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by

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Abstract

Paula Marguerite van Wyk
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A comparison of manual patient transfer training in an academic and clinical environment

It has been suggested that the high risk of injury for nurses may be due in part to a lack of proper or adequate training for manual patient transfers (MPTs). Surveys from 163 student and 33 staff nurses were analyzed to determine which MPTs they perceived having received training for, use most often, and have greatest confidence performing. Overall it was found that nurses perceived being trained on four MPTs; the same four they indicated they use most often and had the greatest confidence performing. However, these MPTs are not currently taught as part of the nursing curriculum at the local university. This indicates that there is a disconnect between the local academic and clinical environments. It is suggested that more explicit and formal training is needed in both environments to promote safer patient handling tasks. Recommendations to revise training protocols at the academic and clinical environments are provided.

Dedication

This thesis is dedicated to my parents, family and friends who have stood by me throughout this process. To my parents who always held education in the highest respect and encouraged me to always strive for higher heights. To everyone for your constant love and belief in me; without which I would not be who I am today.

In Loving Memory

of my father

~ Markus Ludwig van Wjik ~
December 1937 – August 2006

who unfortunately passed during the process of my Masters.

Ik mis U. Ik houd van U.
(I miss you. I love you).

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times of need. You each are incredible individuals who are striving to achieve the highest heights and doing it so beautifully. I'm proud of you all.

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Glossary

Biomechanics – the study of how forces, both external and internal, affect the mechanics of a living body

Body Mechanics – body movements that prevent, reduce, or correct postures that are formed when performing specific tasks

Compression – a force that results in a decreased volume, or the shortening/squeezing of something

Confidence – the belief that you can successfully perform a desired behaviour

Cumulative – the accumulation over time, or successive additions of parts or elements, such as force

Dynamic – in motion, vigorously active, or forceful condition

Ergonomics – the study of how the worker relates to his or her working environment

Force – strength exerted on a person or object

Injury – tissue damage or harm suffered by a person

- **Acute Injury** – the rapid onset of tissue damage or harm

- **Chronic Injury** – tissue damage or harm occurring over an extended period of time

- **Musculoskeletal Injuries (MSIs)** – A musculoskeletal injury occurs when one or more components of the musculoskeletal system is damaged either suddenly (acute) or over time (chronic). Also referred to as musculoskeletal disorders, repetitive strain/stress injuries, cumulative trauma disorders, overuse or overexertion injuries, degenerative joint diseases and soft tissue injuries

- **Work-related Musculoskeletal Injuries (WMSIs)** – a musculoskeletal injury (MSI) that occurs as a result of work activities

Kinematics – the study of the motion of a body or system of bodies without reference given to its mass or the forces acting on it

Kinetics – the study of motion of a body or system of bodies with consideration to forces that cause motions

Load – the amount or quantity of a person or object that is being carried or manipulated

Maximal Acceptable Weight – the greatest amount of weight considered acceptable to manipulate while performing a specific task. If the amount of weight to be manipulated is above the maximal acceptable weight limit then the risk of injury increases.

Neutral Body Postures – when the body, body segment, or joints are kept in alignment with the anatomical position

Overexertion – too much effort or force placed upon the body, which can lead to tissue fatigue and damage

Patient Transfer (PT) – the term referring to the combination of a lift, relocation, and lower of a patient, thus transferring the patient from one location to another

- **Manual Patient Transfer (MPT)** – when a person or group of people perform a PT without the aid of a mechanical lift device

Patient Lift – the act of elevating a person or an object

Peak – the highest or maximum value, such as force, during a specified time interval

Self-efficacy – an individual's perception of their ability to perform a task successfully (also see confidence)

Staff Nurse – a nurse who has completed her educational training, and who works in a clinical setting

Student Nurse – a student who is currently registered in an accredited nursing program to become a practicing nurse

Static – lacking movement, a fixed or stationary condition

Chapter I
Introduction

For the last few decades, a primary focus of biomechanics and ergonomics research has been decreasing occupational musculoskeletal injuries. Work-related musculoskeletal injuries (WMSIs) harm workers, and are problematic for employers and society as injuries can result in a loss of productivity and significant economic burdens. A musculoskeletal injury (MSI) occurs when one or more components of the musculoskeletal system is damaged either suddenly (acute) or over time (chronic). Tasks requiring body movements such as lifting, lowering, twisting, bending, carrying, pushing and pulling can lead to stress on, and trauma to the musculoskeletal system.

In 2006, the United States Department of Labor Bureau of Labor Statistics reported the health care sector among the top fourteen industries with at least 100,000 injuries and illnesses per year combined (BLS, 2006). Nurses perform tasks that are physically demanding, due to the amount of weight they have to maneuver as their bodies are being forced to perform bends and twists (Smedley et al., 1995), and due to sudden movements which are often performed in non-neutral postures (Engkvist et al., 1998). Many studies have attributed the primary reason for WMSIs among nurses to be due to patient lifts (PTs) and transfers (Owen et al., 1992; Owen and Garg 1993; Yassi et al., 1995; Yassi et al., 2001; Nelson et al., 2003; Nelson et al., 2006). Manual patient transfers (MPTs), which include lifting, relocating, and lowering patients, impose a tremendous physical burden on nurses as the forces required to complete these tasks often exceed the physical capabilities of the nurses (Marras et al., 1999; de Castro et al., 2006).

In an attempt to help reduce the potential for WMSIs due to PTs, engineering controls, such as mechanical lift-assists, have been introduced to the industry.

Mechanical lifts have shown to reduce the high peak forces that cause acute injuries when performing a PT manually (Smedley et al., 1995; Daynard et al., 2001). Using mechanical lifts is associated with an increased amount of time to complete the PT task (Garg et al., 1991a; Daynard et al., 2001; Yassi et al., 2001). However, even when mechanical lifts are available, Garg and Owen (1992) found that these devices are not routinely used by nurses to perform PTs. In other words, although MPTs present an increased risk of injury, nurses may still prefer performing lifts manually due to the amount of time needed to use a mechanical lift.

In 1995, Yassi and colleagues interviewed nurses and found they perceived lack of training as the major cause for many WMSIs related to PTs. Training typically takes place in academic and clinical environments. Clinical placements afford student nurses the opportunities to apply theories taught in the classroom and to define their skills (Astin et al., 2005). Currently, there is a lack of knowledge of how to best facilitate the learning experiences of student nurses. This may be caused by a disconnect in the approaches used and the content delivered by the personnel responsible for training at the academic institutions, and the techniques introduced in clinical placement locations. Senior nurses interviewed by Astin and colleagues (2005) felt that the expectations they held regarding student nurses differed greatly from those at academic institutions, and that this should be a major cause for concern. This disconnect can leave student nurses on clinical placements feeling pressured to adapt to the senior nurse, and to neglect lessons taught to them in the classroom or lab setting (Hayes et al., 2006). Bridging any gaps in training approaches and content that do exist between theory and practice need to be addressed in both environments. Knowledge gained in this way will be useful for creating a

curriculum that helps student nurses understand what is expected of them, and helps them to be more fully prepared and well rounded. This will also ultimately improve the quality of care patients receive (Brammer, 2006).

Traditionally, nurses are taught and trained to perform PTs using proper body mechanics for lifting (de Castro et al., 2006). However, these techniques were created based on lifting boxes, which differ from patients in various important and striking ways. Unlike boxes, people do not come with conveniently placed and constructed handles, and the mass of most of the people in the population is well above any recommended weight limits proposed in the literature (Waters et al., 2006). Due to the shape of the human body, as well as other environmental factors (e.g. space, the presence of other equipment), a patient cannot always be kept close to a nurse's body, and awkward body postures can therefore not be avoided (Waters et al., 2006). As such, the training of nurses with proper lifting techniques and body mechanics is not sufficient to alleviate nurses' risk of work-related injury. Training, performed by experienced staff nurses, that incorporates proper lifting mechanics and techniques developed and tested in the field, appears warranted if nurse preparedness and quality of care are to be improved in the future.

Biomechanical studies are useful as they can evaluate proper lifting techniques and assess risks of injury. Previous biomechanical studies evaluating PTs have largely been conducted in a laboratory setting (Garg et al., 1991a; Garg et al., 1991b; Garg and Owen, 1992; Marras et al., 1999; Skotte et al., 2002). Studies performed in a laboratory lack the authenticity of a hospital setting in terms of environmental and time constraints. For example, most studies involve volunteers acting as the patient to be transferred in

each evaluated task. In the studies by Garg and colleagues (1991a, b) the patient was also a subject in the study. Collecting data of nurses performing tasks in a laboratory setting is not necessarily an accurate representation of what occurs in a nurses' natural environment such as a hospital. However, it does prevent some potential difficulties. For example, in clinical settings nurses complete tasks while overcoming obstacles such as space restrictions, time limitations, and medical equipment. Thus, the nurses' natural environment should be taken into consideration when assessing risk of injury as it can create more risk factors.

Owens and colleagues (1999) surveyed student nurses to determine what they were taught regarding lifting patients and what lifting methods nurse educators observed in a clinical setting. The study revealed that there was a significant difference between what the nurse educators taught and what they observed. They suggested that nurses must first acquire relevant knowledge at school and then put into practice what they have learned in clinical settings in a consistent way. However, this assumes that nurses were being taught similar lessons at the university as are practiced at the hospital. If this were the case, the skills the nurses were taught would be reinforced, and fewer stressful lifting situations would result. If nurses are taught a variety of appropriate PT methods, and the importance of proper body mechanics is reinforced well, nurses should be equipped to identify potential hazards and make decisions in the best interest of their own safety and that of their patients. Unfortunately, the number of and risk of injuries are not reduced based solely on an improved education program (classroom/laboratory). There are more underlying issues that need to be addressed, for example, the ability for nurses to enhance their skills through practice.

Practice not only allows a person to enhance their skills but also allows them to develop their perceived confidence to perform a task well. When a nurse receives information and training at school, and the opportunity to define and enhance these skills through practice in the clinical environment is provided, confidence in their ability to safely transfer patients should be increased. Having confidence helps a person remain calm and relaxed when performing the task required, facilitates concentration, and results in the ability to perform tasks with a higher degree of skill and efficiency (Weinberg and Gould, 2007). Therefore, it is important to evaluate the amount and type of training nurses receive in theory and practice, and how this training relates to their self-confidence for successfully manually lifting a patient without harming the patient or themselves.

The purposes of this study are to answer the following research questions:

1. What types of MPT lifting techniques do nurses receive training for at the local University and the local rural Hospital?

Hypothesis 1: Nurses will indicate more often that they have not received training for the MPT lifting techniques depicted.

Hypothesis 2: Of the lifts nurses indicate they received training for, the training will have occurred most often in a clinical setting.

2. What types of MPT lifting techniques are used most often by student nurses and staff nurses?

Hypothesis 3: Nurses use the MPT lifting techniques without an assistance device most often. (Note: an assistance device refers to a gait-belt or a transfer belt and not a mechanical lift assist).

3. What types of MPT lifting techniques are nurses most confident in, in terms of their ability to perform them accurately and without harming the patients or themselves?

Hypothesis 4: Nurses will have the most confidence with MPT lifting techniques that they have received training for.

Hypothesis 5: Nurses will have the most confidence with MPT lifting techniques they use most often.

Note: It was explained that training occurring in the academic environment referred to information presented in the classroom, laboratory, and in textbooks. Working in the clinical environment while on placement, even in the presence of an academic instructor, was considered as information presented in the clinical environment.

Chapter II
Review of Literature

Work-Related Musculoskeletal Injuries

For the last few decades, a primary focus of biomechanics and ergonomics research has been decreasing occupational musculoskeletal injuries (MSIs). Although several advancements have been made, many injuries are still prevalent. Punnett and Wegman (2004) reviewed epidemiological evidence of work-related musculoskeletal injuries (WMSIs) and found that they are the single largest category of occupational illness. WMSIs harm workers, and are problematic for employers and society, as injuries can result in a loss of productivity and significant economic burdens. They also found other factors that may cause an increased risk of injury for workers are psychological (e.g. levels of stress, happiness with job) and demographical (e.g. age, gender, ethnicity). While each risk factor that increases the chance of suffering a WMSI is important, this thesis focused primarily on work-related factors.

Defining Musculoskeletal Injuries

There are several work-related risk factors that can increase a worker's risk of injury. Before understanding the related risk factors, a definition of a MSI is needed. A MSI occurs when one or more components of the musculoskeletal system is damaged, either suddenly (acute) or over time (chronic). The components of the musculoskeletal system that may be affected include: muscles, ligaments, tendons, joint connective tissues, supporting blood vessels and peripheral nerves (Punnett and Wegman, 2004). Tasks requiring body movements such as: lifting, lowering, twisting, bending, holding, flexing and extending can lead to stress and trauma on the musculoskeletal system,

resulting in damage, and thus an injury. Damage often occurs in the form of: strains, sprains, dislocations, irritations and inflammations (NIOSH, 1991).

Musculoskeletal Injury Risk Factors

Although MSIs are not uniquely caused by work-related factors, there are several job features that can increase a worker's risk of injury. One of the most easily observed risk factors is the non-neutral body postures a worker is forced to, or chooses to, perform their task(s) in (Punnett and Wegman, 2004). Designs of workplaces and workspaces can present task performance limitations that force a worker to adopt a non-neutral body posture (Craig et al., 2003). For example, an automotive line worker may need to install specific connectors for an engine while a car hangs overhead and continues to move down the line, necessitating walking. Other parts that are already in place leave narrow openings for that worker to place his or her hands, further defining the posture that must be adopted. When a worker chooses to perform a task with an awkward body posture, they usually do so to save time and energy. Although in the short term, saving time and energy may seem more efficient, over time this could cause wear and tear on the body and lead to the development of MSIs. One possible explanation why non-neutral body postures increase the risk of injury is that when out of neutral range, additional loads are placed on tissues, which can lead to fatigue and tissue damage.

Overexertion has been found to be one of the most prevalent risk factors associated with WMSIs, with approximately one in 20 workers affected (NIOSH, 1981; Craig et al., 2003). In general, overexertion WMSIs occur as a result of too much effort and force placed upon the body, which can lead to fatigue and damage. Tasks involving the manipulation and maneuvering of materials create situations with increased exposures

and disabling events that result in injuries (Bureau of Labor Statistics, 1999). Sizer and colleagues (2004) found a higher risk of developing ergonomic pain in relation to WMSIs among manual material handlers. The tasks that they highlighted as creating an increased risk of injury are holding, carrying or turning objects, pushing or pulling objects, and most noteworthy, lifting objects. NIOSH (1981) published a report stating that approximately 67% of exertion claims involved lifting tasks, highlighting that lifting tasks create an increased risk of injury.

In addition to the possible awkward postures and overexertion risk factors that lifting tasks can be associated with, the body can also suffer from fatigue and damage due to the high frequency of some lifting tasks. With an increased frequency of lifts there is not only an increased risk of injury (Craig et al., 2003), but also an increased severity of injury (NIOSH, 1981). For some occupational tasks, a high frequency of lifts coincides with a rapid work pace (Punnett and Wegman, 2004). A rapid work pace, combined with insufficient recovery time (Punnett and Wegman, 2004), can more easily fatigue the body, also contributing to an increased risk of injury for a worker. Sizer and colleagues (2004) found that, in addition to repetitive motions of frequent lifting, the average weight of the object being lifted significantly increased the risk of injury for a worker. The body can be fatigued when only the frequency of lifts is increased. However, if the lifted object also bears some weight this can increase the amount of damage suffered. As the frequency of lifts increases, the maximal acceptable weight of the lifted object is recommended to decrease, in order to reduce the risk of WMSIs to a worker (Garg and Saxena, 1979). Additionally, the further away the object to be lifted is from the worker's body, the lower the maximal acceptable weight. Being further from the body also

increases the risk of injury, as awkward postures may result. It is important to note that the level of risk associated with each of these factors can differ between various tasks and occupations.

Industries with High Levels of Work-Related Musculoskeletal Injuries

Bernard (1997) reported on the occupations that had the highest incidence rates of WMSIs as a result of overexertion. He reported that occupations involving scheduled air transportation, manufacturing of travel trailers and campers, and patient care facilities were associated with higher rates of injury. Pope and colleagues (1991) looked at WMSIs related to the back and lower limbs. They listed such occupations as truck drivers, crane operators, airplane baggage handlers, warehouse workers, construction trades, nurses, nursing aides, and other patient-care workers as having a disproportionate number of back and lower limb injuries. When looking at occupational risk factors, Smedley and colleagues (2003) found the physical factors such as reaching, pushing and pulling, as often seen with patient handling tasks nurses perform, are important areas for concern when developing injury risk reduction strategies.

Musculoskeletal Injuries and the Health Care Sector

A common trend among these three reports by Bernard (1997), Pope et al. (1991), and Smedley et al. (2003), is that each listed jobs associated with the health care sector as having an increased risk of WMSIs. The United States Department of Labor 2006 Bureau of Labor Statistics report listed the health care sector among the top fourteen industries with reports of at least 100,000 injuries and illness per year combined (BLS, 2006).

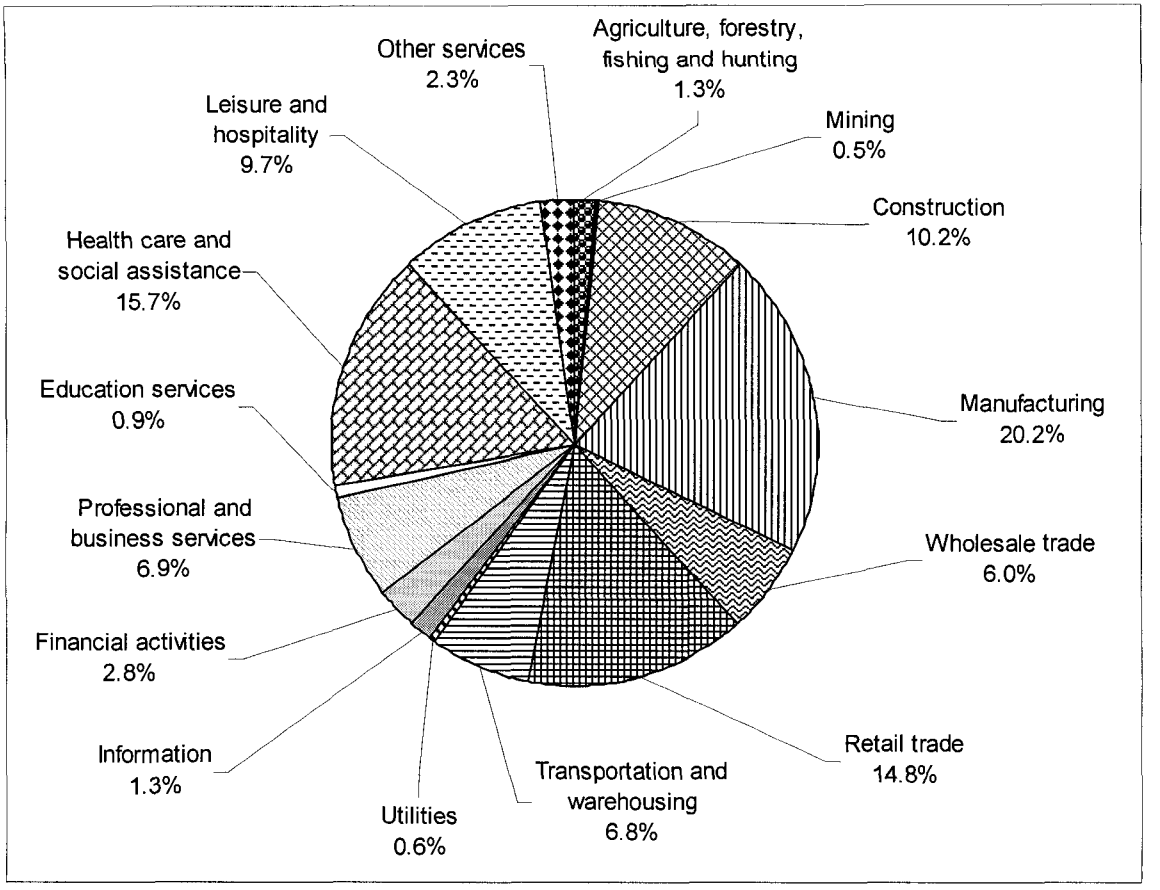


Figure 1: The percentage of non-fatal work-related injuries according to the data collected in 2005 by industry sector (U.S. Bureau of Labor Statistics (BLS), 2006).

Figure 1 above depicts the manufacturing sector (20 %), the health care and social assistance sector (16 %), and the retail trade sector (15 %), as the top three sectors with the largest shares of the work-related injuries. The health care and social assistance sectors are made up of four industries: ambulatory health care services, hospitals, nursing and residential care facilities, and social assistance (BLS, 2006). It should be noted that three of these four industries are primarily related to the health care sector: hospitals, nursing and residential care facilities, and ambulatory health care services. These were among the 14 industries in 2005 that reported 100,000 or more cases of injury or illness (BLS, 2006). Since 2003, when the North American Industry Classification System

(NAICS) began surveying businesses, hospitals have been the leading industry by reporting at least 100,000 injury or illness cases; and, in 2005, hospitals reported 281,500 cases (BLS, 2006). Health care workers experience even higher rates of WMSIs compared to traditionally hazardous and high risk occupations such as construction and mining (Evanoff et al., 2003; Li et al., 2004; de Castro, 2006; Waters et al., 2006).

Under-Reporting of Musculoskeletal Injuries among Nurses

Nurses employed in the health care sector commonly report three categories of occupational injuries: neck, shoulder and back (Lipscomb et al., 2004). In addition, it is believed that the reports represent a low estimate of the actual number of injuries sustained (Collins, 1990; McGuire and Dewar, 1995; Retsas and Pinikahana, 2000; Morse et al., 2005; Nelson et al., 2006). Numerous suggestions have been documented in the literature as to why nurses do not always report an injury: (1) often workers are not aware an injury has taken place until some time after the event (McGuire and Dewar, 1995; Retsas and Pinikahana, 2000), (2) they are unsure if the pain or discomfort experienced is a result of an injury severe enough to necessitate going home (Collins, 1990; McGuire and Dewar, 1995), (3) they fear that reporting will result in a dismissal of employment (Collins, 1990; Retsas and Pinikahana, 2000), (4) the ideal that nurses are to deny their own health and safety to ensure that patient care is the primary concern (Collins, 1990), and (5) the pressure from fellow nurses not to take time off due to the resultant increased workload for others (Collins, 1990). Even with the underestimated reporting the number of injuries experienced they are still among the top industries with the most reported WMSIs, making them a high priority area of research and remediation.

Nursing and Musculoskeletal Injuries

The role of a nurse in a variety of different working environments requires many physically demanding tasks to be performed that place workers at a higher risk for WMSIs (Janowitz et al., 2006). The high risk of injuries associated with providing patient care is due to the complexity and assortment of variables encompassed by the tasks involved (de Castro, 2006). These include: awkward postures, excessive back and shoulder loading due to lifting heavy loads, excessive forces applied during pushing and pulling of people and/or objects, and working long hours and/or shift work (Waters et al., 2006). These risk factors are a combination of both the physical demands of the tasks and the work organizational factors; both of which Trinkoff and colleagues (2002) believe create the high prevalence of WMSIs in nursing.

Work Organizational - Risk Factors

Time restriction is a work organizational factor that can act as a stressor because it places intense pressure on nurses when trying to perform important tasks which are often intensified by a heavy workload (Shamian et al., 2002). When being rushed to complete a task, certain steps may be avoided in order to save time; for example, fully tightening safety restraints. Nurses may put their own well being at risk if it means they can perform a task in less time. This is not only dangerous for the nurse performing the task but the safety and security of the patient involved is also jeopardized. Having many tasks to perform during one shift is what creates a heavy workload. Shamian and colleagues (2002) gathered input from nurses regarding workplace health and safety and reported one nurse's description of the high pace work environment as "trying to beat the clock" (pg 3), and having "eight hours to do a nine hour job" (pg 3). When a nurse has many

tasks to perform in a short amount of time, less attention is provided to ensuring the task is completed with safety as a priority.

Although time is a concern, space can also be a restriction. The physical environment a nurse is situated in can pose further restrictions by limiting movement and positioning possibilities, often forcing nurses to work in dangerous postures (de Castro, 2006). The most common environmental barriers that dictate potentially risky postures and movements are: hospital furniture, assistive devices and other hospital equipment, and the presence of other hospital staff (de Castro, 2006).

The working environment can also be perceived as stressful as an uncertainty regarding current employment situations may exist (Shamian et al., 2002). Trinkoff and colleagues (2002) discuss that, in addition to increased injury rates, there has also been a trend toward lower staffing rates for nurses due to changes in the health care system. The inadequate number of staff available to work is due to lower staffing rates as a result of an administrative decision to reduce the hiring of nurses. In 2008, about only 50% of the student nurses from the Faculty of Nursing program at the local University were employed upon graduation. The reduction in the number of nurses being hired is not a favourable situation, but necessary due to a lack of funding. An inadequate or reduced nursing staff leads to even higher rates of WMSIs (Lipscomb et al., 2004), and can be viwed as contributing to an increased workload (Shamian et al., 2002) as there are fewer people to share the work. In other words, a nurse may have to take on additional job tasks to make up for the lack of workers available. Lost workdays due to WMSIs contribute to decreased staff availability (Trinkoff et al., 2003a). WMSIs have also been believed to contribute to nurse turnover (Trinkoff et al., 2003a). Trinkoff and colleagues

(2003b) found that 6%, 8%, and 11% of nurses who experienced neck, shoulder, or back WMSIs, respectively, reported changing jobs. In a seven day period, Shamian and Villeneuve (2000) found that greater than 8% of the nurses are absent from work. Nurses taking time off from work due to illness or injury creates a reduced staffing situation, forcing the nurses who are working to take on additional tasks on top of an already time-restricted and heavy workload. These conditions only create more stress and an increased risk of experiencing a WMSI. Time off work to recover from a WMSI has an adverse effect by continually prolonging the shortage of nursing staff available. Although organizational changes need to be made to help increase staffing rates, the physical attributes of the tasks also need to be considered.

Sex, Age, Length of Employment – Risk Factors

Additional factors that may decrease physical capacity are sex, age, and length of employment. Myers and colleagues (2002) reported that males showed no overall association with risk of injury. However, the majority of nurses are female. It has been suggested that males may steer away from becoming a nurse as the media has reinforced the stereotype of nursing being a female dominated profession (Black and Juhn, 2000). Jinks and Bradley (2004) state that, traditionally, nurses have been associated with being doctor's handmaidens, sex symbols, and angels, all of which are female-based images. In 2005, the Canadian Nursing Association (CNA) released a report on the demographics of registered nurses in Canada, which included statistics stating that 95% of nurses were female. Stereotypes have been fashioned that characterize feminine traits as nurturing, caring, dependent and submissive and label masculine traits as strength, aggression, and dominance (Evans, 1997). This makes the assumption that females may have a reduced

capacity to meet the demands of the tasks they are required to perform as nurses, and thus increase their risk of a WMSI.

In a study to determine the predictors of shoulder and back injuries among nurses, Myers and colleagues (2002) found that increased age was a protective attribute. It was thought that more seniority, advanced skills and decreased manual handling workloads may explain why there is a negative association between age and risk of back and shoulder injuries among nurses (Myers et al., 2002). Additionally, a senior nurse may be more willing to ask for and receive help with tasks when they feel it is necessary. It is possible that a nurse with less seniority does not feel comfortable asking for help in an already time-restricted and heavy workload situation. In general, Myers and colleagues (2002) found that new employees, defined as less than 21 days since hire, are at an increased risk of WMSIs. They also reported that the risk of injury can be as great as eightfold for new employees, compared to more senior workers. Nursing students in clinical placements could be viewed as new employees and would therefore be at increased risk of injury as well. Clinical placements are an important learning tool for student nurses to gain experience (Andrews et al., 2006), thus it is crucial to provide nursing students with the knowledge to help prevent WMSIs from occurring, as well as ensure they are able to identify possible signs and symptoms that an injury has taken place.

Body Areas – Back and Shoulder

Persistent pain, the restriction of joint movements, and the swelling of soft tissues can indicate that a nurse may be suffering from an injury (Weber, 2006a). Complaints heard most often from nurses are related to low back pain, sciatica, rotator cuff injuries,

epicondylitis and carpal tunnel syndrome (Weber, 2006a). Two primary areas of concern are the back and shoulder regions (Myers et al., 2002; Trinkoff et al., 2002; de Castro, 2006; Waters et al., 2006). Studies have shown that low back pain and/or injury is the most frequently reported WMSI among nurses, with a prevalence ranging between 30-60% (Lagerstrom et al., 1995; Smedley et al., 1995; Trinkoff et al., 2002). Shoulder WMSIs have been reported to be as prevalent as 43-53% among nurses (Lagerstrom et al., 1995; Ando et al., 2000; Trinkoff et al., 2002). Currently, the literature is lacking information regarding nurses and shoulder MSIs. In their study of shoulder disorders and automotive assembly workers, Punnett and colleagues (2000) found shoulder pain and injury to be associated with movements and heavy loads when the arms were above shoulder height. It is plausible that the shoulder injuries nurses experience are due to manual handling activities performed with arms above shoulder height. The literature indicates that the majority of musculoskeletal pain experienced by nurses is focused on the low back (Eriksen, 2003; Maul et al., 2003). Trinkoff and colleagues (2003b) found that WMSIs of the back among nurses are related to the physical demands of tasks such as lifting and transferring patients. Retsas and Pinikahana (2000) found that approximately 40% of 269 nurses surveyed reported injuries as a result of performing manual handling activities. Among all injuries reported, approximately 34% of injuries were from lifting and almost 80% of injuries were to the back. de Castro (2006) believes that WMSIs of the back are a major concern as they can be severely debilitating for nurses. In order to decrease the risk of injury associated with nursing it is imperative to determine which tasks require large physical demands from the nurse, and attempt to eliminate the components of the tasks that are most harmful and/or risky.

Nursing, Musculoskeletal Injuries & Patient Transfers

Nursing can be considered a high risk occupation as workers in the profession are experiencing so many WMSIs. Some nurses have adopted the mindset that injuries, especially in the low back region, are 'part of the job' (de Castro et al., 2006). Several studies have attributed the primary reason for WMSIs among nurses to be due to patient lifts and transfers (Owen et al., 1992; Owen and Garg 1993; Yassi et al., 1995; Nelson et al., 2003; Yassi et al., 2001; Nelson et al., 2006). Weber (2006b) reports that WMSIs related to patient lifts and transfers affect approximately 14 injury cases per 100 employees. Yassi and colleagues (1995) found that patient lifts and transfers were the most common cause of reported back injury among nurses working at Winnipeg's Health Sciences Centre in Manitoba, Canada.

Manual Patient Transfers

Manual patient transfers (MPTs), which include lifting, relocating, and lowering of a patient, impose a tremendous physical burden on nurses as the force required to complete the task often exceeds the physical capabilities of the nurses (Marras et al., 1999; de Castro et al., 2006). Low back injuries resulting from MPTs often occur due to the unacceptably high stresses and compressive forces placed upon lumbar vertebra four, lumbar vertebra five and sacral vertebra one (Evanoff et al., 2003; Li et al., 2004). The high stresses and forces are created through a combination of the sustained awkward postures of the nurse during the task, the magnitude of the weight lifted and the unpredictable nature of the patient being lifted (Nelson et al., 2006). As the stresses and forces imposed upon the nurse increase to the point that they exceed their physical capabilities, then there is an increased risk of injury. Nurses have also expressed their

perceptions that PTs are the most physically stressful task they perform (Evanoff et al., 2003).

Mechanical Lift Devices

In an attempt to help reduce the potential for WMSIs to nurses during MPTs, engineering controls such as mechanical lift-assists have been introduced to the industry. The idea behind a mechanical lift-assist is to have nurses perform less of the transfer themselves by relying on the aid of different devices. Mechanical lifts have been shown to reduce the high peak forces that cause acute injuries when performing a PT manually (Smedley et al., 1995; Daynard et al., 2001). However, using mechanical lifts is associated with an increased amount of time to complete the PT task (Garg et al., 1991a; Daynard et al., 2001; Yassi et al., 2001). An increased amount of time to perform the task is inconvenient as nurses are already pressured to work at a fast pace (Yassi et al., 2001). When pressed for time, a nurse may not pay as much attention or rush through the steps. This may result in missing a significant component and increase not only his or her risk of injury, but also that of the patient. Also of concern is the increased amount of time spent in awkward postures due to increased task completion time (Daynard et al., 2001; Yassi et al., 2001). Attaching slings or harnesses and positioning slide devices under patients result in increasing the time a nurse spends in awkward forward flexion postures when preparing the patient and equipment for transfer (Daynard et al., 2001; Yassi et al., 2001). As a result, nurses are potentially increasing cumulative spinal load exposures, and therefore, their risk of WMSI. This can be particularly troublesome for nurses who repeat PTs and handling tasks frequently (Daynard et al., 2001).

Peak vs Cumulative Compression Injuries

WMSIs resulting from lifting tasks can occur suddenly as a result of one forceful lift, or can develop over time due to an accumulation of repetitive lifting tasks (Weber, 2006b). Limiting exposures to peak compressions would aid in the decrease of sudden acute injuries, whereas cumulative compressions need to be considered for more chronic injuries that develop over time. For example, a peak compression injury to the low back occurs when the maximum amount of force applied to spinal structures is greater than the tolerance of the structures to withstand them. However, cumulative injuries occur when the affected musculoskeletal area no longer has the capacity to recover from the incremental damage from an applied force over time (de Castro et al., 2006). Over an eight hour shift, Tuohy-Main (1997) put forward that nurses may cumulatively lift approximately 1.8 tons (~1636kg) of mass. According to the survey conducted by Retsas and Pinikahana (2000), the cumulative load nurses lift in a typical shift was between 3000 and 5000kg, which is two to three times that of what Tuohy-Main (1997) stated. The absence of early signs and symptoms of cumulative injuries make it difficult to define the actual source of the trauma as the injury may become evident during an unrelated task such as a simple household activity (de Castro et al., 2006). Most PT task injuries are cumulative in nature (Nelson et al., 2006), thus it is important to investigate the adverse effects of cumulative compressions overtime, even if the risk reduction payoffs are not immediately noticeable.

Manual Patient Transfers Preferred

Although mechanical lifts have shown to reduce peak spinal compression, Garg and Owen (1992) found that 98% of PTs are performed manually. In a study determining

why the use of mechanical patient lifts decreased, Li and colleagues (2004) found that the lack of perceived need, lack of time and lack of maneuvering space were the top reasons for non-compliance. Similarly, Evanoff et al. (2003) found the top reasons for non-use of lifts to be lack of perceived need for lifts, lack of time, and insufficient training in lift use. Even when mechanical lifts are available, Garg and Owen (1992) found that these devices are not routinely used by nurses to perform PTs. Additional reasons why nurses opt to not use mechanical lifts include: the requirements of too much physical effort for use of some aids, staff shortages which increase time pressure, concerns for patient safety, additional time requirements for the cleaning of the lifts and various parts (especially with respect to patients in isolation), part malfunctions, and the need to change batteries (Garg and Owen, 1992; Evanoff et al., 2003; Li et al., 2004). There is an additional concern for the safety of the patient being transferred if the battery happens to die while in the process of performing a lift. Therefore, many nurses perceive the use of a mechanical lift to be more burdensome than performing the task manually.

In 1995, Yassi and colleagues interviewed nurses and found they perceived lack of training as the major cause for many WMSIs related to PTs. When nurses receive little to no training on how to use a mechanical lift there is a preference to perform the lift themselves, as the manual movements assume the nurse has more control and thus confidence in transferring the patient. On the other hand, if little to no training is provided to nurses on how to perform PTs with the aid of a mechanical lift, it is possible that training nurses on how to manually transfer a patient is also neglected. If nurses do receive training on proper MPT techniques it is assumed to take place at the academic and/or clinical level.

Academic-Clinical Placement Disconnect

Little attention has been focused on the education student nurses receive at the academic level. Instead, research has been directed toward the relationship between student and senior nurses in hospital settings. To provide student nurses with practical experience, they are required to complete clinical placements that afford them the opportunities to apply theories taught in the classroom and to define their skills (Astin et al., 2005). There is growing concern on how best to facilitate the learning experiences of the student nurse. Often times the academic environment expects the students to learn key skills such as which MPTs they need to know how to perform in the clinical environment; whereas the clinical environment often assumes the academic environment has taught the student nurses at least the basics of how to perform a variety of MPTs. This may be caused by a disconnect in the approaches used and content delivered by the personnel responsible for training at academic institutions and clinical placement locations. For example, in the academic environment being able to administer drugs safely to patients may be more highly valued by the student nurses than understanding how to properly maneuver patients.

Staff Nurses

Studies have found in general that staff nurses do not know what they should realistically expect from student nurses (Astin et al., 2005; Brammer 2006; Hayes et al., 2006; Leners et al., 2006; McCormack and Slater 2006). Staff nurses play a major influencing role and thus, are a very important component in shaping the early clinical experiences of student nurses. The first obstacle faced is whether the staff nurse views the student nurse as a worker or a learner (Brammer, 2006). In the past, the role of a

student nurse was viewed more as an apprenticeship, where the student was taught by working (Astin et al., 2005). Since some of the current staff nurses developed their skills via an apprenticeship model it is reasonable that they may not fully understand the role of education and learning for student nurses at clinical placements. Astin and colleagues (2005) conducted a study to determine the expectations staff nurses had of student nurses beginning clinical placements. The staff nurses they interviewed indicated that although some student nurses were able to perform such skills as appropriate lifting and handling techniques, they lacked a level of mastery they felt should have already been achieved by the students. In other words, the expectations the staff nurses had for the student nurses were not met. The skills, and the level to which those skills could be performed, were expectations of the staff nurses, as they felt they were skills deemed essential by clinicians to perform a task and work in the industry. Failure to meet these expectations in the minds of the staff nurses meant that the student nurses would be unable to meet the basic needs of the patients. Therefore, it is apparent that what staff nurses and academic institutions expect, in terms of level of mastery, can differ greatly, and should be a major cause of concern (Astin et al., 2005).

Student Nurses

Student nurses report feeling an overwhelming sense of confusion as to what is expected from them when they begin clinical placements. Student nurses have reported high stress levels when starting a clinical placement due to their lack of nursing experience, fear of physicians, worries about making errors, and unfamiliarity with the equipment and procedures (Andrews et al., 2006). Ahmadi and colleagues (1987) found that the existence of a disconnect between the academic institution and the clinical

placement or workplace creates feelings of alienation and job choice dissatisfaction among student nurses. Although often faced with conflicting paradigms from the two levels of informants, during clinical placements, student nurses feel pressured to adapt to the staff nurse they are shadowing. As a result, they often neglect lessons taught to them at the academic institution in order to feel as if they belong (Hayes et al., 2006). Andrews and colleagues (2006) found that although student nurses did not perceive themselves as poorly prepared they did hold expectations that clinical placements would afford them the opportunity to learn passively by being taught by others, rather than actively seeking out knowledge and skills themselves. Astin et al. (2005) found that staff nurses believed that at the beginning of clinical placements, student nurses were experiencing a 'reality shock' when they discovered the education they were provided with from school was not adequate enough to prepare them for the reality of the role.

Academic Institutions' and Clinical Placements' Values

Literature suggests a disconnect does exist between academic institutions and clinical placements, especially concerning what the expectations of student nurses should be. Clinical placements are an important learning tool for student nurses to gain experience (Andrews et al., 2006). However, Astin and colleagues (2005) found that academic institutions, and staff nurses training student nurses, differ with respect to the level of clinical skills that they feel that students should possess. Hayes et al. (2006) stated that the values of academic institutions are based on teaching ideal nursing practice, whereas clinical placements focus on more realistic teachings concerning tasks, with respect to the resources available and time constraints. Academic institutions strive to prepare student nurses with a general knowledge of entry practice competencies;

however, clinical placements seem to expect a more developed set of skills from the student nurses (Hayes et al., 2006).

The literature lacks a true comparison between the curriculum at an academic institution and the values a staff nurse tries to instill in student nurses. Although it has been suggested that a disconnect exists between theory and practice, it has yet to be truly addressed from both levels. Bridging any gaps in the training approaches and content that exist between theory and practice needs to be addressed in both the academic and clinical environments. Knowledge gained in this way will be useful for creating a curriculum that helps student nurses understand what is expected of them, and help them to be more fully prepared and well rounded. This will also ultimately improve the quality of care patients receive (Brammer, 2006).

Biomechanical Evaluations

Although there have been studies on the perceptions of student and staff nurses with respect to work-related stressors and expectations, the findings do not clarify completely how and why nurses are suffering from WMSIs. As previously mentioned, it is believed that a nurses' risk of injury is primarily due to PTs (Waters et al., 2006). It is not surprising that injuries often occur because of MPTs, as they frequently create awkward working postures, and the loads lifted are unpredictable and heavy. Even though mechanical lifts have been implemented in many working environments to reduce the risk of injury, due to time and location, nurses often prefer to perform lifts manually.

Attempts to decrease nurses' risk of injury have traditionally involved the teaching of proper body mechanics when performing lifts (de Castro et al., 2006). The proper lifting techniques taught to nurses are based on the ones created by the National

Institute for Occupational Health and Safety (NIOSH), which were based on lifting an object such as a box (Waters et al., 2006). Basing nursing lifting techniques on the NIOSH ideals can be problematic as a box and a patient have very different properties. Waters and colleagues (2006) explain that when lifting a box in optimal situations, boxes have handles, are below a recommended weight value, and are kept close to the body so that awkward body postures are avoided. Unlike boxes, people do not come with conveniently placed and constructed handles, and the mass of most of the people in the population is well above any recommended weight limits proposed in the occupational literature. Due to the shape of the human body, as well as other environmental factors (e.g. space, the presence of other equipment), a patient cannot always be kept close to a nurse's body, and awkward body postures can therefore not be avoided (Waters et al., 2006). Additionally, it should be noted that boxes are typically static objects, whereas patients are dynamic. This means that a patient is unpredictable and can move at any time during the transfer. If the movements of the patient are not expected, or if they are violent, this can create a potentially hazardous situation for the nurse. As such, the training of nurses with proper lifting techniques and body mechanics is not sufficient to alleviate nurses' risk of work-related injury. Training, performed by experienced practicing nurses, that incorporates proper lifting mechanics and techniques developed and tested in the field, appears warranted if nurse preparedness and quality of care are to be improved in the future.

Lifting Limits

Biomechanical models can help in the development and testing of proper lifting mechanics and techniques by calculating the forces and moments a worker is subjected to

while performing a task. Once the calculations have been completed, the values can then be used to determine if the worker is at an increased risk of injury. A biomechanical approach to evaluating proper lifting techniques often involves analyzing joint kinematics (description of a motion) and kinetics (explanation of a motion) to help understand what happens to the body when affected by a mechanical load such as a force or moment (Lin et al., 2006). Biomechanical studies that have looked at patient-handling tasks more often focus on estimating the loads that are applied to the low back (Garg et al., 1991a; Winkelmolen et al., 1994; Marras et al., 1999; Daynard et al., 2001; Skotte et al., 2002). Very little attention, if any, seems to be provided for the effects of a load on the shoulder while performing a lift. As such, there is currently no limit value associated with shoulder loading that can be used to establish WMSI risk. In contrast, over the last few decades there has been a growing body of knowledge with respect to low back injuries. NIOSH (1981) developed guidelines to help reduce the occurrence of a low back injury to a worker. They found that individuals who experience spinal compressions that exceed 3400N were at an increased risk of low back injury and that most workers would not be able to tolerate 6400N of compression without experiencing injury (NIOSH, 1981). In other words, to reduce the risk of injury, a worker should not be exposed to spinal compressions of approximately 3400N when performing manual lifting tasks. Research findings related to MPTs have found that a worker is exposed to compressions between 4000N to 5000N (Garg and Owen, 1992; de Looze et al, 1994; Daynard et al., 2001). Recall that Tuohy-Main (1997) found that nurses cumulatively lift approximately 1.8 tons (~1636kg) during an eight hour shift, which places the nurses at an increased risk of injury. Even when a variety of lifting techniques were evaluated involving two-person

transfers, Winkelmolen and colleagues (1994) found that the compressive loads on each person were close to 3400N. Marras and colleagues (1999) found that even a two person draw sheet repositioning technique, a task they deemed to be considered the safest, had a significant risk of injury associated with it. Although performing a PT with two workers instead of one can reduce the amount of compression experienced by each worker individually, it may not be lowered enough to eliminate it as a cause of concern regarding injury.

Previous Biomechanical Studies Regarding Nurses

Previous biomechanical studies have evaluated patient transferring involving relocating the patient from a bed to a wheelchair (and vice versa), from a wheelchair to a shower chair (and vice versa), and from a wheelchair to a toilet (and vice versa) (Garg et al., 1991a; Garg et al., 1991b; Garg and Owen, 1992; Marras et al., 1999; Skotte et al., 2002). These studies took place in a laboratory setting which can be convenient for data collection purposes. However, these studies lack the authenticity and realness of a hospital setting. Most studies of this sort also involve a volunteer acting as the patient to be transferred in each evaluated task, and in the studies by Garg and colleagues (1991a, b) the patient was also a subject in the study. The PTs studied by Skotte et al. (2002) were performed by an individual who had been disabled as a result of a stroke. Although this can provide a good estimation of what occurs during a PT in the workplace, it is not entirely realistic as a nurses' work environment may have more space restrictions, real patients may be more dynamic and less accommodating with shifting his or her own weight, and where the lift is performed during the shift.

Under-axilla Method

Although biomechanical studies are often quantitative, less invasive qualitative studies can also be performed to further understand other aspects of PTs. Owens and colleagues (1999) used a questionnaire and focused on a specific MPT lifting method. The lift they chose was based on a study performed in 1992 by Garg, Owen and Carlson who stated the most common lifting method used by nurses in a large nursing home involved grasping the residents under the arms. Garg et al. (1992) and Owens et al. (1999) referred to this lifting method as the under-axilla method. According to Corlett and colleagues (1992), in England, this under arm grasp lift is called the "drag". Due to the resemblance of the nurses' arm being placed under and then up around the patient's under arm, this lifting method can also be referred to as a "hook". Garg and colleagues (1992) describe that a single nurse can perform an under-axilla lift by grasping under the arms of the patient while either standing in front of or behind the patient.

Part of the purpose of the study performed by Owen and colleagues (1999) was to look at what students were taught regarding the under-axilla lifting method as well as determine what lifting methods nurse educators observed being used in the clinical setting by practicing nurse personnel. Owen and colleagues (1999) had eight educators who taught PTs to nursing students complete an eight section questionnaire. Section 1 consisted of information about the study. Section 2 depicted 12 manual lifting methods for transferring patients in and out of a bed or chair. Eight of the photos were a version of the under-axilla method and the remaining four were transfer methods Owen et al. (1999) had observed in clinical settings. Below each photo was a scale (1 = never, 2 = seldom, 3 = sometimes, 4 = often, and 5 = very often) which the nurse educators were

asked to use to indicate how often they taught each transfer method depicted. Section 3 included the same 12 photos and scale but the nurse educators were asked to indicate the frequency with which they observed each lifting method in the clinical setting by nursing personnel. The remaining sections asked about maneuvering patients in bed and various lifting methods involving assist devices, and will therefore not be discussed further.

The study revealed that there was a significant difference between what the nurse educators taught and what they observed (Owens et al., 1999). They found that there were more lifting methods observed than the number of lifting techniques that the nurse educators indicated they taught. Thus, it can be assumed that students on clinical placements not only enhance skills taught at the academic level but are also introduced to new methods and skills. Furthermore, when viewing the most frequently used textbooks for teaching PTs according to the nurse educators, Owens and colleagues (1999) found that none of the textbooks contained information pertaining to the under-axilla method. Owens and colleagues (1999) suggest that if nurses first acquire knowledge at school and then can practice what they have learned in clinical settings then their skills are being reinforced, creating less stressful lifting situations. If nurses are taught both a variety of appropriate PT methods and the importance of proper body mechanics they will hopefully be equipped with enough knowledge to identify potential hazards and make decisions in the best interest of their own safety and that of the patient. Additionally, the opportunity to be taught PT knowledge at the academic level and practice skills at a clinical setting will aid the student nurses in developing more confidence to perform transfers when they become practicing nursing personnel.

Confidence

The statement 'practice makes perfect' insinuates that a person becomes better at performing a task that they practice. It seems natural to assume that practice not only allows a person to enhance their skills but allows them to develop their perceived confidence to perform the task well. However, confidence is a difficult term to define as it may have multiple meanings between people. Weinberg and Gould (2007), two sports psychologists, define self-confidence as the belief that you can successfully perform a desired behaviour. In a sports context this may refer to one's belief that they can successfully perform a tackle in football, or score a goal in soccer. In a nursing context, this may relate to a nurses' belief that he or she can successfully perform a MPT. Self-efficacy is a term that is often intertwined with confidence. For the purpose of this study, the term confidence is going to be utilized, as self-efficacy, which can be described as a situation-specific form of self-confidence, looks at an individual's perception of their ability to perform a task successfully (Weinberg and Gould, 2007).

Confidence can benefit individuals who are performing tasks in a number of ways. In situations that may put pressure on an individual, confidence allows that person to remain calm and relaxed when performing the task required (Weinberg and Gould, 2007). Nurses often work in a high pressure atmosphere with increased workloads and decreased time availability; thus, having confidence in their ability to perform tasks will help them to carry out PTs successfully. Confidence is also thought to facilitate concentration. When an individual is not confident, such as a student nurse or an untrained nurse, they may be distracted with worry about their ability to perform the task as required. They may also be concerned about how others perceive their ability to

perform the task. Essentially, Weinberg and Gould (2007) discuss that a confident individual is able to perform tasks with a higher degree of skill and efficiency.

When a nurse receives information and training at the academic level and the opportunity to define and enhance these skills at the clinical level through practice, their confidence in their belief that they can successfully perform a MPT should be amplified. This will also likely improve their ability to perform the transfers skillfully and efficiently. However, a nurse may be confident in his or her ability to perform a MPT accurately, but this does not necessarily mean that they can perform the task without harming or injuring themselves, or the patient being transferred. Therefore it is important to evaluate the amount of training nurses receive at each level (academic and clinical), and how this training relates to their self-confidence for accurately manually lifting a patient, without harming themselves or their patients.

Therefore the purpose of this study was to evaluate perceptions of training, use and confidence that student and staff nurses have regarding a variety of manual patient transfer methods.

Chapter III
Methodology

Participants were recruited from a local midsize University and a local rural Hospital. Following verbal instructions, participants completed a survey (Appendix 1 and Section 3.2.4 below). Participants provided written informed consent as approved by the University of Windsor Research Ethics Board.

Participants

This study involved two groups of participants: student nurses and staff nurses.

Student Nurses

One hundred and sixty-three senior undergraduate students from a BScN program at a midsize university completed a survey. These students were recruited via a classroom presentation that provided a brief verbal description of the purpose of the study and instructions regarding the survey. Senior level (3^{rd} and 4^{th} year) nursing students were chosen to participate in the study as they had completed several clinical placements. Students were excluded if they had not worked in a clinical setting in the last twelve months, and if they had not performed a MPT before.

Staff Nurses

For the purpose of this study a staff nurse was a registered nurse or registered practical nurse who had been working in a clinical setting for at least twelve months. Thirty-three staff nurses from a rural 90 bed hospital in Southwestern Ontario, Canada were recruited to participate in the study. This small rural tertiary care hospital consists of acute/critical care, complex continuing care/rehabilitation, obstetrics, emergency room, operating room, and ambulatory care units.

Procedures

Academic Environment

Information regarding the training regimen provided to student nurses at the academic level was obtained from the Faculty of Nursing program at the local University. The program offers approved and accredited programs based on a multi-disciplinary curriculum that aims to provide intellectual and professional development opportunities to the students enrolled. The lab coordinator was contacted and asked to provide a detailed description of the MPT lifting methods the students are responsible to learn and practice in the laboratory setting, as well as any required reading materials.

Student Nurses

Approximately twenty minutes at the beginning or at the end of required classroom-based courses for the third and fourth year nursing students were provided to the primary investigator to present a verbal explanation of the study and distribute the surveys. First, the student nurses were informed of the purpose of conducting the survey, followed by a brief explanation of the components of the survey. It was explained that training occurring in the academic environment referred to information presented in the classroom, laboratory, and in textbooks. Working in the clinical environment while on placement, even in the presence of an academic instructor, was considered as information presented in the clinical environment. The student nurses were asked to complete the sections of the survey regarding which MPT methods they were trained on, use most often and their confidence levels with performing each lift. After the verbal explanation was provided, and any questions were answered, each student was given a package that contained a consent form and survey.

Staff Nurses

With the help of the Occupational Health and Infection Control Officer at the local rural Hospital, group meetings were set up for staff nurses to be informed of the purpose of the study and be recruited to participate. The staff nurses completed the same survey as the student nurses. As nurses work in a very time-pressed environment they had the option of taking the survey with them to finish at a later time. Thus, the package each nurse was presented with included a self-addressed stamped envelope they could use to return the survey which aided in maintaining participant confidentiality.

Survey

The survey consisted of four sections: i) participant information, ii) training, iii) use, and iv) confidence.

Section 1

Section 1 of the survey asked for participant information such as age, sex, length of employment, educational background and anthropometric data (weight, height). An additional page prior to the first section included a brief explanation about the study in general and how to complete the survey. The remaining three sections focused directly on information pertaining to MPT lifting methods.

The Photos

Sections 2 through 4 included 19 photos that represented various methods for transferring a patient from a sitting position (Figure 2.6). The first 10 photos depicted methods of lifting a patient from the side of a bed, whereas the remaining 9 depicted methods of lifting a patient from a chair (wheelchair or geriatric chair or toilet). The same MPT techniques were used for both the side of the bed and chair. Each MPT lifting

method shown was strictly a one person manual lift; 5 of which involved a gait belt as a lift assist (3 lifting a patient from the side of a bed, and 2 lifting a patient from a chair) and two that involved a transfer belt (from the side of the bed and from a chair). The layout of the survey had five photos in the top row and four or five in the bottom row. The top row consisted of MPT lifting methods without an assistance device whereas the bottom row were assistive lifting methods. The top row photos involved the nurse using her body weight to lift the patient, whereas the bottom row photos were guidance lifts where the patient had some weight bearing abilities and could be lifted with the help of some support from the nurse, or a manual lift assist such as a gait belt or a transfer belt. The first three photos were different types of hook lifts (Figure 2). The first two hook lifts have the nurse at either side of the patient as they are one-handed (one from the front and one from the back), whereas the third is a two-handed lift (from the front) with the nurse facing the patient. The next two lifts were a hug lift (Figure 3) where the nurse reaches her arms around the waist or scapula of the patient and grasps her hands together while placing the patient's arms around her neck and shoulders. For the waist hug lift, the nurse grasps her hands together at the level of the patient's L4-S1 vertebrae, whereas for the scapula lift the nurse grasps her hands together around the patient's scapula. Both hug lifts can be potentially dangerous to the nurse because the force of the lift and the motion of the transfer may cause her to lose her balance backwards if performed improperly, or if a patient reacts unexpectedly.

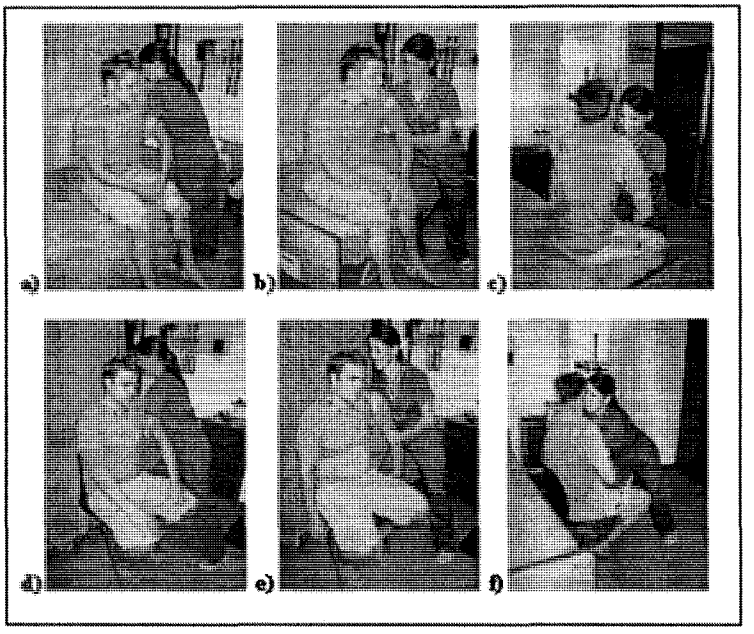


Figure 2: Hook Lifts. From the side of the bed; front hook lift a), back hook lift b), two arm front hook lift c). From a chair; front hook lift d), back hook lift e), two arm front hook lift f).

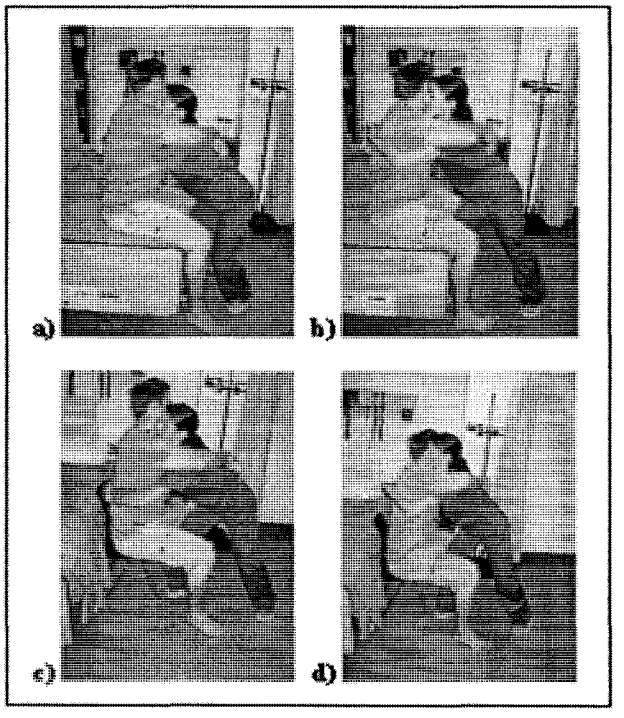


Figure 3: Hug Lifts. From the side of the bed; Waist Hug Lift a), Scapula Hug Lift b). From a chair; Waist Hug Lift c), Scapula Hug Lift d).

The second row begins with the sixth lift depicted, the guidance lift (Figure 4). This lift is used with patient's who are not completely dependent, but rather only require some assistance with their mobility. The nurse faces the patient and they join hands. The nurse is able to take a step back as she uses force to help lift the patient from a sitting position. The next series of MPT lifting methods shown were performed with the aid of a gait belt (Figure 5). The purpose of a gait belt is to aid a nurse with MPTs as they provide several handles that can be grasped. When the gait belt is strapped on around the waist of the patient, the handles are typically found on either side of the patient, as well as on the front and back of the patient. The Front-Side handle gait belt lift allows the nurse to stand at the side of the patient and grasp a handle on one side of the patient as well as one at the front. This method can also be utilized for a two person gait belt lift, but will not be investigated in this study. The Side-Side handle gait belt lift has the nurse facing the patient and grasping a handle at each of their sides. The third gait belt lift has the nurse facing the patient, and like the hug lifts, she reaches around the trunk of the patient, and grasps a back handle with both hands. The Back-Back handle gait belt lift was only included for the lifts performed from the side of the bed, as the back handles are often not accessible when a patient is sitting in a chair.

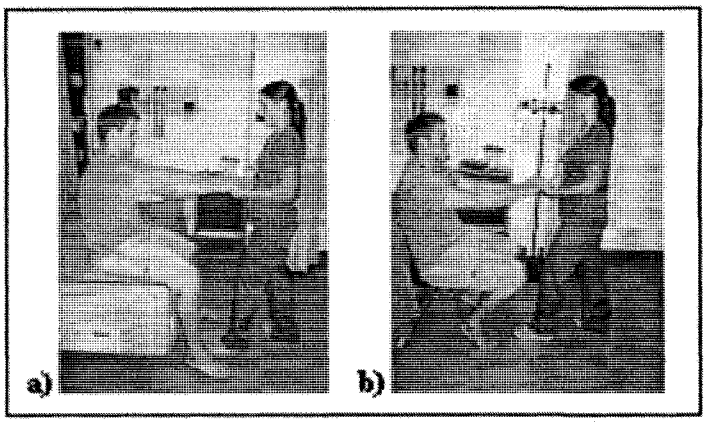


Figure 4: Guidance Lifts; from the side of the bed a), from a chair b).

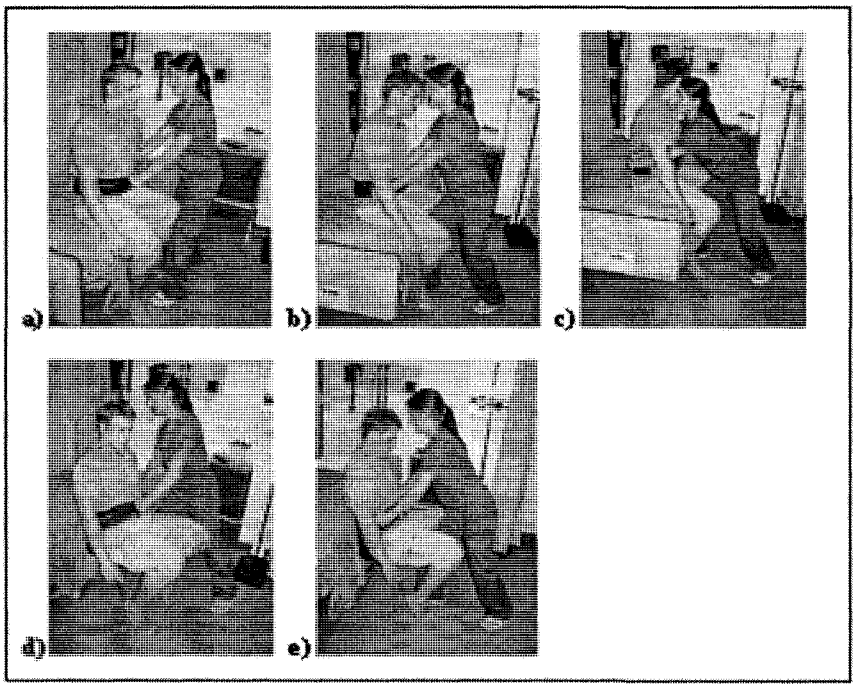


Figure 5: Gait Belt Lifts. From the side of the bed; Front-Side Grasp a), Side-Side Grasp b), Back-Back Grasp c). From a chair; Front-Side Grasp d), Side-Side Grasp e).

The last method depicted was the transfer belt lift (Figure 6). This lift is described in the Clinical Nursing Skills and Techniques textbook (Perry and Potter, 2006) that is a part of the Faculty of Nursing curriculum at the local University. A transfer belt is similar to a gait belt in that it is placed around the waist of the patient and aids the

nurse when lifting the patient. However, unlike the gait belt that has multiple handles to grasp, a transfer belt is grabbed directly by the nurse and pulled. As part of the description of how to lift a patient with a transfer belt, Perry and Potter (2006) state that the nurse should align her knees with the knees of the patient. The nurse faces the patient and grasps the transfer belt with both hands before creating a rocking motion to lift the patient off the side of the bed or from the chair.

The lifting methods included in the survey were a mixture of ones discussed in the literature as well as the methods taught at the academic institution through classroom/laboratory and textbook instruction. The lifts were mocked up in the Faculty of Nursing Laboratory at the University of Windsor and were performed by a nurse with MPT experience.

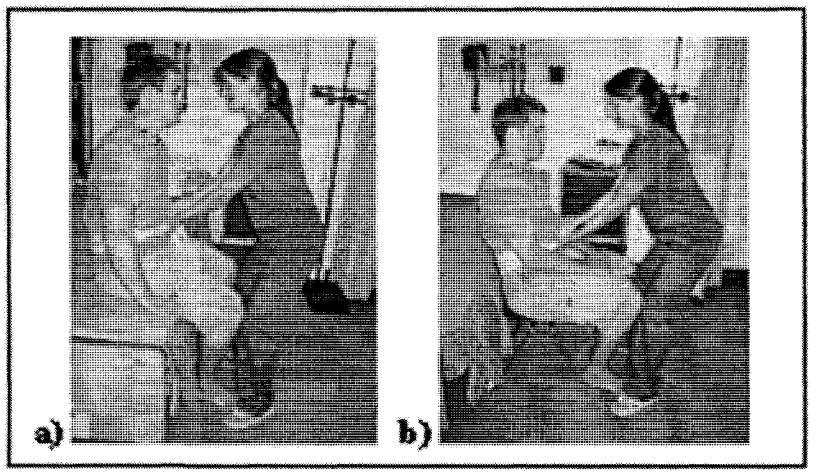


Figure 6: Transfer Belt Lifts from the side of the bed a), from a chair b).

Section 2-Most Often Trained?

Section 2 was designed to identify which of the presented MPT methods the participating nurses received training on. They were asked to respond using either yes, no, or unsure as to whether they perceived having been trained for each MPTs depicted in

both the academic and clinical environments. This section was to determine which methods are most often trained and at which level, academic or clinical.

Section 3-How Often Used?

Section 3 of the survey asked the nurses how often they use each depicted MPTs. Adapted from a survey used by Owen and colleagues (1999), a rating scale was provided underneath each photo. The nurses were given the option to circle numbers 1 through 5 which were explained in a legend at the top of the page to represent; 1 = Never (0% of the time); 2 = Rarely (1-24% of the time); 3 = Sometimes (25-49% of the time); 4 = Occasionally (50-74% of the time); and 5 = Very Often (75-100% of the time). Additionally, the rating scale coincided with a time reference (in the last one month, six months, and twelve months). The intention of this section was to determine which MPTs are used most often in a clinical environment.

Section 4-Confidence With Lifts?

In addition to determining the most frequently trained and used MPT techniques, this study looked at the confidence levels the nurses perceived they had when performing each MPT. The rating scale legend presented at the top of the page was adapted from the scales used in Maibach and Murphy (1995) and Rogers et al. (2002). The scale provides percentages that increase in increments of 10, starting a 0 % and finishing with 100 %. The scale end markers are labeled so that 0% = Not at all Confident and 100% = Extremely Confident. Below each photo were three blank lines for the nurse to indicate the percentage she believes represents her confidence level in her ability to perform each lift a) accurately, b) without harm to the patient, and c) without harm to herself.

Statistical Analyses

Descriptive statistics, such as frequencies, means, and histograms, were computed from collected survey responses. Non parametric chi-square goodness of fit tests were performed for Hypothesis 1. Each subject's response to whether or not they had received training (yes, no, unsure) for each of the 19 lifts was recorded. Then a sum of the yes, no and unsure responses were calculated for each MPT, representing the observed values for the chi-square calculation. The expected value was set so that each response had an equal chance of being selected (33%). Cross tabs chi-square tests of independence were run to determine if nurses who indicated they were trained received their training more often in a clinical environment as opposed to an academic environment or in both clinical and academic environments (Hypothesis 2). Thus, only MPTs determined to have been trained (yes response) from the chi-square goodness of fit tests were used as part of the chi-square test of independence analyses. For each of the 19 MPTs the sum of subjects' responses for where they received training (academic or clinical) were calculated and used as the observed values for the chi-square calculation, whereas the expected values were set to the percentage of choosing each response equally.

For Hypothesis 3, the lifting techniques that appeared in the top row of the pictures on the survey (MPTs 1 through 5, and 11 through 15) were compared to the MPTs from the bottom row (MPTs 6 through 10, 16 through 19). Means for each lift set (top row, bottom row) across all subjects were calculated and compared using non-parametric Wilcoxon Signed- Ranks tests to determine if the two groups were statistically different from each other in terms of what type of lifts are used most often.

Hypotheses 4 compared the MPTs that nurses received training on, with the lifting techniques nurses stated they had the most confidence performing. Similarly, Hypothesis 5 looked to compare the MPTs nurses said they used most often with the MPTs they had the most confidence performing. For each, a one-way ANOVA was run, followed by a Tukey's Post Hoc analysis. The one-way ANOVA compared the different confidence scores (dependent variable) with each category of the three trained categories (independent variable) and then with the five used most often categories (independent variable).

Chapter IV
Results

Participant Information

Student Nurses

A total of 163 (age: M: 24.36 +/- 4.64 years; sex: 20 male, 143 female) senior nursing students from the local University's Faculty of Nursing completed the survey. Thirteen participants (~8%) indicated that they suffered an injury at work in the last 12 months. Of these, 7 (~54%) indicated a back injury only, 2 (~15%) indicated a shoulder injury only, and 4 (~31%) indicated both back and shoulder injuries. Two of the participants who indicated suffering both back and shoulder injuries were male. In other words, 10% of all male participants and approximately 8% of all female participants indicated suffering an injury. Only two of the participants who indicated a back injury took time off for their injury. One participant took a one week leave of absence, whereas the other took twelve weeks.

The cross-section of units that student nurses had experienced as part of clinical placements included, but were not limited to; community, medical surgery, operating room, obstetrics, maternity, complex continuing care, palliative care, cardiology, pediatrics, respiratory, renal, orthopedics, neurology, emergency room, and intensive care.

Staff Nurses

Thirty-three female staff nurses (age: M: 38.97 +/- 12.89 years) from the local rural Hospital completed the survey. Fourteen of the nurses were Registered Nurses (RNs) (age: M: 45.46 +/- 10.06 years) and 19 were Registered Practical Nurses (RPNs)

(age: M: 33.94 +/- 13.47 years). For the purposes of this study RNs and RPNs will be grouped together as registered staff, or staff nurses because both groups of nurses completed the same work tasks at the participating local Hospital. Except for three nurses, work experience ranged from two to 35 years. It has been suggested that after working for approximately 18 months to two years that a nurse has enough experience and reached a level of competence to be considered an expert in his or her field (Benner et al., 1996). The other three nurses only had one year experience on the job. On average, the nurses had 12 years of work experience. The participants worked in a variety of units in the hospital as shown in Table 1. A total of 9 (~27%) indicated that they suffered an injury at work in the last 12 months. Six (~67%) of the injuries were related to the back only, whereas the remaining three (~33%) were both back and shoulder injuries. Similar to the students who indicated injuries, three staff nurses took time off for their back injuries ranging from 1-2 months. These nurses were from the Complex Continuing Care/Rehab, Medical-Surgery, and Emergency Room units.

Table 1: A breakdown of the staff nurses (n=33) into the units where they currently work.

Number of Nurses	Unit
11	2 North or Complex Continuing Care/Rehab
3	Medical-Surgery
9	2nd Floor – a combination of Complex Continuing Care/Rehab, Acute Care, and Intensive Care/Stepdown
3	2 South or Intensive Care/Stepdown
3	Emergency Room (ER)
3	Operating Room (OR)
1	Day Surgery/Ambulatory Care

Frequencies and Descriptive Statistics

Bar graphs were used to visually evaluate the responses received from student and staff nurses regarding the training of, use of, and confidence with the MPT presented to them (Table 2).

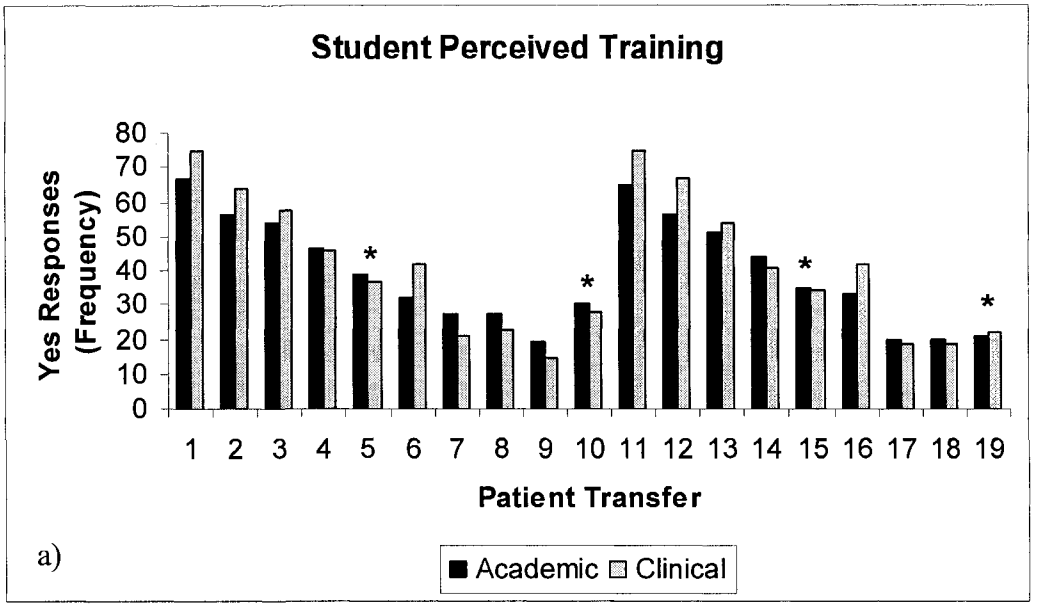
Perceived Training

Student nurses indicated "yes" they perceived being trained most often for the one and two handed hook lifts from the side of a bed and from a chair, all non-assistive lifts (MPTs 1, 2, 3, 11, 12, 13). It is interesting to note that these are not the MPT currently taught as part of the local University's nursing curriculum as part of a lecture or presented in the required textbook (Figure 7a).

The staff nurses perceived being trained on four MPTs most often in both academic and clinical environments (Figure 7b). These four MPTs are the one hand hook lifts (front and back) from the side of a bed and from a chair (MPTs 1, 2, 11, 12). Similar to the student nurses, these MPTs are not the methods currently taught as part of the nursing curriculum at the local University. In contrast to the student nurses, the staff nurses in the academic environment perceived having been trained more often on several MPTs but not in the clinical environment. This would suggest that the nurses currently working in the field perceived receiving more training than the nurses currently still enrolled in school. Notice that in Figure 7 below that MPTs 1, 2, 11, and 12 are common to both student and staff nurses for perceived training in both the academic and clinical environments.

Table 2: A list and description of the 19 Manual Patient Transfer methods used in this study

Patient Transfer	Description
1	Non-assistive Front Hook Lift from the Side of a Bed
2	Non-assistive Back Hook Lift from the Side of a Bed
3	Non-assistive Two Arm Front Hook Lift from the Side of a Bed
4	Non-assistive Waist Hug Lift from the Side of a Bed
5	Non-assistive Scapula Hug Lift from the Side of a Bed
6	Assistive Guidance Lift from the Side of a Bed
7	Assistive Gait Belt Front-Side Grasp Lift from the Side of a Bed
8	Assistive Gait Belt Side-Side Grasp Lift from the Side of a Bed
9	Assistive Gait Belt Back-Back Grasp Lift from the Side of a Bed
10	Assistive Transfer Belt Lift from the Side of a Bed
11	Non-assistive Front Hook Lift from a Chair
12	Non-assistive Back Hook Lift from a Chair
13	Non-assistive Two Arm Front Hook Lift from a Chair
14	Non-assistive Waist Hug Lift from a Chair
15	Non-assistive Scapula Hug Lift from a Chair
16	Assistive Guidance Lift from a Chair
17	Assistive Gait Belt Front-Side Grasp Lift from a Chair
18	Assistive Gait Belt Side-Side Grasp Lift from a Chair
19	Assistive Transfer Belt Lift from a Chair



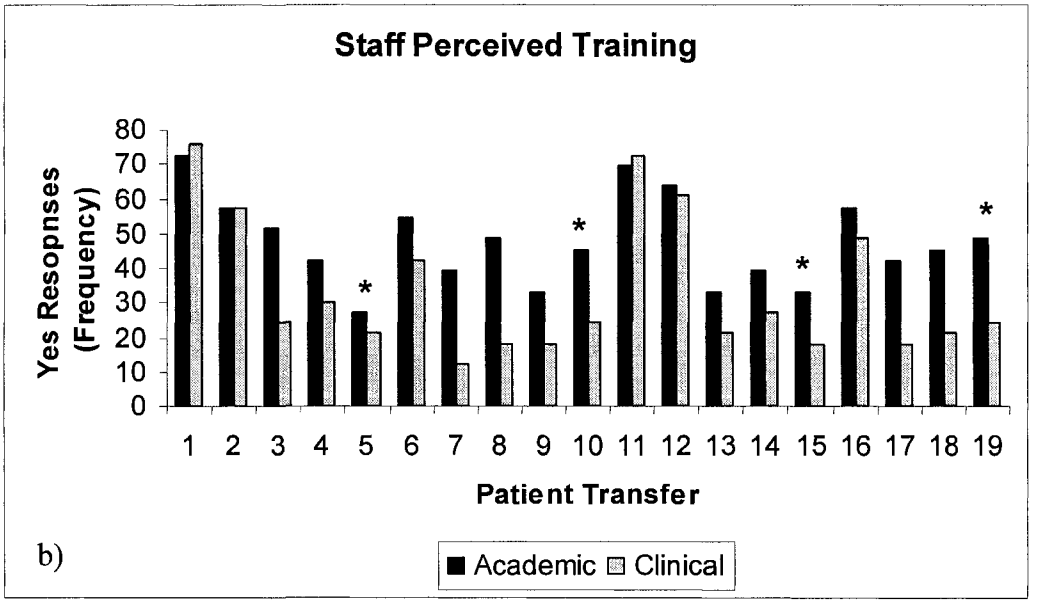


Figure 7: The frequency of 'yes' responses for perceived training in the academic and clinical environments for student nurses a) and staff nurses b). * indicates the MPTs currently part of the nursing curriculum at the local University.

Perceived Use

Student and staff nurses did not appear to differ in their perceived use at one month, six months and twelve months. When the frequencies of the 'very often' response were plotted (Figure 8) the four MPT used most often for both student and staff nurses

were MPTs 1, 2, 11, and 12 (see Table 2). These data also support what was seen in Figure 7 for perceived training. Note, the 'very often' responses were arbitrarily chosen to be plotted as the MPTs used most often are the ones that should be focused on during training. The other end of the spectrum ('never') is also of importance as it indicates which MPTs are never used in general or by unit. Although important the 'never' responses were not plotted as they are the inverse of what is shown for the 'very often' responses in Figures 8 and 9. The next two MPTs with the highest 'very often' frequencies among the student nurses were MPTs 3 and 13 (Table 2). In contrast, for the staff nurses the next two MPTs with the highest 'very often' frequencies were MPTs 6 and 16. Other than the guidance lifts (MPTs 6 and 16) which are considered assistive lifts, all of the MPTs indicated by both student and staff nurses as methods used most often were non-assistive lifts.

The frequencies of the 'very often' responses for perceived use among staff nurses were also graphed based on unit of work (Figure 9). Of the seven units there were two units (OR and Day Surgery/Ambulatory Care) that did not use the 'very often' response for any of the 19 MPTs. The Complex Continuing Care and Rehab and Emergency Room units indicated that they use the non-assistive one arm front hook lift from the side of a bed (MPT 1) and from a chair (MPT 11) 'very often' with greatest frequency. The Medical-Surgery nurses however indicated they use the non-assistive one arm back hook lift from both the side of a bed (MPT 2) and from a chair (MPT 12) 'very often'. In general, the staff nurses who indicated they worked on the 2nd Floor indicated that they used all four of these non-assistive one arm MPT 'very often'. MPT 1 and MPT 11 were both indicated by each of the six units as lifts they use 'very often'.

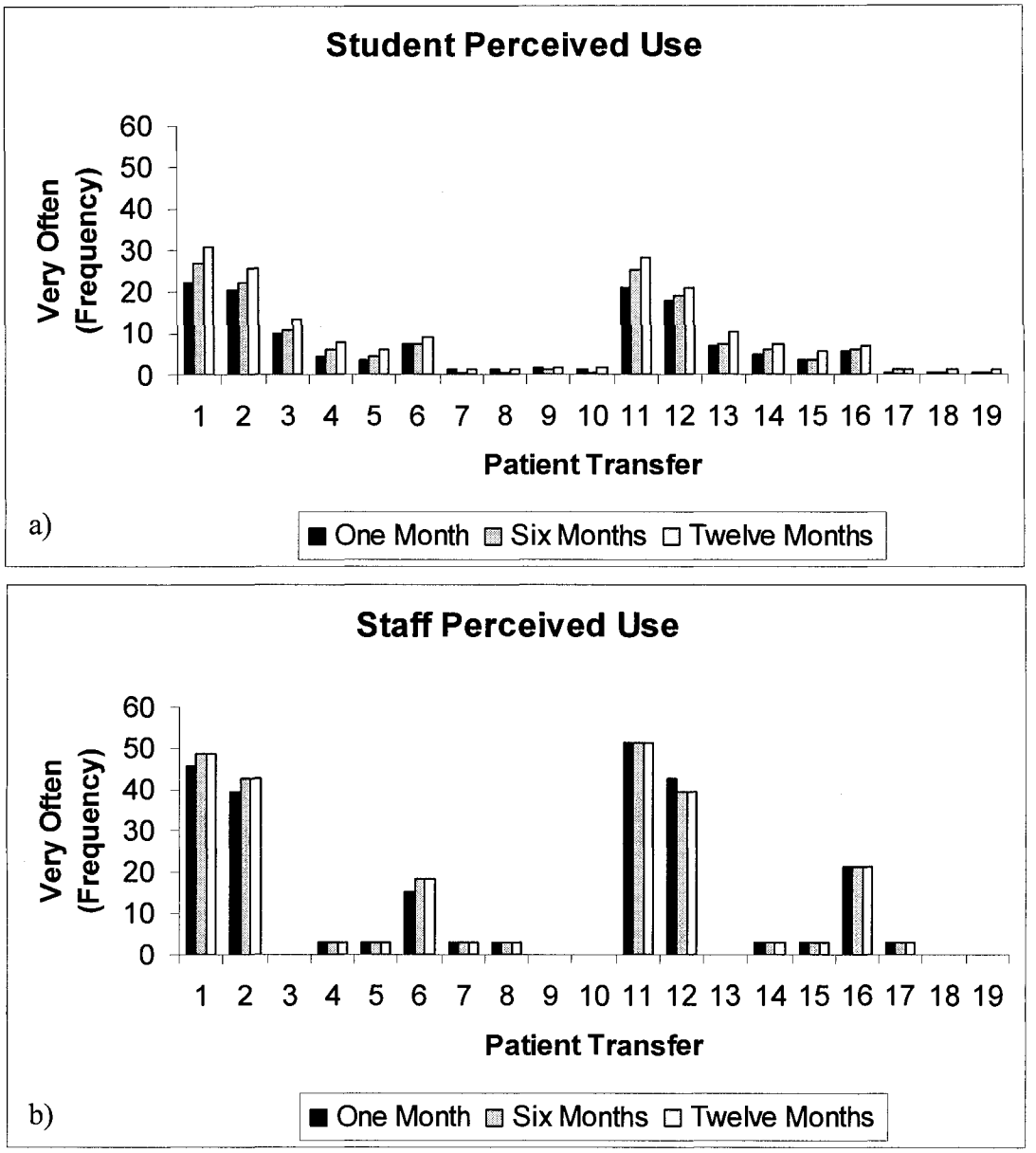


Figure 8: Frequency of perceived use - 'very often' responses for student nurses a) and staff nurses b) at one month, six months, and twelve months.

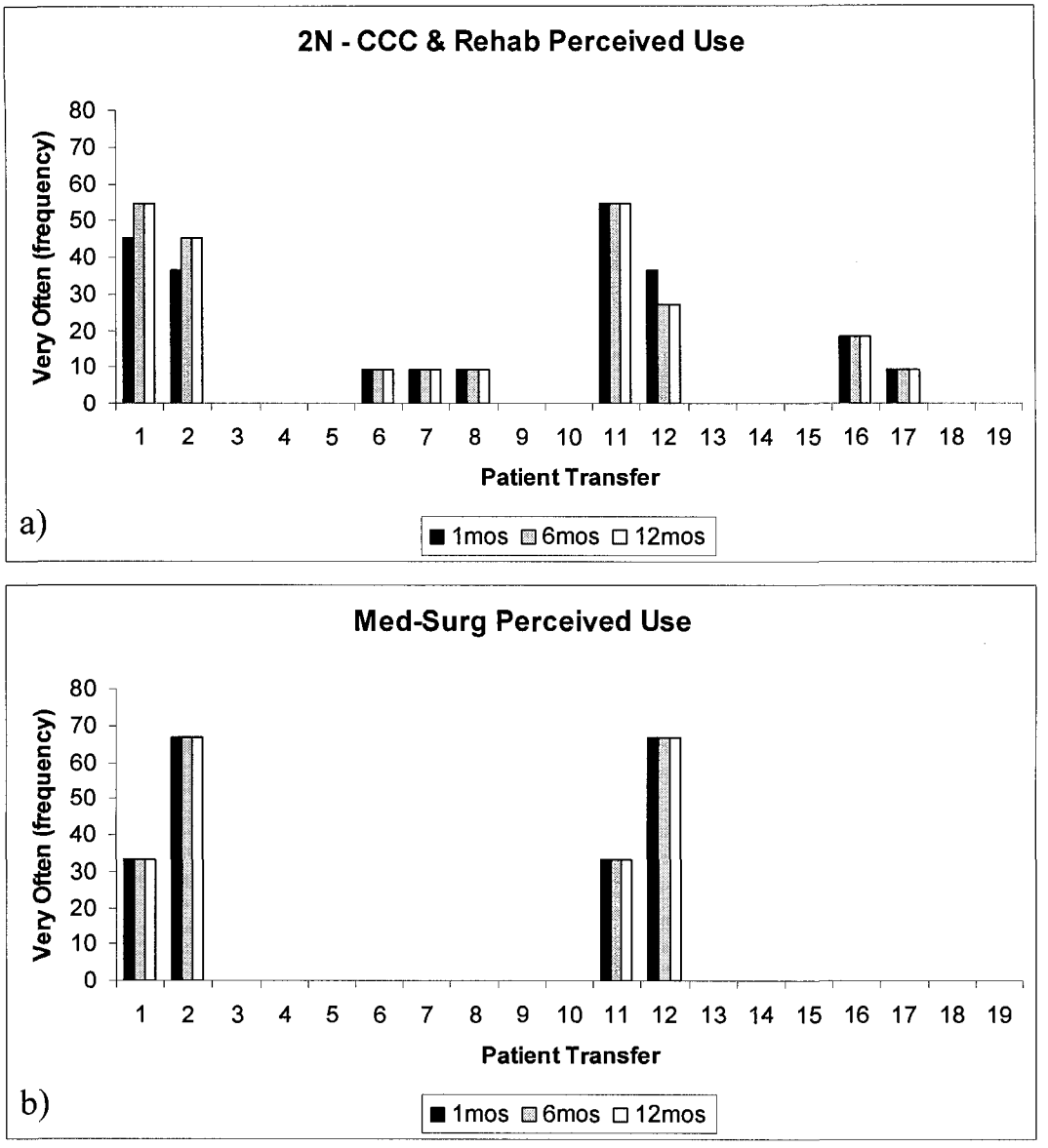
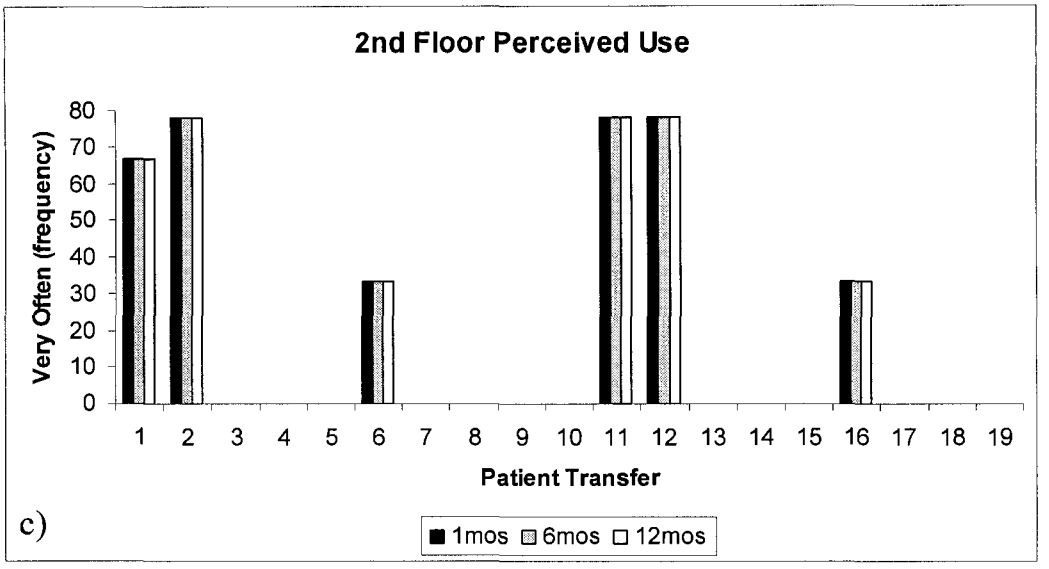
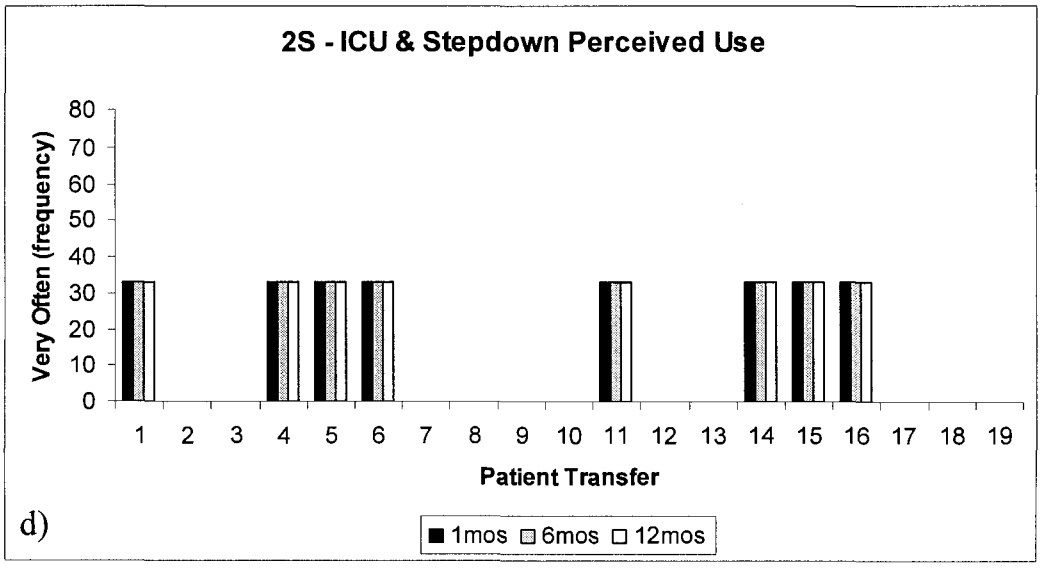


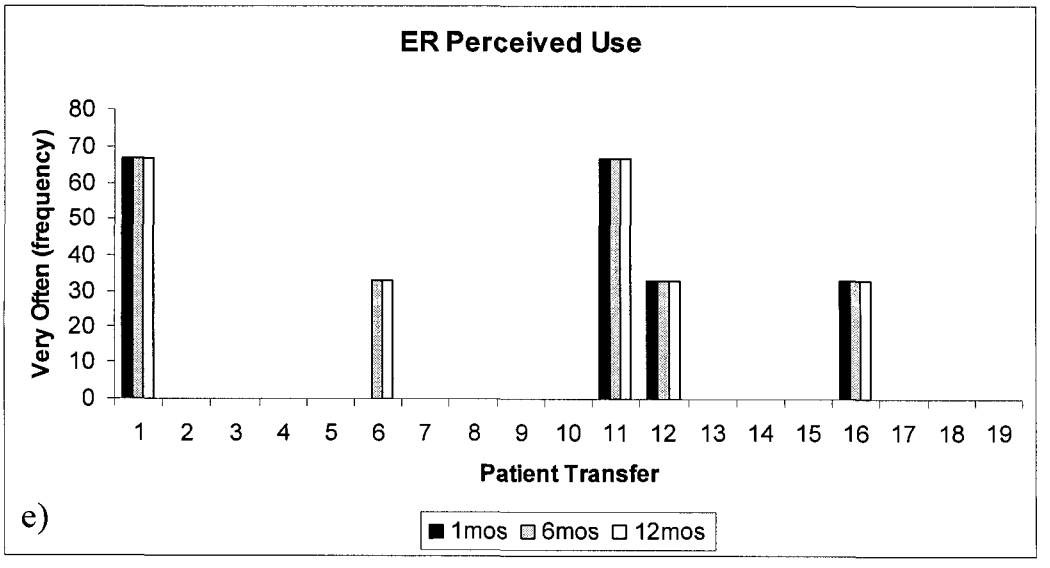
Figure 9: Frequency of perceived use 'very often' responses for staff nurses at one month, six months, and twelve months according to unit: above; 2North – Complex Continuing Care and Rehab a), Medical-Surgery b), below; 2nd Floor c), 2South – Intensive Care Unit and Stepdown d), and Emergency Room e).


2nd Floor Perceived Use
Very Often (frequency)
0 10 20 30 40 50 60 70 80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Patient Transfer
1mos 6mos 12mos

c)


2S - ICU & Stepdown Perceived Use
Very Often (frequency)
0 10 20 30 40 50 60 70 80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Patient Transfer
1mos 6mos 12mos

d)


ER Perceived Use
Very Often (frequency)
0 10 20 30 40 50 60 70 80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Patient Transfer
1mos 6mos 12mos

e)

Perceived Confidence

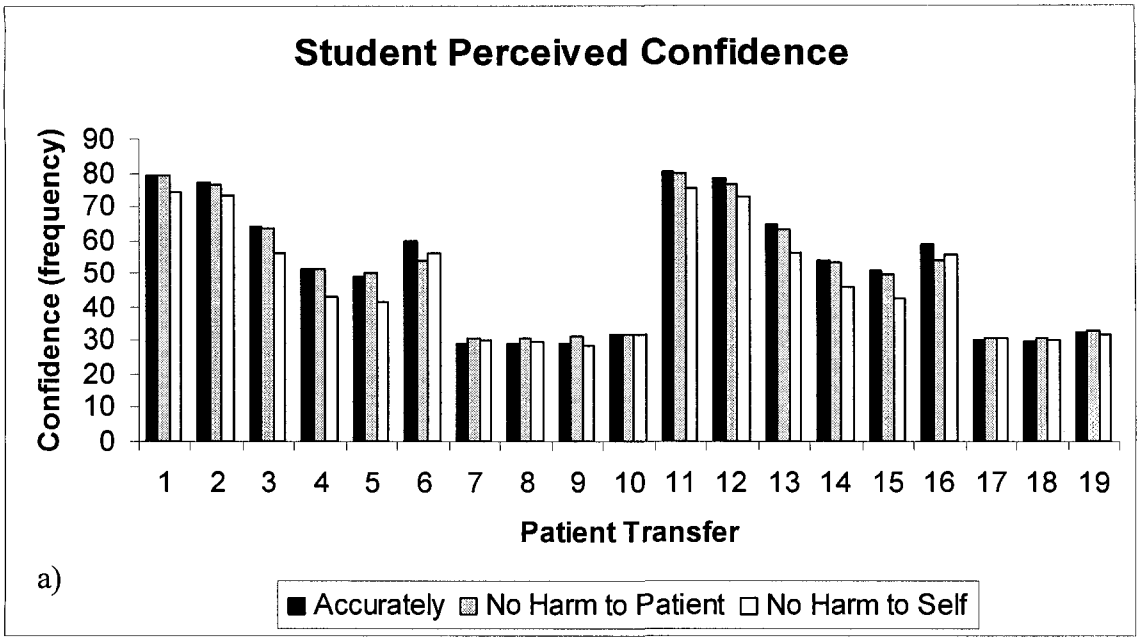
The three types of confidence analyzed (accurately, no harm to patient, no harm to self) appeared to follow similar trends. The student nurses perceived having the most confidence on the same six MPTs (1, 2, 3, 11, 12, 13) that they had the highest frequency of perceived training (Figure 10a). Likewise, the staff nurses perceived having the most confidence on the same four MPTs (1, 2, 11, 12) that indicated being trained on with the most frequency (Figure 10b). Similar to the findings for perceived training and perceived use, the student and staff nurses indicated that the MPTs they have the most perceived confidence for are the non-assistive hook lifts from the side of the bed or from a chair (Table 2).

Training

Non-parametric chi-square, or goodness-of-fit tests were performed to determine if there were differences in the three possible training responses (yes, no, unsure). For all analyses the expected frequencies were set so the possibility of each response was equal. In other words, the null hypothesis stated there is no preference among the response options (Ho: yes=no=unsure).

Student Nurses

All analyses reached statistical significance at $p < 0.05$ (Table 3). For both the academic and clinical environments, the student nurses responded "yes" to receiving training more often than the other responses for 6 (MPTs 1, 2, 3, 11, 12, 13) of the 19 MPT (~32%). Additionally, in the academic environment, student nurses indicated more often that they received training for MPT 4 (Table 3).



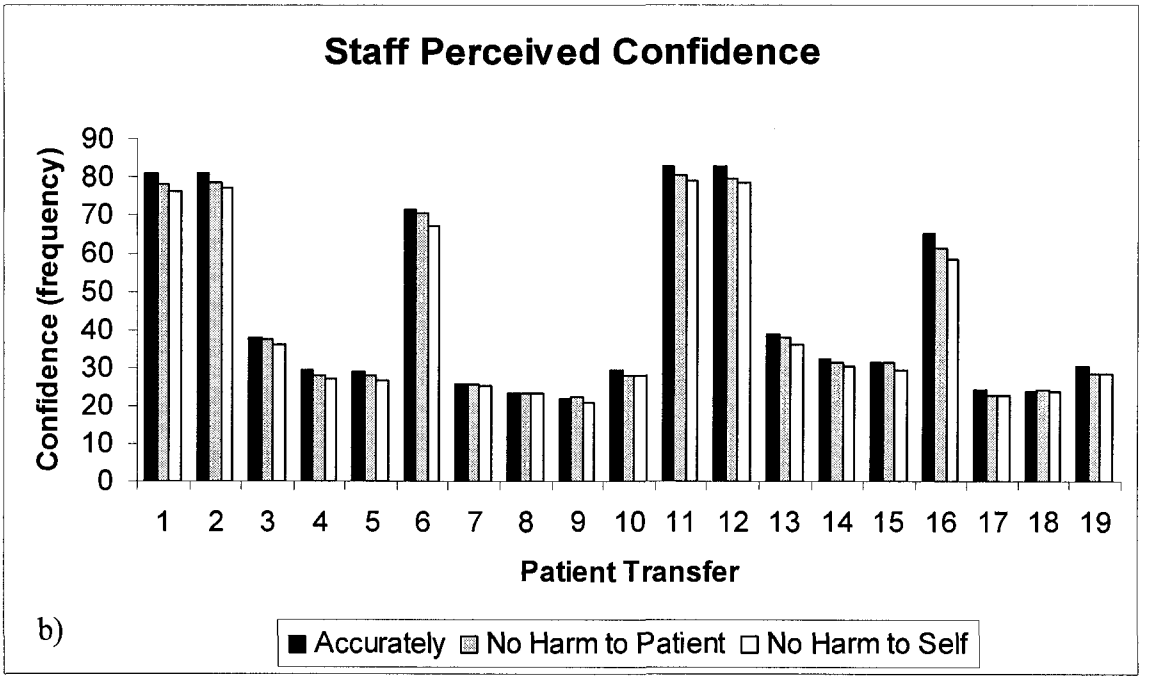


Figure 10: Percentage of the three types of Perceived Confidence (accurately, no harm to patient, and no harm to self) for student nurses a) and staff nurses b).

Table 3: Chi-square goodness of fit observed values and means for the trained responses (yes, no, unsure) with a p-value set at 0.05 for student nurses. The critical value was $\chi^2 = 5.99$.

	Student (n=163)							
	Academic				Clinical			
MPT	χ^2 (obs)	Yes	No	Unsure	χ^2 (obs)	Yes	No	Unsure
1	89.72	**109**	41	13	130.5	**122**	31	10
2	51.77	**92**	54	17	83.57	**104**	50	9
3	49.93	**88**	60	15	67.37	**94**	60	9
4	44.99	**76**	73	14	56.88	75	79	9
5	37.45	63	81	19	53.65	60	89	14
6	60.53	52	96	15	56.92	68	85	10
7	82.54	44	106	13	116.8	34	118	11
8	72.6	44	103	16	100.3	37	113	13
9	99.84	31	114	18	147.1	24	127	12
10	72.05	49	101	13	90.79	45	108	10
11	83.72	**106**	45	12	131.3	**122**	32	9
12	56.18	**92**	57	14	94.43	**109**	45	9
13	49.52	**83**	67	13	61.19	**88**	66	9
14	55.01	72	81	10	61.19	66	88	9
15	40.28	57	86	20	60.45	56	94	13
16	46.39	54	90	19	32.99	68	75	20
17	104	32	115	16	121.7	30	120	13
18	96.82	32	113	18	121.7	30	120	13
19	98	34	113	16	110.7	36	116	11

Staff Nurses

There were two cases that did not reach statistical significance ($p < 0.05$) for the staff nurses (Table 4). Both of these occurred when asking about training on the 19 MPTs in the academic environment. For MPT 7 and MPT 9 the responses of yes, no, and unsure did not differ from each other. The staff nurses indicated more often that they received training for approximately 58% (11 of 19 MPTs) of the MPTs in the academic environment. In the clinical environment the staff nurses indicated more often that they received training for only 5 of the 19 MPTs (~26%).

Table 4: Chi-square goodness of fit observed values and means for the trained responses (yes, no, unsure) with a p-value set at 0.05 for staff nurses. The critical value was $\chi^2 = 5.99$.

	Staff (n=33)							
		Academic				Clinical		
MPT	χ^2 (obs)	Yes	No	Unsure	χ^2 (obs)	Yes	No	Unsure
1	23.46	**24**	6	3	26.91	**25**	5	3
2	9.46	**19**	9	5	10.36	**19**	10	4
3	9.46	**17**	13	3	14.36	8	21	4
4	6.73	14	15	4	16.55	10	21	2
5	9.46	9	19	5	20.36	7	23	3
6	7.09	**18**	9	6	6.73	14	15	4
7	3.46*	13	14	6	19.82	4	23	6
8	11.09	**16**	15	2	16.55	6	22	5
9	4.55*	11	16	6	19.82	6	23	4
10	6.73	**15**	14	4	17.64	8	22	3
11	19.64	**23**	5	5	23.46	**24**	6	3
12	14.36	**21**	8	4	13.27	**20**	10	3
13	11.64	11	19	3	24.18	7	24	2
14	9.46	13	17	3	18.73	9	22	2
15	14.73	11	20	2	27.46	6	25	2
16	10.36	**19**	10	4	8.91	**16**	14	3
17	6.73	14	15	4	23.46	6	24	3
18	6.73	**15**	14	4	16.91	7	22	4
19	8.91	**16**	14	3	21.27	8	23	2

* indicates statistical significance was not reached. The observed chi-square is less than the critical value thus the null hypothesis failed to be rejected and there are no differences between the response options.

Crosstab chi-square tests, or tests of independence were done to determine if the MPTs the participants indicated they had received training for (responded "yes" more often from Table 3 and 4) occurred more often in an academic or clinical environment (Table 5 and 6).

Student Nurses

MPTs 1, 2, 3, 4, 11, 12, and 13 were analyzed for the student nurses. The training for approximately 86% of the MPTs (6 of 7) occurred more often in the clinical environment. Only MPT 4 (~ 14%) had training occur more often in the academic environment.

Staff Nurses

Of the 11 MPTs for the staff nurses that they indicated more often they perceived being trained on, two (~ 18%) of the MPTs were trained more often in the academic environment, 8 (~73%) were trained in the clinical environment, and 1 (~9%) received training in both environments equally. Thus, based on the MPTs that the student and staff nurses indicated they received training on, they perceived the training to occur more often in the clinical environment.

Table 5: Chi-square tests of independence observed values and means for the environments of where training occurs (academic, clinical) with a p-value set at 0.05 for student nurses.

Student(n=163)				
MPT	χ^2 (crit)	χ^2 (obs)	Yes Academic	Yes Clinical
1	9.49	100.1	109	**122**
2	9.49	109.7	92	**104**
3	9.49	91.81	88	**94**
4	9.49	113.4	**76**	75
11	9.49	115.3	106	**122**
12	9.49	108.5	92	**109**
13	9.49	125.6	86	**88**

Table 6: Chi-square tests of independence observed values and means for the environments of where training occurs (academic, clinical) with a p-value set at 0.05 for staff nurses.

Staff(n=33)				
MPT	χ^2 (crit)	χ^2 (obs)	Yes Academic	Yes Clinical
1	9.49	15.03	**25**	24
2	9.49	19.26	**19**	**19**
3	9.49	29.34	8	**17**
6	9.49	25.58	14	**18**
8	9.49	9.76	6	**16**
10	9.49	17.01	8	**15**
11	9.49	13.49	**24**	23
12	9.49	24.71	20	**21**
16	9.49	20.68	16	**19**
18	9.49	16.3	7	**15**
19	9.49	11.43	8	**16**

Use

The 19 MPTs can be divided into two categories: non-assistive lifts (MPTs 1-5; 11-15) and assistive lifts (MPTs 6-10; 16-19). Non-parametric Wilcoxon Signed-Ranks test statistics were performed to determine if there was a difference in the amount of use between the non-assistive lifts and assistive lifts at one month, six months, and 12 months for the student and staff nurses.

Student Nurses

At one month use was significantly higher for non-assistive lifts than assistive lifts ($\underline{T} = 11.44$, $\underline{p}<0.05$, $\underline{z} = -8.66$) (Table 7). This trend was also found when tested at six months ($T = 14.11$, $\underline{p}<0.05$, $\underline{z} = -9.84$) and at 12 months ($\underline{T} = 21.92$, $\underline{p}<0.05$, $\underline{z} = -10.21$).

Table 7: Means(SD) for non-assistive and assistive MPTs at one month, six months, and twelve months for student and staff nurses.

	Student Nurse		**Staff Nurse**	
	Non-Assistive	**Assistive**	**Non-Assistive**	**Assistive**
1mos	1.95 (0.94)	1.29 (0.55)	2.22 (0.59)	1.43 (0.59)
6mos	2.27 (0.89)	1.36 (0.53)	2.25 (0.60)	1.43 (0.59)
12mos	2.53 (0.84)	1.49 (0.62)	2.28 (0.62)	1.44 (0.59)

Staff Nurses

The same trends were found for the staff nurses. At one month ($\underline{T} = 12.00$, $\underline{p}<0.05$, $\underline{z} = -4.49$), six months ($\underline{T} = 10.50$, $\underline{p}<0.05$, $\underline{z} = -4.54$) and at 12 months ($\underline{T}$: 10.00, $\underline{p}<0.05$, $\underline{z} = -4.56$) staff nurses used the non-assistive lifts more often than assistive lifts (see Table 7). Overall, student and staff nurses both used the non-assistive lifts (top row: MPTs 1-5; 11-15) more often than the assistive lifts (bottom row: MPTs 6-10; 16-19).

Training and Confidence

Student Nurses

The one-way analysis of variance (ANOVA) for confidence revealed significant differences as a function of training in the academic environment for the three types of confidence (accurately, no harm to patient, no harm to self) (Table 8). Similarly for the clinical environment, the analyses of student nurses for confidence revealed significant differences as a function of training for all three types of confidence (Table 8). The Tukey's HSD Post Hoc tests revealed nurses had greater perceived confidence when they perceived having been trained on a MPT than when they were unsure or did not believe they had any training. When a nurse was unsure if training occurred, they were more confident in performing the MPTs than if they perceived no training took place. Thus, when a nurse perceived to have been trained, their confidence in performance MPTs was higher (yes > unsure > no).

Table 8: The F values and means for student nurses in the academic and clinical environments for all three types of confidence (accurately, no harm to patient, no harm to self) with a p-value set at 0.05.

	Student (n=163)			
	Academic	F(2, 3094)	Clinical	F(2, 3094)
Accurately				
Yes	69.77	310.99	73.64	562.21
No	38.48		34.66	
Unsure	47.01		47.49	
No harm – patient				
Yes	68.89	308.41	72.17	521.02
No	38.30		35.01	
Unsure	46.98		47.28	
No harm – self				
Yes	64.82	289.30	67.78	482.55
No	35.61		32.22	
Unsure	42.30		44.84	

Staff Nurses

As a function of training in the academic environment, the analyses of staff nurses for confidence revealed significant differences for the three types of confidence (accurately, no harm to patient, no harm to self) (Table 9). Additionally, significant differences for the analyses of confidence as a function of training in the clinical environment among the staff nurses were found for all three types of confidence. The Tukey's HSD Post Hoc tests revealed the same trends as the student nurses. Staff nurses had greater confidence performing MPTs when they had perceived training on a MPT as compared to when they were unsure if training took place, which was related to greater confidence than if the perception was that no training took place (yes > unsure > no).

For student and staff nurses, in either training environment (academic, clinical) and all three types of confidence (accurately, no harm to patient, no harm to self) the general trend was that confidence was highest when training occurred, followed by when the participants were unsure if they received training, and the least amount when it was perceived no training occurred (Figure 11).

Table 9: The F values and means for staff nurses in the academic and clinical environments for all three types of confidence (accurately, no harm to patient, no harm to self) with a p-value set at 0.05.

	Staff (n=33)			
	Academic	F(2, 3094)	Clinical	F(2, 3094)
Accurately				
Yes	58.14	42.96	72.81	116.21
No	28.25		27.25	
Unsure	43.68		46.13	
No harm – patient				
Yes	56.57	41.74	70.81	113.71
No	27.62		26.41	
Unsure	41.05		44.35	
No harm – self				
Yes	55.30	41.76	69.43	116.18
No	26.83		25.37	
Unsure	39.21		43.39	

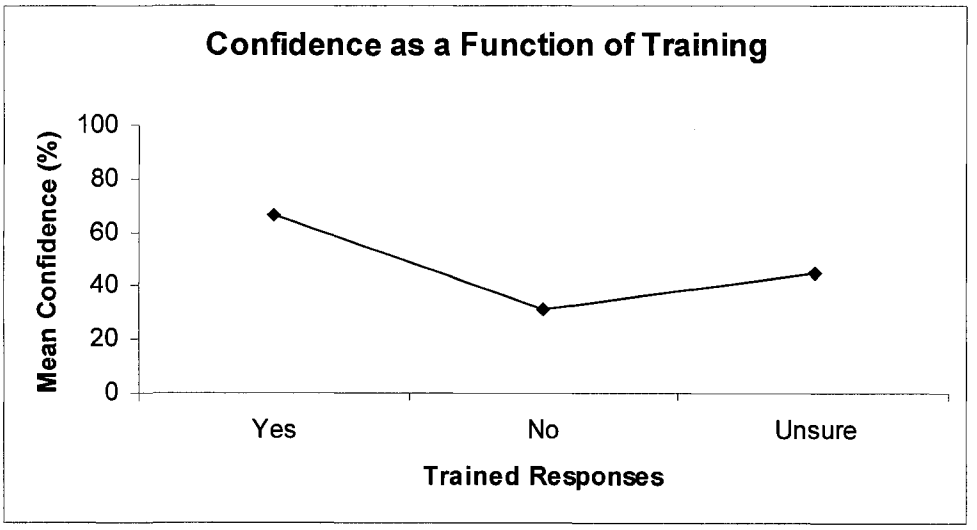


Figure 11: Mean confidence percentage across all 19 MPTs as a function of the training response (yes, no, unsure) for student and staff nurses combined.

Use and Confidence

Student Nurses

For student nurses, the analyses of confidence revealed significant differences as a function of use: at one month, six months and 12 months for all three types of confidence

(accurately, no harm to patient, no harm to self) (Table 10). At one month, six months, and 12 months, the Tukey's HSD Post Hoc tests revealed that each type of confidence was lower in the 'never' use category compared to 'rarely'. Each type of confidence also increased from 'rarely' to the 'sometimes' use response. However, perceived confidence was not significantly different between the 'sometimes', 'occasionally' and 'very often' responses. In general, as use increased confidence also increased.

Table 10: The F values and means for student nurses at one month, six months, and twelve months for all three types of confidence (accurately, no harm to patient, no harm to self) with a p-value set at 0.05.

	1mos	F(4, 3092)	6mos	F(4, 3092)	12mos	F(4, 3092)
Accurately						
Never	42.47		37.77		32.75	
Rarely	64.37	194.17	64.63	323.61	62.35	492.47
Sometimes	76.71		79.09		78.43	
Occasionally	84.16		80.60		82.32	
Very Often	88.00		88.34		86.15	
No harm – patient						
Never	41.98		37.49		32.55	
Rarely	64.32	205.52	64.74	328.90	63.00	494.57
Sometimes	76.93		77.60		77.20	
Occasionally	84.16		80.56		81.29	
Very Often	86.88		86.91		84.55	
No harm – self						
Never	38.84		34.69		29.84	
Rarely	60.63	198.28	59.59	306.05	57.89	468.01
Sometimes	71.44		73.13		73.00	
Occasionally	80.18		75.77		76.80	
Very Often	82.88		82.89		80.98	

Staff Nurses

For the staff nurses, the confidence levels also significantly differed as a function of use at: at one month, six months and 12 months for all three types of confidence (accurately, no harm to patient, no harm to self) (Table 11). For all three time distinctions, the 'never' response was found via Tukeys HSD Post Hoc tests to

significantly differ from all other possible use responses for all three types of confidence. Additionally at one month it was found that the sometimes response was significantly different from the 'very often' response for confidence performing MPTs with no harm to self. At six months there were significant differences between the 'very often' response and the 'rarely' response for accurate confidence, and with the 'sometimes' response for harm to self confidence. At 12 months the 'rarely' response was significantly different from the 'very often' response for all three types of confidence. The 'rarely' response was also significantly different from the 'occasionally' response, and the 'sometimes' response was significantly different from the 'very often' response for no harm to self confidence. In general, for student and staff nurses combined as use increased confidence also increased (Figure 12).

Table 11: The F values and means for staff nurses at one month, six months, and twelve months for all three types of confidence (accurately, no harm to patient, no harm to self) with a p-value set at 0.05.

	1mos	F(4, 622)	6mos	F(4, 622)	12mos	F(4, 622)
Accurately						
Never	24.96		24.78		23.46	
Rarely	77.69	157.70	75.68	159.78	74.18	176.53
Sometimes	81.46		82.03		82.17	
Occasionally	93.04		91.00		91.00	
Very Often	91.03		91.62		91.62	
No harm – patient						
Never	23.77		23.64		22.39	
Rarely	78.46	164.39	75.23	164.26	73.27	179.99
Sometimes	78.33		80.17		80.17	
Occasionally	92.61		91.00		91.00	
Very Often	88.46		88.88		88.88	
No harm – self						
Never	22.97		22.79		22.15	
Rarely	77.12	164.59	75.00	165.73	68.36	164.13
Sometimes	73.54		75.42		75.50	
Occasionally	90.87		89.50		89.50	
Very Often	87.95		88.38		88.38	

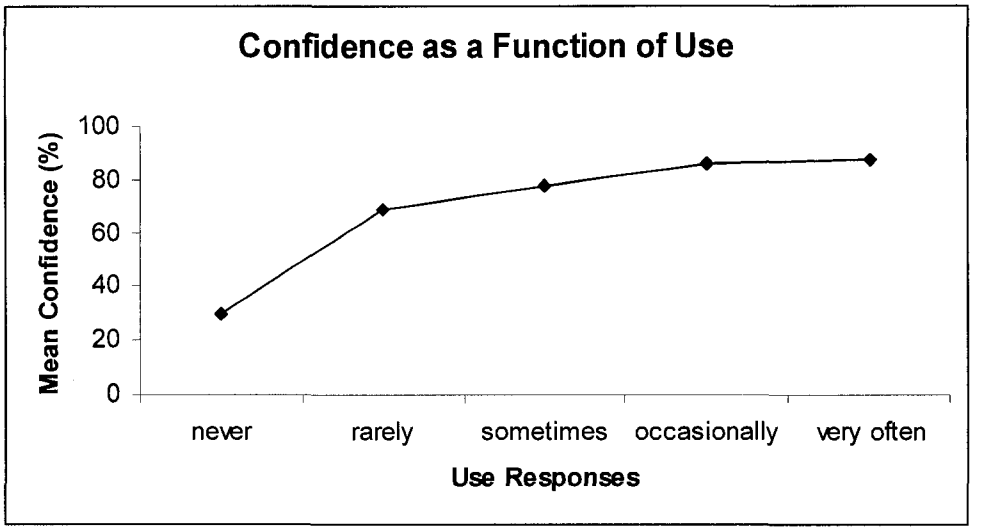


Figure 12: Mean confidence percentage across all 19 MPTs as a function of use responses (never, rarely, sometimes, occasionally, very often) for student and staff nurses combined.

Chapter V
Discussion

Injury

Health care has become the industry with the most injuries and illness reported per year (BLS, 2006). Due to work-related musculoskeletal injuries (WMSI), the nursing occupation continues to lead other industries with the most costly occupational health problems (Nelson et al., 2008). Of the 196 nurses (163 student, 33 staff) in this study, 22 (~11%) indicated that they had suffered an injury at work in the past 12 months. Of these 22 injuries, 2 (~9%) were shoulder injuries, 13 (~59%) were back injuries, and 7 (~32%) were both shoulder and back injuries. Thus, 91% of the reported injuries involved the back. These data support previously reported findings that the majority of WMSI and musculoskeletal pain are focused on the low back (Eriksen, 2003; Maul et al., 2003). Recently, Cameron and colleagues (2008) reported that of the 303 registered nurses that participated in their survey, the most frequently experienced WMSIs were to the low back. Back MSIs are of major concern as such injuries can be severely debilitating for nurses (de Castro, 2006). Not only can back pain negatively affect nurses' ability to perform their job (Cameron et al., 2008), but approximately 12% of nurses will leave the profession each year because of back injuries (Stubbs et al., 1986).

Of the 22 injuries reported in this study, 13 occurred in student nurses and 9 in the staff nurses. Overall, a higher percentage of staff nurses reported an injury in the last 12 months, presumably related to the higher exposure to nursing related duties. Jensen (1990) indicated that when compared to nurses who handled patients less frequently, the nurses who handled patients more frequently have low back pain prevalence rates that were 3.7 times higher. Although some nurses follow the work ethic that 'pain is part of

the job' (de Castro et al., 2006) and work through the pain, others do take time off. The staff nurses in this study took approximately one to two months off, which is similar to findings of Cameron et al. (2008) who found most nurses were away from work from a few weeks to one or two months. The true impact this may have on the current nursing shortage is seen when this time period is broken down into shifts. The average nurse works eight or 12 hour shifts, and approximately 20 shifts a month. Thus, if a nurse took two months off from work due to an injury that is equivalent to 40 shifts or 320 to 480 hours. With not enough nurses working to cover a general schedule, it only becomes more difficult and burdensome on the nurses to make up the lost time. The extra hours a nurse may have to work may cause additional stresses due to increased workload and exposure to risks; this could lead to more nurses being injured.

Even with limited exposure, the student nurses reported suffering injuries. It is possible that the injuries to student nurses occurred because they did not feel comfortable asking for assistance from others (Myers et al., 2002), or they did not have skills advanced enough to properly perform the patient transfers (PTs) and other tasks. The fact that student nurses are getting injured raises concern. Are the student nurses not receiving proper training, or any training at all? Are students attempting to perform PTs that they were not trained on and thus, putting themselves at risk? If the student nurses are not being trained properly, would proper training help reduce the injuries of student nurses and even staff nurses?

Training

Before the student and staff nurses were asked to participate in this study, it was known which PTs were taught as part of the curriculum in the Faculty of Nursing at the

local University. The Scapula Hug Lift (MPTs 5 and 15) is presented to the students in lecture, and the required textbook illustrates the Transfer Belt lift (MPTs 10 and 19). The student nurses indicated that of the 19 MPTs presented they received training on approximately 32% of the lifts in both the academic and clinical environments. Knowing that nurses do receive training on MPTs sounds positive, however, none of the MPTs the student nurses perceived having received training for are ones that are currently a part of the nursing curriculum in the academic environment. This can be viewed as problematic for two reasons. First, if the student nurses are in a clinical placement and believe they have received training on a MPT they may start to perform the lift without caution. This may lead to an increased risk of injury as they may use improper techniques. Additionally, an incorrect perception that training occurred may be why the staff nurses in the Astin and colleagues (2005) study felt that the students lacked a level of mastery they thought students should already have attained when performing such skills as lifting a patient. Secondly, if the student nurses perceive that they have not received training for a MPT they may refuse to perform a lift. Work refusal increases the workload on the other nurses, and thus, increases their risk of injury.

The staff nurses recall being trained on more MPTs than the student nurses. However, these MPTs do not include the Scapula Hug lift that is taught in lecture as part of the nursing curriculum at the local University. Approximately 8% of the staff nurses stated they recently graduated from the nursing program at the local University but more than 65% of the staff nurses received their nursing education from local College in Southwestern Ontario. In general, universities are often viewed as an academic environment that focuses on theoretical learning, whereas colleges take more of an

applied and practical approach as they offer diplomas in such areas as heating and cooling, welding, and horticulture that are considered skilled trades and often involve an apprenticeship program. It may be possible that the staff nurses who attended college were exposed to more PT training due to a more applied approach; however, more research needs to be done in this area to determine if there is a difference between the nursing education curriculums at a university versus a college.

Although it would seem important to teach the student nurses the basics of PTs in the academic environment, one of the purposes of clinical placements is to provide them the opportunity to further advance and refine their skills. Further analyses done for the MPTs the student nurses perceived having received training for showed that more than 85% of the training occurred in the clinical environment. Eleven of the MPTs were further analyzed for the staff nurses, and for more than 72% of these, the training occurred in the clinical environment. The perception that training occurred in the clinical environment may be a result of nurses neglecting what they were taught in the academic environment in order to feel as if they belong and adapt to the nurse who is acting as their preceptor (Hayes et al., 2006). In contrast, it may not be that the student nurses are neglecting lessons taught to them in the academic environment but that the training received is not adequate or explicit enough. Alternatively, it may be that the academic environment does focus more on providing student nurses with general knowledge and nursing ideals, whereas the clinical environment is focused on developing skill sets such as learning how to perform PTs (Hayes et al., 2006).

The academic environment values providing student nurses with knowledge but also acknowledges that nursing is a clinically based occupation, and thus highlights the

importance of skills being taught and/or reinforced in clinical environments. Associated with academic environments, practical instructors accompany student nurses at their clinical placements. Each practical instructor may teach student different types and techniques for performing MPTs based on their own size, experience, and unit where the clinical placement is taking place. In other words the discrepancy may not be whether or not a nurse attended a college or university as many have collaborative programs that acknowledge the importance of both theory and practice, but rather the limitations may lie with the differences in practical instructors. Further research is needed to examine the possible differences between the teachings of practical instructors and to determine if more strict and consistent guidelines are needed to ensure the quality of education provided to student nurses.

Although student nurses enrolled in the local University's Faculty of Nursing are required to spend approximately 100 hours in second year, 200 hours in third year, and two to three days a week in fourth year at clinical placements this does necessarily mean that the units they are assigned to will allow them adequate time to perform and become confident with such tasks as MPTs. Thus, the academic environment becomes a crucial first line of defense in providing students with the basic knowledge in how to perform MPTs. Wilson (2001) did a review of literature and found that studies that provide less than three hours of training on patient handling skills to nurses were ineffective, whereas approximately 40 hours of training over an extended period of time that included the information regarding biomechanics and ergonomics, resulted in significant improvements. The current curriculum at the local University only devotes a portion of a lecture to PT techniques. The student nurses may only be receiving 50 to 180 minutes of

PT training based primarily on lectures. Owens and colleagues (1999) reported that even four to five hours of PT training for student nurses was inadequate, especially as these tasks present a major risk factor for WMSI. The student nurses are also required to purchase a textbook that is considered supplementary to what is taught in lectures. Owens and colleagues (1999) recognize that textbooks are an important part of student education; however, felt that the textbooks also provided poor information when presenting PTs. Therefore, the incorrect perceptions student nurses have towards PT training may be due to an inadequate amount of information being presented to them, and an inadequate amount of exposure time. The student nurses may perceive more training occurring in the clinical environment as it may provide the nurse more opportunities to partake in PTs. The clinical environment allows a nurse to practice the skills that they will use most often through real life experiences. PTs taught and used in the clinical environment may therefore differ from what occurs in the academic environment. If the training that occurs in the academic environment is similar to what occurs in the clinical environment this would help to decrease the apparent disconnect that clearly exists.

Use

The MPTs that both the student and staff nurses indicated they used most often are ones that they perceived having training for but are not ones that are part of the nursing curriculum at the local University. Whether from the side of a bed or from a chair, the one hand non-assistive hook lifts are used most often by the student and staff nurses. In general, this holds true for the staff nurses regardless of the unit that they work in at the local rural Hospital, including nurses who often work as part of a team. For

example, nurses working in the Operating Room (OR) indicated that they would use the one hand hook MPT as often as 50-74% of the time.

Owen (1999) has raised some concern regarding the use of hook lifts. She believes that this method places the patient at an increased risk for injury as pressure is applied to the brachial plexus which may potentially damage the nerve and affect the patient's neck, shoulder, arm, or hands. Additionally, the nurses performing the PT are at an increased risk of injury because the average compressive force to the L5-S1 area is greater than the recommended 3400N. Several studies have reported that PT tasks expose workers to compressions of 4000N to 5000N (Garg and Owen, 1992; de Looze et al., 1994; Daynard et al., 2001). The limitations to these studies however, is that they do not mention the frequency with which these nurses were performing PTs, or patient information such as weight and functional ability. These factors impact on how problematic these types of lifts could be.

The participants were asked to provide reasoning as to why they never use MPTs. The most common response by the student nurses was they perceived not having any training provided to them in either the academic or clinical environment. Some student nurses wrote that the lack of perceived training of a MPT left them feeling as if they "didn't know how to do the transfer properly" or they did not know "when it was appropriate to use such a technique". Additionally, the lack of training left student nurses feeling like they "didn't have any confidence to perform the transfer" and would not use the technique because they "didn't want to perform the transfer wrong and thus hurt my patient or even myself". Having the perception of being trained seems to be very important in having student nurses perform the MPT. However, there were a few student

nurses who stated "I have not been taught how to use a scapula hug lift". This is of interest as it is one of the two methods that the students are actually exposed to as part of the nursing curriculum at the local University. The scapula hug lift is taught via a lecture. It is possible that these students missed that lecture, and as a result, did not receive any training. It is also possible that they just do not recall being trained on the MPT. This may be due to the possibility that they do not use the scapula hug lift often, especially when you consider that the student nurses use the one hand hook lifts most often, and these were also the MPTs they perceived having received training for.

The student nurses also indicated that they did not use the gait belt lifts because they had not received training on them, they were not sure what a gait belt was, and they were not available to use when in clinical placements. The same reasons were given by the staff nurses as to why they do not use the gait belt lifts. Both the student and staff nurses noted that they do not often use the assistive MPTs as they find the hook lifts to be sufficient when performing lifts manually.

An additional reason provided by the student nurses for not using some of the MPTs, more specifically the hug lifts, were that these techniques put them in too close of a proximity with the patient. One student nurse said "I'm not comfortable coming that close to a person/stranger/patient...I feel like it would be too easy to catch a sickness...so I prefer other methods". Where some student nurses reported that they "would never get that close to a patient" others stated they preferred not to use the hug lift MPT methods because they were either too small or the patient was too large. A male student nurse simply stated that it was not because he was afraid to get too close to a patient but that he preferred not to use methods that required at least one of the patient's legs to go in

between his legs because it could be "dangerous for his [anatomy]." Such anecdotal statements broache the issue of whether student nurses are more concerned with their own well being and their own personal values than the knowledge, education, and training they receive through school.

The majority of student and staff nurses, when asked what other types of MPTs they may use, responded that they would perform the hook lifts with two people, or a "Sara" or "Hoyer" lift. A "Sara" lift is a sit-to-stand aid and the "Hoyer" lift is a device with a sling that is used to help transfer a patient from a bed to a chair. Two responses from student nurses differed from this norm. One stated that they "invent their own methods" and they "have back pain at the end of the day". The other student nurse's reply appears more worrisome as they stated that when needing to lift a patient they will "ask a family member for help." The family member of a patient should not be involved in the transfer of a patient as they would not be covered under hospital insurance if something went wrong, and more importantly, they probably have no training, knowledge, nor experience in how to transfer a patient. It could be argued that a family member or personal caregiver may be better equipped to transfer a patient as they would have adapted their methods specifically to that person; more research in this area needs to be done.

Several of the staff nurses noted that the local rural Hospital has a "no lift policy". To most this means that no manual lifts are to be performed; instead, it means that all transfers should be done with the assistance of a mechanical lift (for example the Hoyer or Sara lifts), with the exception of life-threatening emergency situations. However, even the staff nurses that mentioned that they work at a no lift hospital, also indicated that they

used the non-assistive one hand hook lifts and assistive guidance lifts 'rarely' to 'very often'. Even when regulated to use mechanical lifts, nurses still opt at times to manually transfer a patient.

Staff nurses are often reluctant to use mechanical lifts due to the lack of space, time, patient comfort and training on the device (Garg and Owen 1992; Evanoff et al., 2003; Li et al., 2004). Although using a mechanical lift may reduce peak forces experienced by nurses, they are still at risk to injuries as the set-up to transfer a patient via a mechanical lift can be lengthy and the nurse is often in flexed and awkward postures for longer periods of time (Garg et al., 1991a; Smedley et al., 1995; Daynard et al., 2001; Yassi et al., 2001). A "no lift policy" may not always be the best policy.

As the local rural Hospital is a no lift policy hospital, when a patient is first admitted they do not undergo any assessment for moving and handling needs. If a "safe patient handling" policy was implemented instead, each patient would be assessed upon admission as to whether or not they could be transferred manually. A checklist or decision tree would need to include the weight of the patient, the functional ability of the patient (mobility, amount of weight bearing), the frequency of the transfers, the mental characteristics of the patient (tendency towards physically abusive behaviours), and even the patient's preference (comfort, safety, individual dignity) (Appendix 2). Moody and colleagues (1996) asked nurses if they would comply with a 'care plan' which would state such information as the methods for transferring a patient, and found that 67% said they would adhere to the recommendations. Additionally, there may be more nurse buy-in to a "safe patient handling" policy that promotes the health and well-being of the

patient, and the nurse, in comparison to a "no lift policy", which has a negative connotation.

Confidence

Confidence also appears to be positively linked to perceived training and use. Student and staff nurses indicated that the MPTs they had perceived receiving training for and use most often are also the MPTs they have the most confidence performing accurately, without harm to the patient and without harm to themselves. This strengthens the need to ensure that the training occurring in the academic environment is not only adequate but relevant to the PTs used most often as it will effect how nurses perceive their performance ability.

Psychologists associate self-efficacy, or confidence for the purpose of this study, with four key sources; mastery experience, modeling or vicarious experience, social persuasions, and physiological factors (Bandura, 1997). Mastery experience is the idea that an individual gains confidence each time they perform of a task successfully. When an individual views someone else performing a task successfully and believes that they too can perform that task successfully, their confidence increases due to vicarious experiences. When positive feedback or encouragement is provided to the individual performing a task, this is using the key source of social persuasion to increase their confidence. If an individual is able to perform a task free of physiological stressors such as fatigue, fear, and anxiety, they may feel more comfortable and thus confident in their abilities to complete the task. MPT training that encompasses these four key sources would than nurture the development of confidence in nurses and as a result enhance their skills when performing such tasks.

Several studies describe that the traditional training methods provided to nurses include knowledge in body mechanics and personal experiences of the trainer (Owen 1999; Nelson et al., 2003; Trinkoff et al., 2003; Nelson and Baptiste 2006; Vieira 2007). These studies also state that such training methods have not been overly effective, which may be due to the fact that the information regarding body mechanics is no longer relevant or up to date. In the past, instructions regarding how to properly perform lifts or transfers were based on techniques published by NIOSH for lifting a box. However, patients and boxes are very different from one another (Waters et al., 2006). Additionally, the environment in which a box or inanimate object is manipulated is not similar to the environment of a nurse who has to battle space restrictions and the presence of other devices or equipment. Furthermore, this study found that the MPTs currently a part of the nursing curriculum are not the MPTs that nurses perceived being trained on, use most often nor have the most confidence with. It is possible that training techniques need to be updated with more relevant body mechanics information, and other types of PTs need to be taught.

It is possible that not only does the content of the training need to be altered, but maybe the approach to training also needs to change. Nelson and colleagues (2003) discuss that earlier studies regarding the best lifting techniques were focused on men performing the tasks. This is problematic as nursing still remains a predominately female dominated occupation. Future studies need to focus more on women, as sex may play a crucial role in how the tasks are performed. Moreover, nurses may be receiving information regarding what proper lifting techniques should be used but they may not understand how it applies to when they are actually transferring a patient. Studies have

stated that education in "body mechanics" has improved the level of skill a nurse has when performing a transfer, but has not really shown any changes in the rates of back injuries (Nelson and Baptiste, 2006). Recently, an ergonomic training session occurred in an office environment that used traditional and participatory techniques (Okkema, 2008). The traditional training presented ergonomic and biomechanic ideals to the participants in a lecture based method, whereas the participatory training presented the same ideals but involved demonstrations, practice, and feedback. Okkema (2008) found participatory training to be a more effective method than traditional training as it resulted in more significant positive outcomes. Further research needs to be done to see if this approach could also be adapted to nurses in both the academic and clinical environments. If nurses are able to help correct each others postures in PT mock-up situations, they may be better able to visualize and understand how many factors will influence their body postures when transferring a patient, and how they can adapt the ergonomic and biomechanic principles in developing better methods to perform such tasks. Additionally, when a student nurse is acting as the patient to be transferred by another student nurse, they can be prompted to be "combative", thereby providing experiences with different types of patient exposures that may be similar to what occurs in real workplace settings. The participatory training methods would also provide nurses more opportunities to practice PTs, thereby gaining greater confidence in becoming more comfortable performing such tasks.

The four key sources of confidence (Bandura, 1997) as discussed earlier, would be incorporated as part participatory training methods. The presence of physiological stressors are reduced when the opportunity to practice PTs occur outside of the busy

wards where nurses typically perform these tasks. This provides nurses the opportunity to become comfortable with performing such tasks and enhancing their skills in a supportive environment before having to perform them in their normal working situations. Practicing these skills in a nurturing environment also allows for an individual to provide feedback and thus increase confidence through social persuasions. Additionally, being shown how to perform PTs by an instructor, as well as viewing colleagues be praised for their successful completion of the tasks will encourage growth in confidence through vicarious experiences. Furthermore, when the individual themselves successfully performs PTs, they will increase their confidence through mastery experience.

Hypotheses Revisited

Recall this study was designed to answer three main questions that had five hypotheses associated with them. The first question was to answer what types of MPT lifting techniques that nurses receive training for at the local University and rural Hospital. There were two corresponding hypotheses to this research question.

Hypothesis 1: Nurses will indicate more often that they have not received training for the MPT lifting techniques depicted.

The non-parametric chi-square, or goodness-of-fit tests revealed that student nurses only perceived training on approximately 32% of the 19 MPTs. However, the staff nurses indicated however that they perceived being trained on 26 – 58% of the MPTs depicted. Thus, to answer this hypothesis it must be broken down by type of nurse.

For student nurses, we fail to reject Hypothesis 1 as they indicated that they did not perceive receiving training on 68% of the MPTs. In contrast, for the staff nurses we reject Hypothesis 1 as they did indicate perceived training on up to 58% of the MPTs depicted.

Hypothesis 2: Of the MPTs nurses indicate they received training for, the training will have occurred most often in a clinical environment.

Crosstab chi-square tests, or tests of independence determined that the student nurses perceived they received 86% of their training in the clinical environment. Similarly, the staff nurses indicated that they perceived 73% of their training in the clinical environment. Thus, we fail to reject Hypothesis 2 as both staff and student nurses perceived the training occurred most often in the clinical environment.

Overall, the MPT methods that student and staff nurses perceived having been trained on are MPTs 1, 2, 11, and 12. The chi-square analyses revealed they were MPTs that were associated with perceived training, and this was supported by the higher percentage of "yes" responses in comparison to other types of MPTs as seen in Figure 7.

The second research question asked what types of MPT lifting techniques were used most often by student and staff nurses.

Hypothesis 3: Nurses use the MPT lifting techniques without an assistance device most often.

The paired sample t-test statistics showed that at one month, six months, and 12 months the non-assistive lifts were used more often than the assistive lifts, thus we fail to reject Hypothesis 3.

It was found that MPTs 1-5 and MPTs 11-15 were used more often than MPTs 6-10 and MPTs 16-19. Furthermore, Figure 8 illustrates that MPTs 1, 2, 11, and 12 were the methods that student and staff nurses indicated using the most often. These happen to be the same four MPTs found to be trained most often as well.

The last research question was in regard to which MPT lifting techniques nurses were most confident in, in terms of their ability to perform them accurately and without harming the patients or themselves.

Hypothesis 4: Nurses will have the most confidence with MPTs that they have received training for.

One-way analyses of variance (ANOVA) determined there were differences in confidence levels as a function of the training responses (yes, no, unsure). Tukey's HSD Post Hoc tests revealed the general trend that confidence was highest when training occurred and lowest when they perceived no training had occurred.

Therefore, we fail to reject Hypothesis 4, as having the perception of training related to a greater percentage of confidence in performing the MPTs accurately, without harm to the patient and without harm to themselves.

Hypothesis 5: Nurses will have the most confidence with MPTs that they use most often.

One-way ANOVAs showed that there were also differences in confidence levels as a function of use. Tukey's HSD Post Hoc tests generally revealed that as use of a MPT increased the percentage of confidence performing the MPT also increased.

Thus, we fail to reject Hypothesis 5, as using a MPT more often corresponded to a greater percentage of confidence performing the MPT accurately, without harming the patient and without harming themselves.

In other words, the student and staff nurses were most confident performing MPTs that they perceived receiving training for and use most often. This is further supported by Figure 10 that illustrates the MPTs the student and staff nurses had the most confidence with were the same methods indicated earlier that were trained and used most often (MPTs 1, 2, 11, and 12).

Recommendations

Student Nurses

The general findings of this study were that when a nurse perceives being trained on a MPT and uses that MPT often then they will have confidence performing the MPT. Unfortunately, the MPTs that the current nursing curriculum at the local University presents to student nurses are not the MPTs student nurses perceive receiving training for, nor are these MPTs the methods student and staff nurses indicate that they use most often. It is recommended that a few changes be made to the current nursing curriculum. These recommendations are based on increasing the amount of exposure student nurses are provided with. More exposure provides more opportunities to practice and define skills, thus increasing abilities to perform the tasks and associated confidence levels.

A general knowledge of body mechanics should be presented to the students. Although this has been done in the past, it has been based on dated information, and thus needs to be revised to more accurately represent what is now known about lifting and transferring people and not just inanimate objects. It is important that they understand

that lifting an object, pushing a cart, or even working at a computer station and answering phones are tasks that can place them at a risk of injury if they are not aware of proper body postures while they execute these tasks. Presenting the students with a variety of methods illustrating how to transfer a patient is important as it more closely replicates real work conditions. The transfers should be presented in three categories: one person MPTs, team MPTs (two or more people), and mechanically assisted PTs. It should be discussed why it is important to know each of these three categories of PTs. For example, mechanically assisted PTs can help reduce peak force or acute injuries. They should also learn that there are some downfalls to using these methods such as increased time and lack of availability. Team lifts are often ideal in certain units such as the Operating Room where mechanical lifts are not available, and the patient is too heavy to lift by themselves. Lastly, one person MPTs are important to know because the patient may be able to provide some assistance with the transfer may feel degraded being transferred in a mechanical lift, or MPTs may be the only option in an emergency or when mechanical aids are not available.

Informing student nurses about the options will help them to make informed decisions when working in the clinical environment. In addition to being presented information on a variety of lifts and why they should or should not be used, the student nurses should have lab sessions focused on them practicing these tasks. Mechanical lifts may not be available in the labs to practice, making the training in the clinical environment essential. Faculty members should be present during the practice of the PTs as they can provide feedback to the students. Practicing the PTs in the labs is important because reading how a lift should ideally be performed and actually performing the lifts

with a variety of obstacles (uniforms, equipment) can be very different. Additionally, practicing PTs in the lab increases the exposure student nurses have with performing the lifts before entertaining the clinical environment. This will undoubtedly help to increase their level of confidence and quality of care provided to patients.

As time is limited in the academic environment to present students a variety of skills and knowledge, it is also recommended that once MPTs are presented in lecture and practiced in the laboratory, the modules on the computer are introduced to be completed each year until graduation. The computer module could consist of a 20 minute interactive video that reminds the student nurses about the key ideals and practices regarding MPTs, followed by a multiple choice quiz. The multiple choice quiz would test the student nurse on the information provided to them during the video, and a certificate acknowledging the completion of the module could be presented to the students and be required to graduate from the program.

Staff Nurses

The staff nurses indicated that they perceived being trained on, used most often, and had the greatest confidence with the same MPTs as the student nurses. It is important to ensure that nurses receive training upon employment and at least once a year on the PTs they use most often to ensure they are using the best practices when performing transfers. Annual training can be done via an informational video that highlights the important factors to remember. For example, when possible, it is best to orient your body in line with an object you are going to lift rather than twisting your body. This video could be similar to the modules recommended that students be required to complete each year. Alternatively, the nurses could be provided with the option of attending an in-

session (approximately 30 minutes in length) that goes through the same information. Upon employment, nurses should be provided with additional instructions from the nurse they are shadowing as this will not only increase the amount of training they receive, but will also expose them to training they may not otherwise receive (i.e. how to use a particular mechanical lift). Hopefully, training staff nurses and providing them with annual reminder sessions will help reduce work-related musculoskeletal injuries.

In addition to providing the staff nurses with more formal training than they currently receive, it is recommended that there be a shift away from a "no-lift" policy towards a "safe-patient handling" policy. First of all, a "no-lift" policy can create a negative atmosphere and may make nurses afraid to perform certain tasks. A "safe-patient handling" policy promotes well-being for the staff nurses as well as the patients. The "safe-patient handling" policy involves each patient being assessed when admitted to the hospital. This assessment may also occur at a variety of different times during a patient's stay, for example, after surgery and again after a few days of recovery. The assessment can be based on a simple decision tree (Appendix 2) that provides direction to nurses as they determine if the patient should be transferred by one person manually, a team, or a mechanical lift.

Limitations

The study asked the student and staff nurses if they experienced an injury at work over the last 12 months. However, it was only asked if the back and shoulder were injured. Although these are the two most common areas for a nurse to experience an injury, it does not mean that injuries to other areas, for example the neck, do not occur. Additionally, it was only stated that the injury had to take place at work, it did not specify

how the individual was injured, or during what type of a task. It would have been interesting to determine if the injuries experienced occurred while performing a PT or other tasks.

The survey only included 19 MPTs which were chosen based on what has been included in the curriculum at the local University, in the literature, and examples provided by nurses who have over 30 years experience. It is possible that there are other types of one person MPTs that should have been included. However, when asked to provide examples of other types of PTs used, the student and staff nurses only made note of team lifts or mechanically assisted lifts. Furthermore, the 19 MPTs were presented using static photos representing the ideal way the transfer should be performed. There are times in which a patient may not be compliant with the transfer and becomes reluctant or abusive. In these cases the method of performing the PT must be adapted to correspond with the movement of the patient. In other words, a nurse may not have realized they use one of the 19 MPTs depicted as they often have to perform lifts in an adapted way.

It was verbally stated that lessons taught in the classroom, laboratory, and via textbooks were to be considered to have taken place in the academic environment, whereas clinical placement and work experiences were to be considered the clinical environment. Although this was stated, it was left to each participant to interpret whether they considered the location of training to be the academic or clinical environment. Thus, some of the findings may have resulted due to their interpretations of the two definitions.

This study only used student nurses from one university and staff nurses from one hospital. Although a disconnect between these two locations was made apparent this

does not mean that disconnects would exist with other academic or clinical environments. In other words, the findings of this study may not be generalized to other institutions.

Another limitation of this study is that the findings are only the perceptions of the student and staff nurses. Although the current curriculum at the local University was obtained, unfortunately it is not known exactly what the staff nurses were taught in the academic environment, nor what occurred in the clinical environment for either the student or staff nurses.

Future Research

This study focused on one person manual patient transfers. It would be interesting to determine which types of team lifts nurses have perceived they have received training for, use most often, and have the greatest confidence in performing. It would be assumed that similar results would be found with respect to the relationships between training, use and confidence. However, it would be important to determine which patient transfers are most popular, and incorporate those into training sessions and educational curricula.

With Canada being an aging population, the current average age of 40-45 years for working nurses is likely to increase if not remain the same. There are many life changes that can occur in a woman's life at this stage, most notably menopause. Menopause may alter woman's strength capabilities and may place them at even greater risk for such disorders as osteoporosis. With such physiological changes it may be crucial for a nurse to adapt PTs they are using to help reduce their risk of injury. Future studies should focus on the lifting performance and training principles of pre- and post-menopausal women.

As most of the studies regarding PTs have been done in a laboratory, and with students acting as the nurse or patient, it is important that studies in the natural environment take place. Assessing nurses in the clinical environment is important to more fully understand how they perform tasks when a variety of obstacles are taken into consideration. It would be of interest to compare lifting techniques used by nurses in a variety of environments (in a hospital, nursing home, nurses who visit patients in their home), differ from one another. Additionally patient handling skill comparisons could be made between the nurses in a variety of environments with caretakers, who do not have formal nurse training but look after family members in the home.

Chapter VI
Conclusion

The following are a summary of the main findings of this study:

- The student and staff nurses indicated having the most perceived training, use, and confidence for the same manual patient transfers.
- There is a disconnect between what is taught at the local University in the Faculty of Nursing and at the local rural Hospital in terms of manual patient transfer training.
- Training student nurses in the academic environment needs to be expanded to include more hours of practice in the lab and adequate information presented in lecture.
- The clinical environment needs to provide more formal and consistent training to staff nurses annually and upon employment.
- Adopting a "safe patient handling" policy will help to promote the well being of staff nurses and the patients they care for.

Appendices

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WINDSOR
ONTARIO ✦ CANADA

A comparison of manual patient transfer and lifting technique training in an academic and clincial environment.

Dear Participant;

Thank you for participating in this study. The results of this study will be used for the completion of my graduate thesis. The information you provide will be used to help decrease the chances that nurses will be injured while at work. Currently, it is believed that performing manual patient transfers is the main risk factor for injury. This study is investigating what manual patient transfer and lifting methods nurses are taught, teach, use, and have confidence in.

This study involves three groups of participants; fourth year nursing students; staff nurses; and charge nurses. Each group of participants will complete a survey that shows a series of photos that depict different types of lifts from either the side of a bed or from a chair. You will be asked to indicate via the scales provided which lifts you received training for, which lifts you use most often, and which lifts you have the most confidence performing. Senior nurses will complete an extra section that inquires about which lifts you teach most often.

Staff nurses will also be asked if they would like to be video-taped while you perform your normal work activities for approximately two hours. The video will help us to better understand how nurses perform manual patient transfers in their natural working environment, and will assist in the creation of a training video. Please indicate your willingness to volunteer for this important part of the study by ticking off the box on the survey.

To participate in this study please ensure that you have:

i) performed a single person manual patient transfer or lift
ii) been in a clinical placement within the last 12 months (if nursing student)
iii) been working in a clinical environment for more than 12 months (if practicing nurse)

If you should have any comments, questions, or concerns please do not hesitate to contact the primary investigator of the study; Paula van Wyk at vanwyk@uwindsor.ca (519) 253-3000 x2468 or the faculty advisors of the study; Dr. David Andrews at dandrews@uwindsor.ca, x2433 or Dr. Patti Weir at weir1@uwindsor.ca, x2443.

Thank you once again for taking the time to participate in this study. Your input is valued and very much appreciated.

Sincerely,

Paula van Wyk
Masters in Human Kinetics Candidate
Biomechanics and Ergonomics
University of Windsor
vanwyk@uwindsor.ca
519-253-3000 ext: 2468

Subject Code: _____

Section 1: Participant Information

- □ **Please check if willing to be video-taped (staff nurses only)**

- Birth Date (month/year): ____/____ • Height: _____ • Weight (lbs):_____

- Dominant Hand (please circle): Left / Right • Sex (please circle): Male / Female

- Highest Level of Education Completed (please check):
  - Registered Practical Nurse College Diploma □ where: _____
  - Registered Nurse College Diploma □ where: _____
  - Baccalaureate Degree in Nursing □ where: _____
  - Baccalaureate Degree – non Nursing □ where: _____
  - Masters Degree □ where: _____
  - Doctorate □ where: _____

- Do you have a specialized certificate? (please circle)
  1. No 2. Yes If yes, please specify:_____

- What is your present job title? (please check)
  - Registered Practical Nurse (RPN) □
  - Registered Nurse (RN) □

- How many year(s) have you been working as a RPN: _____
  RN: _____

- Which **unit** are you currently working on? _____
  - How long have you worked on your current unit? _____
  - How many shifts do you work a month? _____
  - How long is your shift? _____

- For how many years have you worked as a nurse in a hospital? _____
  - Please list all of the units you have worked on and the approximate duration for each:

Unit	**Duration (years)**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- **Injury History:**
  - Have you suffered a low back injury at work?
    - In the last twelve months? No / Yes
  - Have you suffered a shoulder injury at work?
    - In the last twelve months? No / Yes
      - If yes, did you take time off work? No / Yes
        → How long? _____

Section 2a: Which patient transfer or lifting methods were you TRAINED on and where?

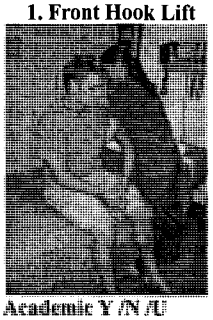
From the Side of a Bed:

Look at the photos below and circle if you were **TRAINED** how to use each lift. If so, were you trained in an academic setting (ie: college/university) or a clinical setting (ie: hospital), or both? Please circle the appropriate answer.

"Y" = Yes **"N" = No** **"U" = Unsure**

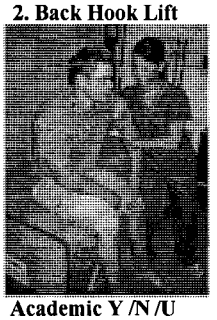
Were you trained how to perform a...

1. Front Hook Lift



Academic Y /N /U
Clinical Y /N /U

2. Back Hook Lift

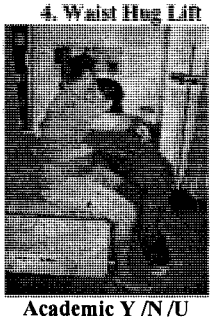


Academic Y /N /U
Clinical Y /N /U

3. Two Arm Front Hook Lift

Academic Y /N /U
Clinical Y /N /U

4. Waist Hug Lift

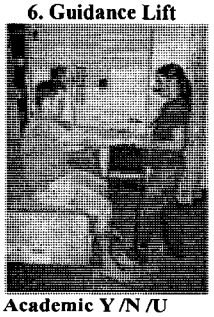


Academic Y /N /U
Clinical Y /N /U

5. Scapula Hug Lift

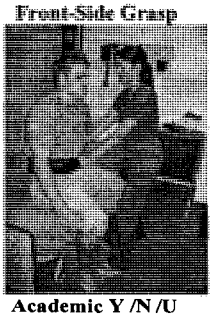
Academic Y /N /U
Clinical Y /N /U

6. Guidance Lift



Academic Y /N /U
Clinical Y /N /U

7. Gait Belt Front-Side Grasp



Academic Y /N /U
Clinical Y /N /U

8. Gait Belt Side-Side Grasp

Academic Y /N /U
Clinical Y /N /U

9. Gait Belt Back-Back Grasp

Academic Y /N /U
Clinical Y /N /U

10. Transfer Belt

Academic Y /N /U
Clinical Y /N /U

Section 2b: Which patient transfer or lifting methods were you TRAINED on and where?

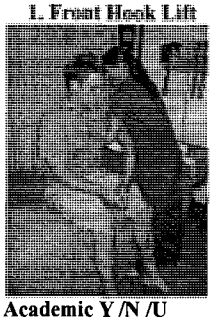
From a Chair (wheelchair/geriatric chair/toilet):

Look at the photos below and circle if you were **TRAINED** how to use each lift. If so, were you trained in an academic setting (ie: college/university) or a clinical setting (ie: hospital), or both? Please circle the appropriate answer.

"Y" = Yes **"N" = No** **"U" = Unsure**

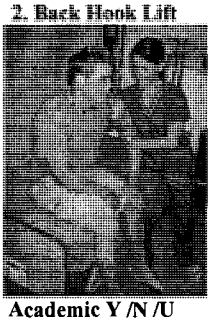
Were you trained how to perform a...

1. Front Hook Lift



Academic Y /N /U
Clinical Y /N /U

2. Back Hook Lift

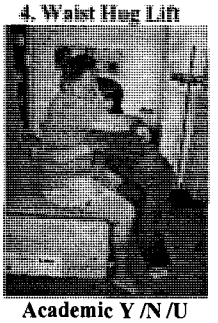


Academic Y /N /U
Clinical Y /N /U

3. Two Arm Front Hook Lift

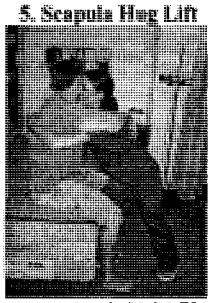
Academic Y /N /U
Clinical Y /N /U

4. Waist Hug Lift



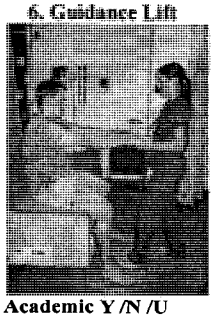
Academic Y /N /U
Clinical Y /N /U

5. Scapula Hug Lift



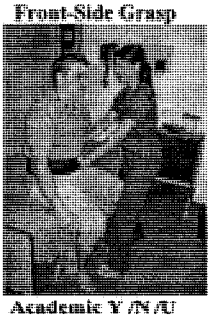
Academic Y /N /U
Clinical Y /N /U

6. Guidance Lift



Academic Y /N /U
Clinical Y /N /U

7. Gait Belt Front-Side Grasp



Academic Y /N /U
Clinical Y /N /U

8. Gait Belt Side-Side Grasp

Academic Y /N /U
Clinical Y /N /U

9. Transfer Belt

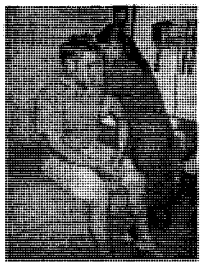
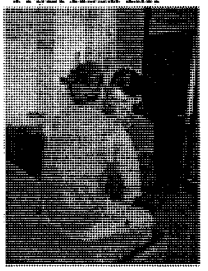
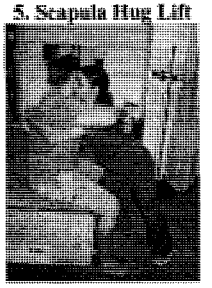
Academic Y /N /U
Clinical Y /N /U

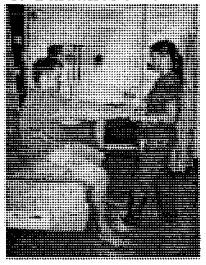
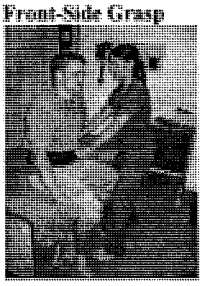
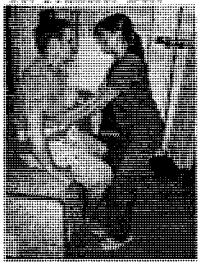
Section 3a: How often do you USE each patient transfer or lifting method?

From the Side of a Bed:

Look at the photos of the lifts below and select the option that corresponds best with the amount you **USE** each patient transfer or lifting method.

1 = Never (0% of the time)
2 = Rarely (1-24% of the time)
3 = Sometimes (25-49% of the time)
4 = Occasionally (50-74% of the time)
5 = Very Often (75-100% of the time)

	1. Front Hook Lift	**2. Back Hook Lift**	**3. Two Arm Front Hook Lift**	**4. Waist Hug Lift**	**5. Scapula Hug Lift**
					
In the last...					
1 month:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6 months:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12 months:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

	6. Guidance Lift	**7. Gait Belt Front-Side Grasp**	**8. Gait Belt Side-Side Grasp**	**9. Gait Belt Back-Back Grasp**	**10. Transfer Belt**
					
In the last...					
1 month:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6 months:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12 months:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

If you answered Never (1) to any of the lifts listed above, please list the reasons why you don't use this lift:____

_____

_____

_____

_____

_____

Please list other lifts you may use and how frequent (i.e. never, rarely, sometimes, occasionally, very often): ____

_____

_____

_____

_____

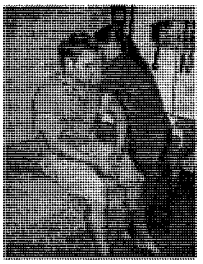
Section 3b: How often do you USE each patient transfer or lifting method?

From a Chair (wheelchair/geriatric chair/toilet):

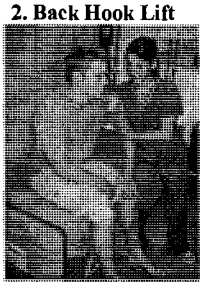
Look at the photos of the lifts below and select the option that corresponds best with the amount you **USE** each patient transfer or lifting method.

1 = Never (0% of the time)
2 = Rarely (1-24% of the time)
3 = Sometimes (25-49% of the time)
4 = Occasionally (50-74% of the time)
5 = Very Often (75-100% of the time)

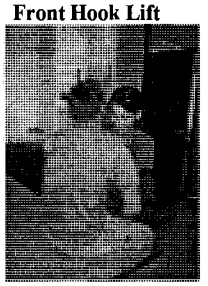
1. Front Hook Lift



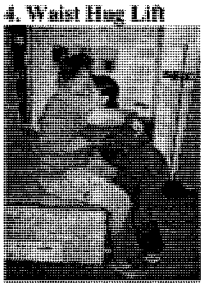
2. Back Hook Lift



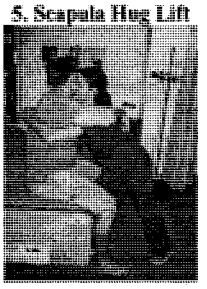
3. Two Arm Front Hook Lift



4. Waist Hug Lift

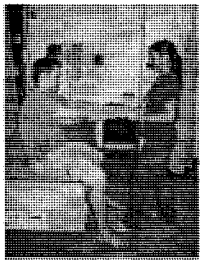


5. Scapula Hug Lift



In the last...															
1 month:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
6 months:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
12 months:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

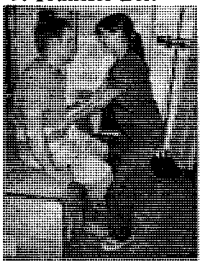
6. Guidance Lift



7. Gait Belt Front-Side Grasp

8. Gait Belt Side-Side Grasp

9. Transfer Belt



In the last...															
1 month:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
6 months:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
12 months:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

If you answered Never (1) to any of the lifts listed above, please list the reasons why you don't use this lift:____

_____

_____

_____

_____

_____

Please list other lifts you may use and how frequent (i.e. never, rarely, sometimes, occasionally, very often): ____

_____

_____

_____

_____

Section 4a: How CONFIDENT are you with each patient transfer or lifting method?

From the Side of a Bed:

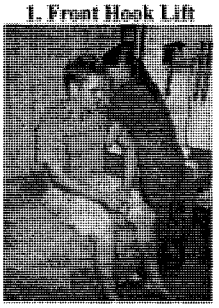
Look at the photos below and indicate a percentage of how **CONFIDENT** you are at performing each lift.

0% -- 10% -- 20% -- 30% -- 40% -- 50% -- 60% -- 70% -- 80% -- 90% -- 100%	
Not at all Confident	Extremely Confident

How CONFIDENT are you in your ability to perform each lift ...

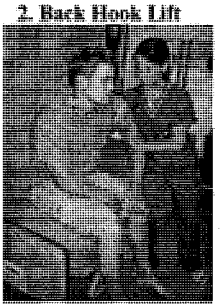
a) **accurately?**
b) **without harming the patient?**
c) **without harming yourself?**

1. Front Hook Lift



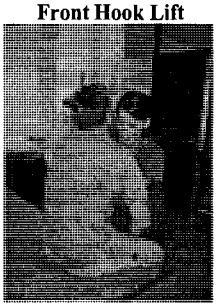
a. _____%
b. _____%
c. _____%

2. Back Hook Lift



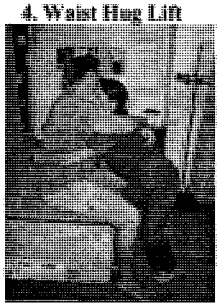
a. _____%
b. _____%
c. _____%

3. Two Arm Front Hook Lift



a. _____%
b. _____%
c. _____%

4. Waist Hug Lift

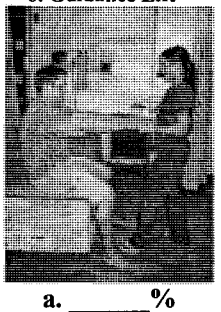


a. _____%
b. _____%
c. _____%

5. Scapula Hug Lift

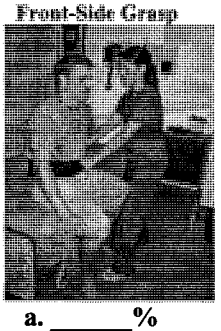
a. _____%
b. _____%
c. _____%

6. Guidance Lift



a. _____%
b. _____%
c. _____%

7. Gait Belt Front-Side Grasp



a. _____%
b. _____%
c. _____%

8. Gait Belt Side-Side Grasp

a. _____%
b. _____%
c. _____%

9. Gait Belt Back-Back Grasp

a. _____%
b. _____%
c. _____%

10. Transfer Belt

a. _____%
b. _____%
c. _____%

Section 4b: How CONFIDENT are you with each patient transfer or lifting method?

From a Chair (wheelchair/geriatric chair/toilet):

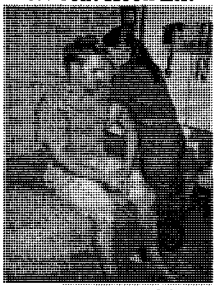
Look at the photos below and indicate a percentage of how **CONFIDENT** you are at performing each lift.

0% -- 10% -- 20% -- 30% -- 40% -- 50% -- 60% -- 70% -- 80% -- 90% -- 100%	
Not at all Confident	Extremely Confident

How CONFIDENT are you in your ability to perform each lift ...

d) accurately?
e) without harming the patient?
f) without harming yourself?

1. Front Hook Lift

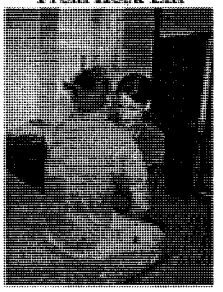


a. _____%
b. _____%
c. _____%

2. Back Hook Lift

a. _____%
b. _____%
c. _____%

3. Two Arm Front Hook Lift



a. _____%
b. _____%
c. _____%

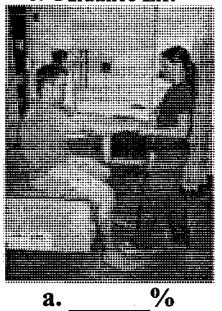
4. Waist Hug Lift

a. _____%
b. _____%
c. _____%

5. Scapula Hug Lift

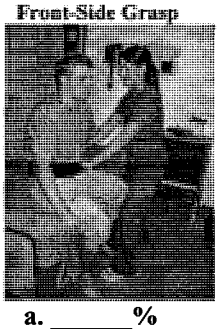
a. _____%
b. _____%
c. _____%

6. Guidance Lift



a. _____%
b. _____%
c. _____%

7. Gait Belt Front-Side Grasp

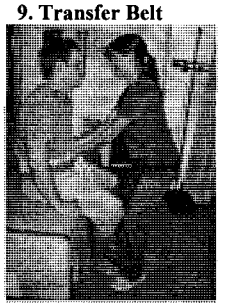


a. _____%
b. _____%
c. _____%

8. Gait Belt Side-Side Grasp

a. _____%
b. _____%
c. _____%

9. Transfer Belt



a. _____%
b. _____%
c. _____%

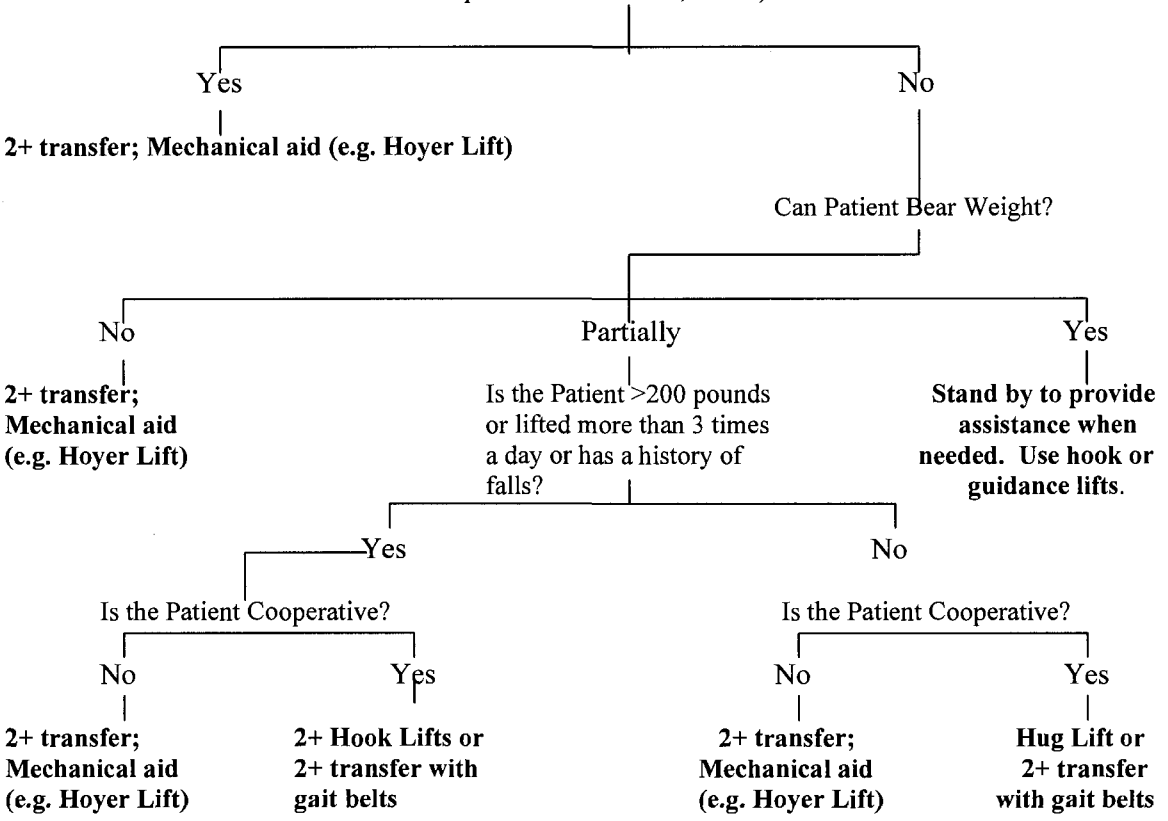
Patient Transfer Assessment Form

Patient Name: _____ Assessment done by: _____
Assessment date: _____

Patient Phase (circle): Admittance Pre-Surgery Post-Surgery Recovery

Weight: _____ Height: _____ Age:_____

Does the Patient have any physical ailments that would affect method of transfer (e.g. severe edema, fragile skin, osteoporosis, respiratory or cardiac problems, equipment such as IV tubes, severe pain or discomfort, etc…)?



Additional Comments:

_____
_____
_____

UNIVERSITY OF
WINDSOR
OFFICE OF THE
RESEARCH ETHICS BOARD

Today's Date:	October 19, 2007
Principal Investigator:	Ms. Paula van Wyk
Department/School:	Kinesiology
REB Number:	07-185
Research Project Title:	A comparison of manual patient transfer and lifting technique in an academic and clinical environment
Clearance Date:	October 19, 2007
Project End Date:	September 30, 2008
Progress Report Due:	
Final Report Due:	September 30, 2008

This is to inform you that the University of Windsor Research Ethics Board (REB), which is organized and operated according to the *Tri-Council Policy Statement* and the University of Windsor *Guidelines for Research Involving Human Subjects*, has granted approval to your research project on the date noted above. This approval is valid only until the Project End Date.

A Progress Report or Final Report is due by the date noted above. The REB may ask for monitoring information at some time during the project's approval period.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the REB. Minor change(s) in ongoing studies will be considered when submitted on the Request to Revise form.

Investigators must also report promptly to the REB:
a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) all adverse and unexpected experiences or events that are both serious and unexpected;
c) new information that may adversely affect the safety of the subjects or the conduct of the study.

Forms for submissions, notifications, or changes are available on the REB website: www.uwindsor.ca/reb. If your data is going to be used for another project, it is necessary to submit another application to the REB.

We wish you every success in your research.

Maureen Muldoon, Ph.D.
Chair, Research Ethics Board

cc: Dr. Patricia Weir, Kinesiology
Mark Curran, Research Ethics Coordinator

This is an official document. Please retain the original in your files.

401 SUNSET, WINDSOR, ONTARIO, CANADA N9B 3P4
TELEPHONE 519-253-3000 ext. 3948 FAX 519-973-7050

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