
Physical Condition

Is the physical condition of an individual a risk factor for LBP?

Smedley, et al., (1997) conducted a prospective cohort study of 961 women that returned a self-administered questionnaire. Eight hundred forty-three women (88%) returned at least one follow-up questionnaire during the follow-up after 24 months. Based on the 838 women who completed at least one follow-up questionnaire and who provided usable information about back pain, 38% developed low back pain while under follow-up including 11% whose pain was bad enough to require time off work. The incidence of low back pain according to age, height, and weight showed symptoms were significantly more common in the tallest women, but this excess did not lead to more absence from work. No clear trends were apparent in relation to age or weight. No increase in risk of back disorders with weight or body mass index was found. One of the key messages discussed in this study was that individual risk factors for body mass, height, and weight are not sufficiently discriminatory for risk of back pain (Smedley, et al., 1997).

In a prospective study, using 403 healthy healthcare worker volunteers, Adams, et al., (1999), considered the personal risks associated with first time low back pain. A series of self-administered questionnaires (Modified Somatic Perception Questionnaire, the Zung Depression Scale, and the Health Locus of Control Scales) and anthropometric factors were quantified using standard techniques to
measure lumbar curvature and hip and lumbar spine mobility. Leg, back strength, and back muscle fatigue ability were measured in functional postures. Additionally, follow-up questionnaires sent after 6, 12, 18, 24, 30, and 36 months, inquired about back pain, and multivariate logistic regression analysis was used to identify risk factors at each follow-up. Consistent predictors of serious back pain included: reduced range of lumbar lateral bending, a long back, reduced lumbar lordosis, increased psychological distress, and previous non-serious low back pain. Adams, et al. concluded personal risk factors explained up to 12% of first-time low back pain.

**Medical History**

The medical history of the worker should be documented and assessed prior to placing him or her into a role performing demanding physical activities (Rogers, 2003). Medical conditions (decreased aerobic function, decreased mobility, strength, and agility) identified, that may reduce the ability to perform the essential functions of the job, require "interventions" aimed at reducing the frequency of OLBP by taking a proactive approach that is the result of a thorough pre-placement screening. These screening efforts, including radiology examinations, medical examinations, and generic pre-placement strength tests, have been ineffective in predicting who will subsequently develop disabling LBP on the job and 97% of LBP is called strain/sprain or nonspecific as the practitioners can not determine the source of the pain (Frank et al., 1996).
Patient Handling Activities

Patient handling activities continue to be one of the key risk factors to healthcare workers. A key component surrounding patient handling activities is to accurately assess the patient prior to starting the activity. One way to perform this function is to use a patient assessment criteria form. Nelson et al., (2001), recommends matching the equipment with the patient characteristics (Figure 3.2). In this table, the recommended equipment is designated by the dependence of the patient for assistance by the healthcare worker. The more dependent the patient is, the more equipment use is recommended.

Manual Patient Transfer

The manual handling hazard is reduced when a systematic process is put in place prior to performing the tasks. Patient care transfers from point “a” to point “b” represent a task that includes force, awkward postures, and possibly an uncooperative or confused patient. Patients represent asymmetric, unequally weighted objects that can move (Nelson, et, al., 2003). This increases the risk of back injury to the person performing the task. Patient transfers may be lateral or vertical. An example of lateral transfer would be to move a patient from bed to stretcher. A vertical transfer might be assisting a patient from the wheelchair to a toilet.
### Figure 3.2

**Patient Assessment Tool and Lift Aid Determination Grid**

<table>
<thead>
<tr>
<th>Resident Dependency Classification</th>
<th>Height Adjustable Bed</th>
<th>Full Sling Lift</th>
<th>Stand Assist Lift</th>
<th>Lift Walker</th>
<th>Stand Assist Aid</th>
<th>Gait Belt with Handles</th>
<th>Friction Reducing Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Independent</td>
<td>Recommended</td>
<td>Never</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Rarely</td>
</tr>
<tr>
<td>1 - Supervision</td>
<td>Recommended</td>
<td>Rarely</td>
<td>Occasionally</td>
<td>Occasionally</td>
<td>Normally</td>
<td>Occasionally</td>
<td>Rarely</td>
</tr>
<tr>
<td>2 - Limited Assistance</td>
<td>Strongly Recommended</td>
<td>Rarely</td>
<td>Normally</td>
<td>Normally</td>
<td>Normally</td>
<td>Normally</td>
<td>Normally</td>
</tr>
<tr>
<td>3 - Extensive Assistance</td>
<td>Required</td>
<td>Normally</td>
<td>Normally</td>
<td>Normally</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Always</td>
</tr>
<tr>
<td>4 - Total Dependence</td>
<td>Required</td>
<td>Always</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Always</td>
</tr>
</tbody>
</table>

Source: Used by permission from Audrey Nelson, PhD, RN

Patient Safety Center (personal communication 10/27/04).
Awkward Postures During Patient Care Delivery

Frequently, awkward postures are part of any patient handling or moving activity. Awkward postures can be described as reaching behind, twisting, working overhead, kneeling, forward or backward bending, and squatting (Ergo-Web, 2004). For example, awkward positions may include pulling the patient up in bed, starting a peripheral intravenous line, feeding a dependent patient and transferring a patient from bed to chair (Nelson, et. al., 2001). In the prospective cohort study by Smedley, et al., (1997), 46% of the women who reported manually transferring a patient from bed to chair at least 10 times per shift, experienced LBP episode with almost 10% missing time from work.

Activities of Daily Living

Activities of daily living (ADLs) include bathing, dressing, and feeding activities. In the prospective cohort study by Smedley, et al., (1997), 45% of the women manually moving a patient around in bed (at least 10 per shift), reported an episode of LBP, including 12% who missed time from work. These activities require the HCW to be in an extended forward flexion motion for the majority of the task. This increases the loading of the spine and the risk of cumulative causal relationship to OLBP (Fathallah, et al., 1998).

Total Workload

The total workload for a given shift of work may be more hazardous for the HCW based on the frequency and amount of assistance available
to perform these tasks. The amount of time in which these tasks are performed may make them more hazardous as well, especially as 12 hour shifts become the norm. The dependence status of patient(s) assigned may exceed the recommended weight lift (RWL) (> than 8 hour shift) (Cohen, et al., 1997). Reduction in the job satisfaction experienced by the HCW can induce physical stressors that produce muscle tension and increased likelihood of OLBP. Data collected by the Minnesota Nurses Association in 1995, related 65.2 % increase in injuries, while registered nurse (RNs) staffing was decreased by 9.2 %. (injuries increased for LPNs' by 50%, nursing assistants' 51%, other professionals' 85.4%, and other assistive personnel's 116.6%). “Although all categories of injuries and illnesses increased, the majority were injuries related either to moving patients (such as back, neck, and shoulder injuries) or to sharps.” (Shorgen, et al., 1996, p. 3). This study followed 12 hospitals experiencing restructuring in the Minneapolis/St. Paul metropolitan area. The full time equivalents (FTEs) relative to total FTEs changed very little (.06 %) in a three year period. However, during this time, RNs worked an average of 53 over-time hours per RN per year (Shorgen, et al., 1996).

**Unplanned Events**

Unplanned events, such as patients falling or reaching for HCW limbs, may cause over exertion and strain. If the patient falls or is confused the result may be the failure of a smooth transfer or ambulation.
Excessive weight (bariatric patients) will require special equipment that meets the dimensions and load capacity required (Nelson, 2001).
CHAPTER IV

HAZARD PREVENTION AND PROTECTION – INTERVENTIONS OF IDENTIFIED RISKS

Ergonomic Program

Establishing a Team

The Ergonomic Program for healthcare workers should be designed to identify and correct the WRMSD hazards in the workplace. The team approach will be key in setting goals in the development of the program as well as the maintaining of the activities related to training and education. The team should include the following members: occupational and environmental health nurse (OEHN), workers/union representatives, managers/supervisors, maintenance or facilities staff, human resources personnel, healthcare providers, safety and health personnel, purchasing personnel, engineers, and an ergonomist (Ergo-Web, 2004).

Hazard Identification, Prevention, and Control

An effective ergonomic program includes hazard identification, prevention, and control for analyzing the work site. The first component includes worksite analysis. This may include record reviews, employee completed checklists, and surveys regarding specific job tasks, and observations of work processes. The second component identifies engineering controls by examining the equipment, personal protective equipment, physical layout, and the process in which the workers perform the work. The third component encompasses the administrative controls
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that include policy and procedures, training and education, and medical management (Ergo-web, 2004).

Hazard Identification

Worksite Analysis

A worksite analysis is a process for identifying and correcting hazards and is done as a health and safety review (Ergo-web, 2004). The ergonomic program team members should be properly trained about the tools selected to perform the function of worksite analysis.

Record Reviews

Maintaining employee health records includes individual records documenting surveillance activities, and group records of exposure data (Rogers, 2003). Data collection for the WRMSDs should include completed discomfort surveys, evidence of employee interviews, safety committee reported trends, interpretation of data, and recommendations for exposure elimination (Ergo-Web, 2004).

Absence rates that identify relationships to back pain and injury can be useful in examining patterns and trends to providing interventions. For example, nursing units with high levels of perceived job strain have higher absence, negative physical manifestations, and job dissatisfaction (Seago and Faucett, 1997). Also units that have workers with low decision latitude have a higher absence rate (Seago and Faucett, 1997). Costs associated with absence can be decreased as much as 100% with appropriate interventions, such as mechanical lifts.
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(Nelson, 2001). The effectiveness of interventions can also be determined by quantitatively measuring the outcomes of such indicators as absenteeism, turn over rates, and productivity (Van Wyk, et al., 2001). In addition to record reviews, there are four commonly used tools to help identify risks/hazards: questionnaires, checklists, videotaping and narrative reports (Ergo-web, 2004).

An employee questionnaire is designed to collect the opinion of those working in the areas being assessed. It includes questions related to the worker, administrative and environmental factors, and tasks. This can be conducted by interview or by written questionnaire.

Employee questionnaires vary from setting to setting. The one standardized musculoskeletal symptom survey used for screening, prior to injury reporting, is the Nordic Musculoskeletal Questionnaire (NMQ) (Menzel, 2004). This tool has been widely accepted as valid and reliable. There are several versions of the tool including one that focuses on the lumbar region (Menzel, 2004). A comparative review of available tools in the literature is recommended. A custom designed survey, to focus on the body parts of the working population assigned, is preferable. A one page, anatomically figured, questionnaire (Figure 4.1) can reduce the response time as well as comprehension problems. This allows the employee to circle the areas of concern and document type of symptoms. This tool can be distributed to employees, as complaints of WRMSDs are reported. The OEHN can assist the employee in completion of the tool.
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Figure 4.1
Cornell University Musculoskeletal Discomfort Survey
Standing (female)

The diagram below shows the approximate positions of the body parts referred to in the questionnaire. Please answer by marking the appropriate box.

During the last week, how often did you experience:

- neck, pain, discomfort
- upper back pain, discomfort
- upper arm pain, discomfort
- lower back pain, discomfort
- forearm pain, discomfort
- wrist pain, discomfort
- hip pain, discomfort
- thigh pain, discomfort
- knee pain, discomfort
- lower leg pain, discomfort
- foot pain, discomfort

If you experienced neck, pain, discomfort, how unacceptable was this?

If you experienced neck, pain, discomfort, did this interfere with your ability to work?

<table>
<thead>
<tr>
<th>Area</th>
<th>Never</th>
<th>1-2 times/week</th>
<th>3-4 times/week</th>
<th>Every day</th>
<th>Several times every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Back</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Arm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Back</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forearm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip/Thigh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Leg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scoring Guidelines - Cornell Musculoskeletal and Hand Discomfort Questionnaires

These questionnaires are for research screening purposes and not for diagnostic purposes. Scores can be analyzed in 4 ways:

1. by simply counting the number of symptoms per person
2. by summing the rating values for each person
3. by weighting the rating scores to more easily identify the most serious problems as follows:
   - Never = 0
   - 1-2 times/week = 1.5
   - 3-4 times/week = 3.5
   - Every day = 5
   - Several times every day = 10
4. by multiplying the above Frequency score (0, 1.5, 3.5, 5, 10) by the Discomfort score (1, 2, 3) by the Interference score (1, 2, 3)

In the computational analyses missing values can be coded as 0. If the missing value is for the frequency score then use this as a zero in multiplying, i.e. all combinations of Frequency, Discomfort and Interference become 0. However, if the missing value is in the Discomfort or Frequency score then treat it as missing so that the multiplied score will be at least the value of the Frequency score.

Source: Human Factors and Ergonomics Laboratory at Cornell University
Discussion of the results can be coordinated by the OEHN with the employee and medical provider.

A checklist representing tasks associated with a specific job is a quick way to document and collect data to identify potential problem areas. Questions should be written so that the answer will generate further investigation of problems (Ergo-Web, 2004).

Videotaping is a tool that can accomplish several things. It records or videotapes a select portion of the work period and job tasks from different angles and can be studied multiple times (Ergo-Web, 2004). Multiple sessions may be needed if there are several parts to certain tasks (transfer from bed to chair to ambulation). Patient privacy should be respected and permission requested and granted prior to taping.

The last method commonly used is the narrative review. This is a method used where the team member observes an area for 30-40 minutes and completes a written description of his/her observations. The observations should include the task, the task description, the technique and equipment used in completion of the task, and the safety techniques utilized in completion of tasks. Using at least two methods (interview, checklist, videotaping, or narrative) is recommended in order to identify the risk factors. Risk factors and WRMSDs occurring on the job should be investigated and included in the analysis (Ergo-Web, 2004). Correlation of this information will help to formulate solutions.
Hazard Prevention

LBP is common in any studied population and LBP cannot be expected to completely be prevented (Frank, et al., 1996). This is related to the natural onset of degenerative LBP and in addition OLBP is extremely variable and has a wide range of disability. There is also a significant amount of successful treatment, rehabilitation, and earlier accommodation at work requiring study. One hazard, manual patient lifting, can be performed with less risk of initiating OLBP. One solution is the use of a designated lift team (Chaney, 2003).

Chaney collected data from eighteen hospitals on the success of lifting teams. In 2003, the tertiary acute care facilities reporting ranged from 150 to 500 beds, with most lift teams operating 7 days per week. Some operated 12 hour shifts and others 24 hours. Injury rates and/or lost workday reductions were reported in facilities that used lifting teams for all total patient transfers (Figure 4.2) (Chaney, 2003).

Hazard Control

Engineering Controls

Equipment

The development of engineering controls is dependent on the risks associated, based on unit or service provided. Equipment recommended for patient handling in healthcare delivery can be as simple as a friction-reducing device or as dramatic as a ceiling lift (Nelson, 2001).
## Figure 4.2

**Chaney Hospital Lift Team Data**

<table>
<thead>
<tr>
<th>Facility-hospital</th>
<th>Number of Beds</th>
<th>Number of Lift teams/years of data</th>
<th>Changes Documented</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>500</td>
<td>1 lift team 2 years of data</td>
<td>69% decrease in injury claims</td>
</tr>
<tr>
<td>B</td>
<td>400</td>
<td>1 team, 6 extra FTEs hired for repositions/ three year average data</td>
<td>experienced zero injury rate on shifts covered, (no repositioning done by lift team),</td>
</tr>
<tr>
<td>C</td>
<td>Unknown</td>
<td>24 hour coverage on patient care units only/5 years of data</td>
<td>57 % reduction in injury claims</td>
</tr>
<tr>
<td>D</td>
<td>150</td>
<td>11 hour coverage, one team/10 years of data</td>
<td>Reduced lost days by 90%</td>
</tr>
<tr>
<td>E</td>
<td>Unknown</td>
<td>2 teams/3 years of data</td>
<td>two teams with zero injuries on units using lift teams within five year period</td>
</tr>
<tr>
<td>F</td>
<td>Unknown</td>
<td>Not provided</td>
<td>30% injury reduction in one year for lifting injury</td>
</tr>
<tr>
<td>G</td>
<td>1500</td>
<td>2 teams/unknown data period</td>
<td>60,000 lifts performed without injury to staff or lift team on shifts covered</td>
</tr>
<tr>
<td>H</td>
<td>350</td>
<td>2 teams/2 year pre lift team data/1 year post lift team</td>
<td>60% decrease in lost time days related to transfer injury</td>
</tr>
<tr>
<td>I</td>
<td>300</td>
<td>Cross trained transport team/2 year pre lift team, 1 year post lift team data</td>
<td>Reduced lost time days by 99%</td>
</tr>
<tr>
<td>J</td>
<td>350</td>
<td>1 team day shit/ 5 days per week, 9 years of data</td>
<td>Reduced lost time injury 94% in 1st year, with 0-1 lost time injury for next 8 years</td>
</tr>
<tr>
<td>K</td>
<td>Unknown (16 units)</td>
<td>7 teams / 2 years data</td>
<td>7% decrease in injury rate with lift team, 17 % increase in injury rate without lift team</td>
</tr>
</tbody>
</table>
In Figure 4.3, Nelson used an evidence-based tool specifically designed to identify tasks of risk associated by unit and function (bariatric, spinal cord, medical, etc.) for continuing to minimize risks associated with patient handling (Nelson, 2001). Equipment recommended for patient handling in healthcare delivery can be as simple as a friction-reducing device or as dramatic as a ceiling lift (Nelson, 2001). The dependence status of the patient should be assessed and the equipment use designed and purchased with the unit's specific need in mind. For example, on a spinal unit, complete dependence of the patient for physical needs might require a ceiling lift to minimize or eliminate the hazard associated with lifting total dependence patients. On the medical surgical unit, a slide board may suffice. Based on the previous identified hazards (manual transfers, patient handling, and moving activities) the following equipment may need to be evaluated for any unit or service where patient handling activities are performed: Air assisted lifting devices, friction reducing lateral sliding devices, mechanical lateral transfer aids, transfer chairs, powered full body sling lifts, powered standing assist and repositioning lifts, standing assist and repositioning aids, sliding boards, and gait/transfer belts. The recommendations for selecting the appropriate equipment for the tasks can be done in at least three ways: central on-site team comprised of core members from the ergonomic program, an on-site clinical team from the specific area targeted for evaluation, or a central evaluation team with a designated champion (Nelson, 2001). Smedley, et
Patient Assessment Criteria and Care Plan for Safe Patient Handling and Movement

I. Patient's Level of Assistance:
   - Independent — Patient performs task safely, with or without assistive devices.
   - Partial Assist — Patient requires no more help than stand-by, cueing, or coaxing, or no more than 50% physical assistance by the nurse.
   - Dependent — Patient requires more than 50% assistance by nurse, or is unpredictable in the amount of assistance offered.

An assessment should be made prior to each task if the patient has varying level of ability to assist due to medical reasons, fatigue, medications, etc. When in doubt, assume the patient cannot assist with the transfer/repositioning.

II. Weight Bearing Capability
   - Full
   - Partial
   - No

III. Upper Extremity Strength
   - Yes
   - No

IV. Patient's level of cooperation and comprehension:
   - Cooperative — may need prompting; able to follow simple commands.
   - Unpredictable or varies (patient whose behavior changes frequently should be considered as "unpredictable"), not cooperative, or unable to follow simple commands.

V. Weight: __________  Height: __________
   Body Mass Index (BMI) [needed if patient’s weight is over 300]
   If BMI exceeds 50, institute Bariatric Algorithms
   The presence of the following conditions are likely to affect the transfer/repositioning process and should be considered when identifying equipment and technique needed to move the patient.

VI. Check applicable conditions likely to affect transfer/repositioning techniques.
   - Hip/Knee Replacements
   - History of Falls
   - Paralysis/Paresis
   - Unstable Spine
   - Severe Edema
   - Wounds Affecting Transfer/Positioning

Comments: __________________________________________

VII. Care Plan:

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Task</th>
<th>Equipment Assistive Device</th>
<th># Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transfer To and From: Bed to Chair, Chair To Toilet, Chair to Chair, or Car to Chair.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Lateral Transfer To and From: Bed to Stretcher, Trolley.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Transfer To and From: Chair to Stretcher, or Chair to Exam Table.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Reposition in Bed: Side-to-Side, Up in Bed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Reposition in Chair: Wheelchair and Dependency Chair.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bariatric 1</td>
<td>Bariatric Transfer To and From: Bed to Chair, Chair to Toilet, or Chair to Chair.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bariatric 2</td>
<td>Bariatric Lateral Transfer To and From: Bed to Stretcher or Trolley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bariatric 3</td>
<td>Bariatric Reposition in Bed: Side-to-Side, Up in Bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bariatric 4</td>
<td>Bariatric Reposition in Chair: Wheelchair, Chair or Dependency Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bariatric 5</td>
<td>Patient Handling Tasks: Requiring Sustained Holding of a Limb/Access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bariatric 6</td>
<td>Bariatric Transporting (Stretcher, Wheelchair, Walker)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sling Type (circle choice): Standard  Amputation  Head Support
Sling Size: ____________________________
Signature: ____________________________ Date: ____________________________

If patient’s weight is over 300 pounds, the BMI is needed. For Online calculators, see: http://www.knell.com/body_mass_index_calculator.html or http://www.sizewiserentals.com/bmi Calculator.htm
Source: Used by permission from Audrey Nelson, PhD, RN - (personal communication 10/27/04).
al. (1997) compared injury rates of 38 women assigned to manual transfers and mechanical device transfers performing the activity up to 5 or more times per shift. Forty-six percent of the women manually performing a patient transfer from bed to chair reported LBP, with 9% missing time from work. In contrast, 35% of women using a mechanical lift device, experienced LBP, but only 3% missed time from work. Mechanical lift device use resulted in a three-fold decrease in lost time from work.

**Administrative Controls**

**No Lift Policy**

No lift policy, no axilla lift policy, and a zero lift policy are all examples of administrative controls. The way in which patient handling and transfer is performed can be dictated by a facility policy that is well marketed and enforced. It is dependent on providing the right education, equipment, and training. Wyandot County Nursing Home, implemented a new no lift policy after experiencing one back injury that resulted in $240,000. Wyandot County Nursing Home now has zero back injuries due to lifting. The equipment cost a total of $280,000. "The nursing home estimates savings of $55,000 a year in reduced overtime and absenteeism; $125,000 in reduced turnover costs, and more than $100,000 in reduced workers' compensation costs" (Jolliff, 2003).

**Patient Handling and Transfer Policy**

Establishing a patient handling and transfer policy should include topics on reduction of injury goals, resources in which to accomplish the
goals, types of lifts and methods to safely accomplish expectations of special situations (i.e. evacuation of dependent patients) and provision of training and education (Workers' Compensation Board of British Columbia, 2003).

**Evaluation of Technique**

The establishment of the “Back Injury Resource Nurse” (BIRN) at the Department of Veteran Affairs allows for the continued building of the ergonomic program. This staff resource person conducts retraining, and evaluates HCW techniques, conducts discussion, and keeps the momentum of awareness of safely performing lifting and handling tasks alive. The peer leadership brought with this designated role helps to facilitate many components of the current ergonomic program on an on going basis (Nelson, 2001). The BIRN role was developed to encourage all levels of participation from the HCWs performing patient handling activities. Data collection is ongoing regarding the effectiveness of the BIRN role. The BIRN role demonstrates promise as a new educational model and is an advantage in peer leadership (Nelson, et al., 2003). The utilization of many rotating members to this role increases staff awareness and promotes the “real time” exchange of information between team members. Goals surrounding this role are to monitor the progress of the program, and establish the organization conveyance of importance. Another goal would be to invest in the safety culture change, and to improve job satisfaction related to employee and patient safety.
Observations and technique evaluation in patient handling activities is warranted, as noted by Karahan (2004) that 57.1% of the nurses lifted and 82% perform extension activities incorrectly. The conclusion from this research was that some of the nurses do not use body mechanics correctly and the majority have low back pain (Karahan, and Bayraktar, 2004).

**Job Satisfaction Survey**

Job satisfaction surveys have been used to speculate the degree of dissatisfaction that may contribute and delay recovery in back injury. The Psychosocial Aspects of Work Questionnaire, referenced and discussed by A. K. Burton, 1997, evaluates three work parameters; job satisfaction, social support, and mental stress. The Back Beliefs Questionnaire measures the negative consequences of LBP and how beliefs about job satisfaction, the ability to cope with pain, and how attribution of negative consequences contributes to the level of functioning (Burton, 1997).

In the Boeing study discussed by Hadler (1997), personal and occupational characteristics of employees were assessed. The results demonstrated that reported back injuries were 2.5 times more likely from workers who documented they “hardly ever” liked their jobs compared to workers that “almost always enjoyed” their jobs. Also in the Boeing study, workers volunteered to respond to the Work APGAR questionnaire (Adaptation, Partnership, Growth, Affection, Resolve). These areas relate to aspects associated with job satisfaction (co-workers and supervisors,
enjoyment of job tasks). The results of this study, although well known for influencing the field of back pain studies, could be improved by adding testable hypotheses, and by adding psychosocial factors related to the personal life of the worker (Volinn, Spratt, Magnusson, and Pope, 2001).

Workers identified that job dissatisfaction was also a predictor of additional reports of OLBP (Papageorgiou, et al., 1997). As nursing positions decreased by 10% in Minnesota in the early 1990s, the rate of reported back injury rose by 65% (Shorgen, et al., 1996). Job satisfaction in conjunction with staffing ratios are areas that impact worker belief and are important enough for healthcare administrators to examine (Lipscomb, et al., 2004).

**Staffing Policy**

A staffing policy providing for adequate staffing ratios contributes to nursing job satisfaction. Lipscomb et al., (2004) conducted a cross-sectional study using a self-reported questionnaire. One thousand, one hundred and sixty three nurses met the criteria to participate. This study was in response to a call by The Institute of Medicine (IOM) and the National Occupational Research Agenda Organization (NORA) to examine the occupational health impact of changes in healthcare as well as individual and organizational changes. The survey results indicated that there is a three-fold incidence in MSDs (neck and back musculoskeletal disorders) as the work demands increased (12 health care system changes that addressed staff levels, patient acuity, and the delivery of
nursing care had increased, decreased, or stayed the same over the past year). In addition, only 25% of the nurses surveyed indicated they found their jobs satisfying (Lipscomb, et al., 2004). Administrative controls that address ways to provide protective staffing ratios as well as address morale builders are likely to contribute to preventing the adverse impact from the changing health care delivery systems (Lipscomb, et al., 2004).

Training and Education

Patient handling and lift training that has been done, without the use of mechanical devices, has not been shown to be effective (Yassi, et al., 2001). Yassi, et al. surveyed 346 employees divided into three groups; group one - no intervention/education (control group), group two- “safe lifting” adoption with equipment use with three hour training session, and group three-three hour intensive training and worksite assessment with appropriate equipment allocation based on risk assessment. Data were collected at baseline, six months, and one year. Group three showed a significant increase in the use of appropriate equipment by six months and continued to be sustained for one-year follow up.

Trinkoff found the same evidence supporting the use of mechanical devices. “The finding that those who were trained to use mechanical devices were more likely to prefer this option for patient transfers is also encouraging” (2003, p. 6).

Many training and educational programs have not been “healthcare worker friendly”. OSHA and NIOSH educational material does not address
the risk associated with handling a human being (confused, non-cooperative, non-stationary patient, etc.) (Nelson et al., 2001).

**Personal Protective Equipment (PPE)**

**Back Belts**

The protective use of back belts, while lifting, remains unproven (Ergonomics, 2004). Some believe that individuals will try to lift more than safely possible while wearing the belt (Ergonomics, 2004). The current recommendation by NIOSH concludes that there is not enough scientific evidence to support or refute the use of back belts (NIOSH, 1994). Each employer must assess and determine the possible indication for back belt use. Gait belts for patients may be more appropriate (Ergonomics, 2004).

**Foot Wear**

Foot wear that contains anti-fatigue insoles may help to protect and give relief to those workers that spend long periods standing and walking on hard floored surfaces (Ergo-Web, 2004). Use of this type of protection would be dependent of the type of flooring and the length of hours standing and walking. Flooring that is solid (i.e. concrete) without cushioning of any type (carpet) would result in more impact per step. In general, insoles would be an adjunct to helping with musculoskeletal fatigue (Ergo-Web, 2004).
ROLE AND ACTIVITIES OF THE OCCUPATIONAL AND ENVIRONMENTAL HEALTH NURSE

The role of the occupational and environmental health nurse (OEHN) is an evolving and expanding role (Rogers, 2003). OEHN functions are different depending on the needs of the employer, the perception of the nurse and the company, and the size of the company. Seven major practice roles include clinician/practitioner, case manager, health promotion specialist, manager, educator, researcher, and consultant.

The activities performed in these roles can be instrumental in a healthcare delivery system and include pre-placement assessment, health surveillance, health promotion, education of the healthcare worker, health hazard assessment, and case management including early and appropriate return to work programs.

Pre-Placement

Physical Capacity Assessment

Physical capacity assessment should be done at the time of hire (pre-placement) as well as post injury (Cohen, et al., 1997). Demonstration of the physical capability of workers can be accomplished by a series of strength and endurance screenings. This assessment is as simple as asking the worker to touch his or her toes (flexibility), or by conducting a computerized isometric testing circuit (functional capacity.
study) that can evaluate effort and strength (Orford, et al., 1998). Physical therapy modalities may be part of assessing capacity, as well as, treatment. The goal of pre-placement assessment is to determine whether a worker is able to perform a job safely and not pose a threat to co-workers (Rogers, 2003). The assessment should be designed to provide a recommendation for hire in a position where the worker is able to meet the physical and psychological demands of the job (Rogers, 2003).

**Physical Demands Assessment**

Physical demands are the identified functions that may include the amount of pushing, pulling, lifting, carrying, squatting, walking, sitting, and standing, etc., associated with a job description. The physical demands of the worker's job should be provided by the employer and used in conjunction with the other data collected in the worker's medical record (Rogers, 2003). Individuals may vary in their ability to adjust to the same job demands (Cohen, et al., 1997). The OEHN provides documentation, tracking and evaluation of the physical/psychological demands of the position to ensure the healthcare worker is able to meet the job demands (Orford, et al., 2004).

**Health Surveillance**

Health surveillance for WRMSDs is performed to evaluate the health data and any known exposure history to a potential hazard. Surveillance activities are dependent on the identification of high risk
groups, as they relate to job assignment and environmental hazard exposure (Rogers, 2003). In addition to the data gathered from injury and illness records, medical visits, and symptom surveys, comparison with incidence and prevalence rates should be done. Surveillance data may indicate that special screening, tests, or other diagnostic services be performed. The OEHN will review data, document findings, and make recommendations for worker placement or for the safe return to work post injury (Rogers, 2003).

Health Promotion

Health promotion activities can be implemented upon hire or periodically as organized activities such as a "health fair" or other educational program. Elective, self-completed, health risk appraisals could identify personal health risks that need a targeted effort on the part of the employer to assist in management of WRMSDs (Orford, et al., 2004). Risk reduction activities may include exercise programs, stretching, walking, and nutritional education. These interventions can be proactive in minimizing illness, injury, and absenteeism (Orford, et al., 2004). The OEHN can be instrumental in primary prevention of identified risks for WRMSDs by providing counseling and education aimed at reducing obesity and increasing exercise. Secondary prevention measures include early identification of disease and interventions to limit the disease or disability (Rogers, 2003).
Education of the Healthcare Worker

Education and training of the HCW can be done at the time of screenings, as well as in group settings, or by training team members to refer worker complaints related to WRMSDs to the OEHN (Ergonomics, 2004). Educational topics should include symptoms associated with WRMSDs, and the administrative and engineering controls specific to the unit the HCW is assigned, and the communication avenues open to the employee on how to access medical care (Ergo-web, 2004). The recognition of symptoms information can be distributed, posted, or made part of periodic safety meetings.

The HCW should be able to readily access the information about WRMSDs. The avenue to have medical assessment and intervention should be communicated to the employee and supervisor, and a point of contact established. Preferably the onsite OEHN is readily accessible to discuss employee/employer concerns or address any reported WRMSD symptoms (Ergo-web, 2004). In the Yassi, et al. (2001) randomized control study, 346 nurses were followed for a five-year period. The nurses were divided into three groups; no intervention/education group one (control group), group two "safe lifting" adoption with equipment use with three hour training session, and group three had three hour intensive training and worksite assessment with appropriate equipment allocation based on risk assessment. Data were collected at baseline, six months, and one year. The biggest effective changes (application of education and
use of appropriate equipment) in worker behavior was seen in group three within the first six months. Yassi, et al., suggests this may be attributed to the "honeymoon phase" and believes that the value of periodic education and training "remains to be explored". Nelson, et al., (2003) expressed similar concerns about education and training, proposing that reinforcement of change in behavior, even with agreements on the best techniques, is difficult to achieve.

**Health Hazard Assessment**

Health hazard assessments should be tailored to the data collection results. The assessment should be conducted by completing physical examinations, medical and occupational histories, recording symptoms and complaints voiced by the affected workers, using periodic exams that target risks specific to the tasks performed, and discussing lifestyle activities (Rogers, 2003).

If the data indicate that the WRMSDs reported have cumulative onset, then engineering and administrative controls should be reviewed. Establishing policies that define staffing ratios and scheduling adjustments may minimize extended overexertion and unnecessary fatigue risks (Ergo-Web, 2004). Modified assignments to minimize awkward postures are used as well as anti-inflammatory and pain medications. Units that cannot assure appropriate scheduling and staffing ratios should not be considered for modified duty (Nelson, 2001). Reassignment may be part of the accommodation during recovery. Job familiarity in efforts to
Managing Occupational Musculoskeletal Injury

recommend appropriate accommodations is vital to the injured workers recovery (Orford, et al., 2004).

Accommodations for Modified Duty

Appropriate accommodations for modified duty are dependent on the cumulative review of information. A free on line resource for determining job accommodations can be found on the web site at the Job Accommodation Network (JAN) (division of the Office of Employment Disability Policy, Department of Labor (DOL). This service is also available by phone to assist with ideas for job specific accommodations as well as by medical condition (Job Accommodation Network, 2003).

For example, according to the Job Accommodation Network, medical employers may need to:

- provide a spring bottomed linen cart. Make patient lifting and transfer devices available. Make wheelchairs, scooters, industrial tricycles, or golf carts available if walking long distances is required.
- Train employees on proper lifting techniques and on proper use of patient lifting and transfer devices. Provide powered beds for transporting patients
- Provide a height adjustable desk and ergonomic task chairs to fit use for different people (Job Accommodation Network, 2003, p. 4).
Case Management of Work Related Musculoskeletal Disorders

According to the American Association of Occupational Health Nurses (AAOHN, 2004) position statement on the OEHN as a case manager, effective occupational health and safety programs help control costs associated with employee injury and illness (AAOHN, 2004). Proactive OEHNs can help to anticipate the needs of the injured worker and facilitate the early return to work and recovery. Case management includes coordination of specialty referral, ensuring accurate diagnosis communicated to stakeholders, assessment of consistent treatment plans, and facilitation of communication for employer and employee.

The employer policies determine the role of the OEHN and the referral protocol for medical management. In states where repetitive injuries are considered compensable and eligible for workers’ compensation benefits, specialty referral by the treating physician of record may consist of orthopedic, neurosurgical, or physical medicine and rehabilitation (PMR). Accurate diagnosis will provide treatment progression and appropriate modalities (Bigos, et al., 1994).

The literature is highly variable for classifications of spine disorders, which makes it difficult to compare the outcomes of the research (Frank, et al., 1996). Identification of characteristics to predict the course of clinical outcomes must be monitored. Case managers must be assessing the treatment outcomes in order to identify psychosocial factors that may delay recovery (i.e. job dissatisfaction)(Thorson, et. al., 1994).
An interdisciplinary approach, considering the diagnosis of acute vs. chronic care will help to successfully guide rehabilitation (Thorson, et al., 1994). The case manager is in a position to collaborate with the manager, treating physician, healthcare providers (i.e. physical therapists), and employee to coordinate treatment plans and work-related activities.

In a study by Gaines and Hegmann (1999), the presence of Waddell's non-organic signs were used as a predictor for acute LBP patients to return to work. Previously mentioned was Waddell's clinical tool, a questionnaire designed to indicate the presence of abnormal illness behavior by identifying physical signs or symptom descriptions that are non-organic in nature (Main and Waddell, 2004). A positive answer to these questions and exams are credited with "helping identify psychosocial factors of risk, these signs and symptoms are believed to be more highly associated with aspects of distress and illness behavior than physical pathology in patients with chronic LBP" (Fritz, 2000, p. 3). The results, in this study indicated that patients who exhibited Waddell signs took four times longer to return to work. An active rehabilitation and return to work program is proposed by the evidence review conducted by Waddell and Burton (2000).

The OEHN must be mindful of the prospect of delayed recovery in planning return to work assignments. In addition, familiarity with the physical demands of the job facilitates the HCW's return to work. Information, about the physical demands of the job is conveyed to the
healthcare provider and used by the OEHN to coordinate the transitional
duty. Previously collected baseline data will be useful for the OEHN to
compare with the need for assignment and placement of the injured
worker (Rogers, 2003). An early return to work assignment, coordinated
by the OEHN, consists of working with the supervisor to modify any
components of the job that would interfere with timely healing. This may
include reduced physical demands, reduced hours, and additional
assigned staff to provide physical functional support for manual tasks.
Employer commitment to meet the medical provider restrictions results in
an earlier return to work and to improved function for the HCW (Burton,
1997).
CHAPTER VI
DISCUSSION AND CONCLUSIONS

The successful management of OLBP in HCWs requires discussion and implementation of the best policies/guidelines, practices available to minimize identified risk factors, and recommendations for future research. 

Policy/Guidelines

Agency specific published guidelines or policies to facilitate the management of HCW MSDs should be reviewed (Figure 7.1). The guideline for nursing homes, "Ergonomics for the Prevention of Musculoskeletal Disorders" (OSHA, 2002) is relevant, comprehensive and recommended for implementation. The document references the "Patient Care Ergonomic Resource Guideline – Safe Patient Handling and Movement", (Nelson, 2001), and has adopted the patient positioning and transfer algorithms found in Nelson’s information. This results in added value to the practitioner if they are aware the guideline exist. Many of the component recommendations are from the "Elements of an Ergonomic Program" (Cohen et al., 1997). Also, another guideline "Musculoskeletal Disorders in the Workplace: Low Back and Upper Extremities" developed by a multidisciplinary panel uses a scientific basis for connecting musculoskeletal disorders with the workplace, considering people, job tasks, and work environments. It includes recommendations for actions to consider on the basis of current information and for closing information gaps (Barondess, Cullen, and Lateur, 2001).
### Figure 6.1

**Policy and Guideline Agency Summary**

<table>
<thead>
<tr>
<th>Agency/Author</th>
<th>Guideline</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Safety Center- Veteran’s Administration, Tampa, Florida, 2001</td>
<td>“Patient Care Ergonomic Resource Guideline – Safe Patient Handling and Movement”</td>
<td>Comprehensive program components to manage risks, interventions in patient handling in healthcare delivery</td>
</tr>
<tr>
<td>Occupational Health and Safety Administration, 2002</td>
<td>“Ergonomics for the Prevention of Musculoskeletal Disorders”</td>
<td>Comprehensive program components to manage risks, interventions to prevent musculoskeletal disorders (MSDs) in healthcare delivery</td>
</tr>
<tr>
<td>Institute of Medicine (IOM), 2001</td>
<td>“Musculoskeletal Disorders in the Workplace: Low Back and Upper Extremities”</td>
<td>Publication on musculoskeletal disorders</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 1998</td>
<td>“Clinical Practice Guideline: Acute low back problems in adults”</td>
<td>Clinical practice guideline on medical management of MSDs</td>
</tr>
<tr>
<td>American Association of Occupational Health Nurses (AAOHN)</td>
<td>Ergo resources</td>
<td>Information and links for MSDs management and ergonomic information for nurses</td>
</tr>
<tr>
<td>National Guideline Clearinghouse</td>
<td>Publish guidelines by maintaining the database with funds from grants of NIOSH funded researchers</td>
<td>Comprehensive database of evidence-based clinical practice guidelines and related documents.</td>
</tr>
<tr>
<td>American College of Occupational and Environmental Medicine</td>
<td>“Employee Health Services for Healthcare Facilities”</td>
<td>Overview for providing occupational health services to healthcare workers</td>
</tr>
</tbody>
</table>
The Agency for Health Care Policy and Research (AHCPR) was instrumental in helping establish one of the first recognized guidelines on managing adult low back pain. It was developed and published in 1994. "A revised guideline Clinical Practice Guideline: Acute low back problems in adults is now available and recommended for clinicians and the treatment for LBP (Waddell and Burton, 2000). The Quebec Task Force Committee provided results that recommended validation for classification and for a wider adoption of consistent diagnosis and classification as it relates to LBP (Atlas, Deyo, Patrick, Convery, Keller, and Singer, 1996). This information needs to be distributed and implemented into occupational health services and providers.

Prescription meds, such as muscle relaxants and opioid analgesics, appear to be no more effective than non-steroidal anti-inflammatory and over the counter acetaminophen (Frank, et al., 1996). Insurance companies are interested in practice guidelines as they guide payment decisions. More studies are needed to determine if practice guidelines work best and at what level (primary care physicians, etc) (Frank, et al., 1996). The ability to provide good research is based on standardization and consistent reporting in a designated, validated, statistically significant manner.

The AAOHN website contains resources and links to ergonomic topics that include management commitment, employee involvement, program management, worksite analysis, hazard prevention and control,
education and training, and medical management. The web site is set up to refer visitors to other links (many of which are included in this paper) providing specific topics related to the management of WRMSDs (AAOHN, 2004). This information may be more widely used due to its link with a professional organization.

The National Guideline Clearinghouse (NGC) is a comprehensive database of evidence-based clinical practice guidelines and related documents. NGC is an initiative of the Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services. This Clearinghouse can be used as a "mechanism for obtaining objective detailed information on clinical practice guidelines and to further their dissemination, implementation, and use. " Maintaining databases containing the collaborative efforts of experts often operating with funds from grants of NIOSH funded researchers" (National Clearinghouse Guideline, 2004) is recommended.

On the American College of Occupational and Environmental Medicine (ACOEM) website, an evidence based statements section addresses the guidelines for Employee Health Services for Healthcare Facilities. The use of ergonomic committees and surveys (Ergo Web), and the development of lifting teams may be helpful in addressing ergonomic issues (Ergonomics, 1998). This is not a useful guideline as it was last revised in 1998, there is minimal information found on ergonomics that is specific to the HCW.
Managing Occupational Musculoskeletal Injury

Practice

Recommendations for identifying associated risk factors, injury prevention, and rehabilitation are being published in the literature, incorporated into guidelines from various federal and state agencies, implemented into healthcare systems, and posted on web sites devoted to safety and health activities. Recommendations for best practices can be developed by using this readily accessible information.

Recommendation for Best Practices for Patient Lifting Tasks

The published documents related to the healthcare industry that represent comprehensive program components to manage patient lifting tasks are the “Patient Care Ergonomic Resource Guideline – Safe Patient Handling and Movement”, (Nelson, 2001), the “Handle with Care” (Workers Compensation Board of British Columbia, 2003) and the “HealthCare Wide Hazards Module-Ergonomics” (Ergonomics, 2004). Best practices for patient lifting uses appropriate mechanical transfer and lifting devices that eliminate manual lifting, dedicated lift teams, and components to increase awareness, ergonomic programs, education and training, and organizational commitment (Trinkoff, et al., 2003).

Recommendations for Best Practices for Interventions

The published documents related to the healthcare industry that represent comprehensive program components to manage interventions are “Patient Care Ergonomic Resource Guideline – Safe Patient Handling and Movement”, (Nelson, 2001), and “Intervention Strategies to Reduce
MSDs Associated with Patient Handling: A Systematic Review "(Hignett, et al., 2003). The best practice recommendations for interventions are multifactorial. Strategies include risk assessments, equipment provision, design and evaluation, and work site organizational culture and environmental design changes. Group discussion of stakeholders with the implementation of a monitoring/audit system facilitate a successful outcome in injury prevention. The least effective approach is technique training and healthcare management should review the current strategies and revise as appropriate (Hignett, et al., 2003).

Future Research

Research topics should include investigating why injuries continue to occur when equipment for patient lifting is available, addressing any perceptions that injury is "just part of the job", and continuing to evaluate the effectiveness of education and training related to minimizing WRMSDs.

According to the recent article by van Tulder, et al., 2004, the process for the development of primary care guidelines for LBP need to be improved. A standardized process for all research priorities, guidelines, and program recommendations should be evaluated for quality and consistency (van Tulder, et al., 2004).

The implementation of standardized primary care guidelines by occupational health care providers may successfully control costs and reduce delayed recovery in workers with WRMSDs. Additional research is
needed to determine if “best practices” provide successful medical outcomes in healthcare workers with WRMSDs. Evaluation of an organization’s commitment to safety, education and training, and worker accountability is recommended. Topics should include determining why some healthcare employers require nurses to lift 50 pounds, ideal time intervals for education and training (orientation, annually, or quarterly), as well as what organizations must do to ensure workers do not deviate from safe practices.

Gaps in the Literature

Gaps cited in available literature conclude that more evidence-based results and outcomes, for the management of LBP, WRMSDs, in HCWs are warranted. The first guideline, “Clinical Practice Guideline: Acute low back problems in adults”, referenced as being evidence-based to manage LBP (Bigos, et al., 1994) continues as the most recognized guideline and is referenced in many of the guidelines that have followed by other agencies. Carefully controlled studies are needed to determine the care, cost, individual predictors, active case management, and rehabilitative efforts for management of LBP (Waddell and Burton, 2000).

Evidence-based medicine gaps remain problematic as most researchers have focused in on only one etiological factor. WRMSDs as it relates to LBP, continues to require more research. Gaps in the treatment of LBP, variables in the interventions for management, recommendations to determine the best provider or health services to utilize for treatment, is
being addressed. Some OEHNs are not familiar with the information and have not incorporated it into practice. Efforts to bridge this gap in worksite implementation may include OEHNs attending local, state, and national conferences that provide speakers that have published information on WRMSD identification, prevention and protection, and visiting worksites that are “best practice” facilities, and mentoring.

In conclusion, the management of occupational musculoskeletal injury in healthcare workers is an ongoing problem in healthcare delivery systems. Work-related musculoskeletal disorders (WRMSDs) can be related to acute injury or cumulative, repetitive tasks. The largest group of WRMSDs experienced by healthcare workers are back injuries which represent the highest costs in prevention, protection, and rehabilitation. The multifactorial risks associated with WRMSDs require multifaceted intervention efforts by the OEHN. One of the biggest risks identified in healthcare workers is patient care handling and lifting tasks. The OEHN can be instrumental in minimizing or eliminating identified lifting hazards, establishing programs to assess the health of the worker, and educating employees at risk for WRMSDs. They can also provide the appropriate health surveillance and case management of affected employees. The OEHN is the conduit for change and is able to implement interventions and promote the health and safety of HCWs performing patient care handling and lifting activities. Continued research will provide avenues for prevention, improved diagnosis, treatment, and rehabilitation of HCWs.
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sustaining WRMSDs.
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APPENDICES

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Appendix A

Algorithm 1: Transfer to and from: Bed to Chair, Chair to Toilet, Chair to Chair, or Car to Chair

Start Here

- Can patient bear weight?
  - Fully: Caregiver assistance not needed; Stand by for safety as needed.
  - Partially: Stand and pivot technique using a gait/transfer belt (1 caregiver) or powered standing assist lift (1 caregiver).

- Is the patient cooperative?
  - Yes: Use full body sling lift and 2 caregivers.
  - No: For seated transfer aid, must have chair with arms that recess or are removable.

- Does the patient have upper extremity strength?
  - Yes: Seated transfer aid; may use gait/transfer belt until the patient is proficient in completing transfer independently.
  - No: For full body sling lift, select a lift that was specifically designed to access a patient from the car (if the car is the starting or ending destination).

Source: Used by permission from Audrey Nelson, Patient Safety Center (personal communication 10/27/04).
Algorithm 2: Lateral Transfer to and from: Bed to Stretcher, Trolley

Start Here

Can patient assist?

Yes

> 200 Pounds: Use friction reducing device* and 3 caregivers.

Partially Able or Not at All Able

< 200 Pounds: Use friction reducing device*

Caregiver assistance not needed. Stand by for safety as needed.

Surfaces should be even for all lateral patient moves.

For patients with Stage III or IV pressure ulcers, care must be taken to avoid shearing force.

Source: Used by permission from Audrey Nelson, Patient Safety Center (personal communication 10/2/04).
Algorithm 3: Transfer to and from: Chair to Stretcher or Chair to Exam Table

Start Here

Is the patient cooperative?

Yes

Can the patient bear weight?

Fully

Caregiver assistance not needed; Stand by for safety as needed.

Partially

If exam table/stretcher can be positioned to a low level, use non-powered stand assist. If not, use a full body sling lift.

No

Use full body sling lift and 2 or more caregivers.

Source: Used by permission from Audrey Nelson, Patient Safety Center (personal communication 10/27/04).
Appendix D

Algorithm 4: Reposition in Bed: Side-to-Side, Up in Bed

1. Caregiver assistance not needed; patient may/may not use positioning aid.
2. Encourage patient to assist using a positioning aid or cues.
3. Use a full body sling lift or friction reducing device and 2 or more caregivers.
4. < 200 Pounds: Use a friction reducing device and 2-3 caregivers.
5. > 200 Pounds: Use a friction reducing device and at least 3 caregivers.

- This is not a one person task: DO NOT PULL FROM HEAD OF BED.
- When pulling a patient up in bed, the bed should be flat or in a Trendelenburg position to aid in gravity, with the side rail down.
- For patients with Stage III or IV pressure ulcers, care should be taken to avoid shearing force.
- The height of the bed should be appropriate for staff safety (at the elbows).
- If the patient can assist when repositioning "up in bed," ask the patient to flex the knees and push on the count of three.

Source: Used by permission from Audrey Nelson, Patient Safety Center (personal communication 10/27/04).
Appendix E

Algorithm 5: Reposition in Chair: Wheelchair and Dependency Chair

Start Here

Can patient assist?

- Partially
  - Caregiver assistance not needed; Stand by for safety as needed.

- Fully
  - If patient has upper extremity strength in both arms, have patient lift up while caregiver pushes knees to reposition.
  - If patient lacks sensation, cues may be needed to remind patient to reposition.

Does chair recline?

- Yes
  - Recline chair and use a friction reducing device and 2 caregivers.

- No

  Is patient Cooperative?

  - Yes
    - Use full body sling lift or non-powered stand assist aid and 1 to 2 caregivers.
  
  - No
    - Use full body sling lift and 2 or more caregivers.

Comments:
- Take full advantage of chair functions, e.g., chair that reclines, or use or arm rest of chair to facilitate repositioning.
- Make sure the chair wheels are locked.

Source: Used by permission from Audrey Nelson, Patient Safety Center (personal communication 10/27/04).
Appendix F

Algorithm 6: Transfer a Patient Up From the Floor

Source: Used by permission from Audrey Nelson, Patient Safety Center (personal communication 10/27/04).