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Evaluation of Occupational Risk Factors for Nurses and CNAs: Analysis of Florida Workers' Compensation Claims Database

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by

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Dedication

I dedicate this dissertation to my mother, Zorida Mohammed, who did her very best to see that I got an education and never hindered my aspirations, and to Lisa Davis who shouldered much of my responsibilities so that I could have the time to explore and write this scientific work. I also dedicate this dissertation to my guru, Mahavatar Babaji, who has watched over me for many lifetimes and with whose guidance I now prepare for graduation from life itself.

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List of Abbreviations

ANA	American Nurses Association
ADLs	Activities of Daily Living
BLS	Bureau of Labor Statistics
CDC-P	Centers for Disease Control and Prevention
CNAs	Certified Nursing Assistants
EPA	Environmental Protection Agency
LPNs	Licensed Practical Nurses
MMI	Maximum Medical Improvement
MVA	Motor Vehicle Accident
MSD	Musculoskeletal Disorder
NIOSH	National Institute of Occupational Safety and Health
NOC	Not Otherwise Classified
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
RNs	Registered Nurses
USA	United States of America
USF	University of South Florida
WCB	Workers' Compensation Board

Abstract

The purpose of this study was to evaluate occupational risk factors for nurses and CNAs by analyzing the Florida workers compensation claims database for all open cases for the year 2010. Risk factors for the cause of injury, nature of injury, body part injured, as well as, demographic and lifestyle factors were evaluated for a sample of CNAs, nurses and servers

Musculoskeletal injuries lead to most claims even though needlestick injuries receive the most attention. In 2010, health expenditures in the United States neared $2.6 trillion. CNAs, orderlies, and attendants had the highest rates of musculoskeletal disorders of all occupations with an incidence of 249 per 10,000 compared to 34 per 10,000 for all workers. The financial burden of back injuries in the healthcare industry is estimated to add up to $20 billion annually.

Data was extracted for cause of injury, nature of injury and body part injured. Extracted data was analyzed both descriptively and by logistic and linear regression using SAS version 9.2. Results were significant for falls, lifting, being struck and pushing and pulling as major causes for injury. Regarding the nature of injury, sprains and strains constituted the majority of claims. The lower back was the body part most commonly injured in a claim.

It was concluded that emphasis must be placed on risk factors for musculoskeletal injuries such as falls, lifting, temporal and environmental factors, age and lifestyle factors rather than needlestick injuries.

Results from this study will be used to characterize risk factors for occupational injuries in CNAs and nurses, and to devise and implement preventive measures, including new legislation, to curb such injuries

Chapter One

Introduction

The focus of this study was to evaluate the state of Florida workers' compensation claims database for the year 2010. Risk factors for the cause of injury, nature of injury, body part injured, as well as, demographic and lifestyle factors were evaluated for a sample of CNAs, nurses and servers. The group of servers was the control group representative of a baseline population. This chapter begins with some background information on the state of Florida and its current healthcare issues, which will set the stage for the milieu in which worker injuries occur.

Background of Florida

Much of the state of Florida is situated on a peninsula between the Gulf of Mexico, the Atlantic Ocean, and the Straits of Florida. The history of Florida can be traced back to when the first Native Americans began to inhabit the peninsula as early as 14,000 years ago. Written history began with the arrival of Europeans to Florida in 1513. The state was the first mainland realm of the United States to be settled by Europeans. Florida has had many waves of immigration, including French and Spanish settlement during the 16th century, as well as entry of new Native American groups migrating from elsewhere in the South. Free blacks and fugitive slaves also migrated to Florida.

Florida was under colonial rule by Spain and Great Britain during the 18th and 19th centuries before becoming a territory of the United States in 1822. Two decades later, in 1845, Florida was admitted to the union as the 27th US State. Since the 19th century, immigrants have arrived from Europe, Latin America, Africa and Asia.

Culture

The culture of Florida is similar that of the rest of United States, however, as a coastal state, its culture has been influenced by immigrant populations especially those from Latin America and Europe. Florida is a melting pot as well as an international crossroad to the United States. Southern culture remains partly prominent in the state, particularly in the Panhandle. More recently the state has been influenced by the cultures of people moving in from foreign countries and other parts of the United States.

Economy

Florida's culture is also influenced by its economy, most notably from the effects of tourism, a highly important industry in the state. The spoken language is English with one-fifth of the population speaking Spanish and 200 other first languages spoken at home.

Florida is nicknamed the "Sunshine State" due to its warm climate and days of sunshine, which have attracted northern migrants and vacationers since the 1920s. A diverse population and urbanized economy have developed. In 2011 Florida, with over 19 million people, passed New York and became the third

largest state in population. The population of Florida is 19.5 million and this number is growing.

Florida has an older population in the Northwestern counties, to where many retired people migrate each year. Southern Florida, however, is broadly urban with a large youth population and many college campuses and is dependent on tourism.

The economy has developed over time, starting with the use of natural resources in logging, mining, fishing, and sponge diving, as well as cattle ranching, farming, and citrus growing. Tourism, real estate, trade, banking, and retirement destination businesses followed.

Healthcare

Florida has made strides in healthcare with many counties taking local initiatives that focus on relevant health factors such as diabetic screening and attention to other chronic diseases, and obesity. The rate of adult smokers decreased due to outreach from Tobacco Free Florida.

Weight challenge is the number one public health threat facing the state. In Florida, only 35 percent of adults are at a healthy weight and 65 percent are either overweight or obese. One in four high school students is overweight or obese. The State Health Improvement Plan aims to bend the weight curve over the next few years. Manatee County is striving to reduce obesity rates through programs focusing on physical activity and proper nutrition (John H. Armstrong, 2013). Polk County has started a similar weight loss program.

The total number of Health care providers in Florida is 664,760, according to the Bureau of Labor Statistics (BLS). There are 865 nurses per 100,000 of population, in Florida. The Kaiser Statistics in 2007, ranked Florida's, nursing and residential facilities, 3rd among the top ten industries with the highest morbidity at 8,200/100,000. The number of workers employed in occupations with a high risk of morbidity increased by 28.2 %, from 792,978 to 1,060,257. Horizontal violence and bullying exist among nurses and is a risk factor for the health and welfare of nurses and their patients.

The Affordable Care Act resulted in increased numbers of clinicians in the National Health Service Corps. Nearly 10,000 Corps clinicians provide care to more than 10.4 million people who live in rural, urban, and frontier communities throughout the nation. As of September 30, 2012, there were 375 Corps clinicians providing primary care services in Florida compared to 167 in 2008.

In Florida, 49 health centers operate 426 sites, providing preventive and primary health care services to 1,080,695 people. Health Center grantees in Florida have received $161,073,869 under the Affordable Care Act to support ongoing health center operations and to establish new health center sites, expand services, and/or support major capital improvement projects.

Occupational Health

Occupational safety and health professionals include occupational medicine physicians, occupational health nurses, industrial hygienists, and safety professionals. An adequate number of safety and health professionals is

important for workplace hazard identification and the prevention and treatment of work-related injuries.

On average per 100,000 employees, there is one occupational medicine physician, three occupational health nurses, three industrial hygienists, and five safety professionals who are board-certified. There is a lower rate of board-certified professionals in occupational safety and health in Florida compared to the United States average.

Statement of the Problem

Occupational injuries to CNAs and nurses have been of perennial concern to the healthcare industry. One would naturally think that nurses and CNAs would have higher rates of illness from infection, puncture wounds, and chemical exposure compared to a baseline population of servers, simply due to the greater presence of these exposures in the healthcare setting, but, surprise!-in our analysis it appears as though there is not much difference in those claims between these occupations, and the important issues for nurses are related to musculoskeletal injuries, to where our focus will now shift.

Magnitude of the Problem

Back injuries and back pain are an important concern for nursing staff and healthcare organizations. It has a negative impact on the well-being and quality of life of the worker, and affects the productivity of the organization (Gropelli, 2011). Healthcare workers as a whole are more likely to experience a musculoskeletal disorder (MSD) than workers in construction mining or manufacturing (Control, 2009). Among nurses, 52% complain of chronic back

pain (Association, 2012) and there is a lifetime prevalence up to 80% (Edlich, Winters, Hudson, Britt, & Long, 2004). Thirty-eight percent (38%) of nurses report having occupational-related back pain severe enough to require leave from work (Association, 2012). Back pain is so ubiquitous in the profession that many nurses accept musculoskeletal pain as part of their job (Gropelli, 2011).

Twelve percent (12%) of nurses who leave the profession report back pain as a main contributory factor (Association, 2012) and 20% have reported changing to a different unit, position, or employment because of back pain (Li, 2004).

Cost

Employers feel the pinch of slowed production, employee turnover, and medical cost reimbursement (Edlich, Winters, Hudson, Britt, & Long, 2004). The average worker's compensation cost for back pain is $10,698 per case (Services., 2012) and nursing personnel have the highest incidence rate of workers compensation claims for back injuries of any occupation (Association, 2012).

In 2010, health expenditures in the United States neared $2.6 trillion (Kaiser, 2010). In 2010, nursing aides, orderlies, and attendants had the highest rates of MSDs of all occupations with an incidence of 249 per 10,000 compared to 34 per 10,000 for all workers (Labor, 2012). The financial burden of back injuries in the healthcare industry is estimated to add up to $20 billion annually (Control, 2009).

Risk Factors

In healthcare, one of the most frequent cause of injury is the manual handling of patients (Services., 2012) (Gropelli, 2011). Musculoskeletal disorders are aggravated by working in awkward postures with very repetitive or static forceful exertions (Services., 2012). Patients lack the convenience of handles, even distribution of weight, and have been known to become combative during the lifting process (A. Nelson et al., 2004) (A. Nelson, Baptiste, A., 2004).

Obesity Epidemic

According to the United States Centers for Disease Control and prevention(CDC-P), the prevalence of obesity has dramatically increased over the last 20 years. Over a third of adults are overweight and there is a significant increase in obesity as we age (Services., 2012).

The growing prevalence of obesity is prohibitive of manual lifting as the National Institute of Occupational Safety and Health (NIOSH) guidelines recommend that the maximum recommended weight to be lifted by women in the 90th percentile of strength is 46 lbs (Edlich et al., 2004). The cumulative weight lifted by a nurse in one typical 8-hour shift is equivalent to 1.8 tons (A. Nelson, Baptiste, A., 2004). This statistic represents repetitive work which surely exceeds NIOSH guidelines.

Inadequate Staffing

With the changing healthcare environment, health care institutions have been required to become more efficient. One way they have tried to do this is by decreasing staffing and increasing patient loads which are associated with

increased rates of worker injury (Trinkoff, 2005). Many institutions have also decreased the number of Registered Nurses (RNs) utilized (who are generally higher paid than Licensed Practical Nurses (LPNs) or CNAs). A study of 21 hospitals in the Twin Cities found that when RN positions were decreased by 9%, work-related illnesses and injuries among nurses increased by 65% (Trinkoff, 2005).

Shortage of Nurses

The average age of a registered nurse in the United States is approximately 47 years (Services., 2012). Many nurses in the workforce are nearing retirement and 12-18% leave the profession annually due to chronic back pain. The occupational injury rates may aggravate a shortage which will likely result in longer hours and more demanding schedules for practicing nurses (Services., 2012). Fewer registered nurses may mean increased risk of occupational injuries.

Factors with Limited Progress

The teaching of manual lifting techniques has not been successful in affecting injury rates (A. Nelson, Baptiste, A., 2004). There is little evidence that training in manual handling reduces the prevalence of back pain directly, since factors influencing the occurrence of back pain are complex (Hollingdale & Warin, 1997). Patient characteristics and workplace environment may make it difficult to employ perfect technique. Even if proper technique is used, patient weight may exceed NIOSH lifting guidelines.

Other factors that have limited progress have been barriers to the use of equipment, and use of inappropriate equipment. There is evidence that back belts will not be effective in the prevention or nursing injuries (Li, 2004) (A. Nelson, Baptiste, A., 2004). Other barriers to the use of equipment have been patient aversion of the equipment, operationally difficult to use equipment, storage issues, inadequate access to equipment, time constraints, inadequate number of lifting devices, inadequate device training, space restrictions to control equipment, and weight limitations.

Interventions for Injury Prevention

When considering potential interventions for reducing back injuries (see Haddon's Matrix), use of engineering controls which create permanent changes that eliminate risks at the source (A. Nelson, Baptiste, A., 2004) show the most promise.

Behavioral interventions which look to change the patient, like reducing the obesity rates in the United States or decreasing the number of patients in the hospital through health promotion, are beyond the ability of the healthcare facility. Interventions which look to make the nurse more resilient, physically fit, or more aware of body mechanics may help, but do not consistently insulate the nurse from risk. There is evidence that lift teams reduce injury rates, but are not available at all times for all patient-handling tasks (Li, 2004).

Many studies have shown that availability and use of mechanical patient lifts significantly reduce back injuries and other musculoskeletal injuries (Li, 2004). OSHA recommends that manual lifting of residents in nursing homes be

minimized in all cases and eliminated when feasible (Labor, 2012). Engineering controls like room design and use of adjustable equipment (beds, chairs, poles, etc.) also provide consistent prevention when used appropriately by preventing unhealthy body postures.

Healthcare administrators or safe patient handling committees must make smart decisions with room design, general equipment purchase and patient lift equipment to make interventions effective. Several studies support the need for training on patient handling equipment to prevent injuries (A. Nelson, Baptiste, A., 2004). Equipment must be accessible, clean, and well maintained to encourage use. Staffing must also be adequate so that nursing staff will use the patient handling equipment and not perform lifts or transfers manually simply to save time.

Study Objectives

This research will evaluate the workers' compensation claims made by CNAs, nurses, and servers in the state of Florida for the year 2010, to identify risk factors which can be prevented to reduce injuries. Objectives of the current study are as follows:

- Determine the most important adverse health outcomes associated with nurses and CNAs in the state of Florida.
- Evaluate whether or not nurses and CNAs are at greater risk for specific types of adverse health effects from infectious disease, puncture injuries, and chemical exposures compared to a baseline

population of servers, and if so determine the magnitude of these increased risks.

- Determine the risk factors leading to the most important adverse health outcomes in nurses and CNAs as compared to a baseline population.
- Determine whether demographic, environmental, and temporal factors such as age, gender, BMI, lifestyle, time of day, day of week and month of year, are risk factors for adverse health outcomes to nurses and CNAs as compared to a baseline population.
- Evaluate workplace violence as a major risk factor for adverse health outcomes for nurses and CNAs, and how it compares to a baseline population.

Hypotheses

This study will attempt to test the following hypotheses:

1. The most important adverse health outcomes for nurses and CNAs are related to musculoskeletal sprains and strains.
2. Nurses and CNAs are at no greater risks of infectious disease, and chemical exposures compared to a baseline population of servers.
3. The most important risk factors leading to adverse health effects in nurses and CNAs are falls, heavy lifting, pushing/pulling, and being struck.
4. Demographic, environmental, and temporal risk factors play a role in adverse health outcomes for nurses and CNAs.

5. Violence in the workplace is a greater risk factor for nurses and CNAs as compared to a baseline population of servers.

This research will determine if there are increased risks associated with working as CNAs and nurses compared to a baseline population of servers. Results from this study will be used to characterize risk factors for occupational injuries in CNAs and nurses, and to devise and implement preventive measures, including new legislation, to curb such injuries.

Chapter Two

Literature Review

Healthcare workers consistently rank among the top occupations with disabling back injuries, primarily from manually lifting patients. Reported injuries to CNAs are three to four times that of registered nurses.

Among nurses, back, neck, and shoulder injuries are commonly noted as the most prevalent and debilitating. Back injury from patient-lifting may be the single largest contributor to the nursing shortage, with 12 - 18% of nurses leaving or being terminated because of back injury. The risk for musculoskeletal injury is mostly associated with dependent patient care and crosses all specialty areas of nursing. A nurse's personal risk factors such as an abnormal back (eg. scoliosis) make the back more susceptible to occupational injury, even under normal stress conditions. (Edlich et al., 2004).

Risk Factors:

Ergonomic Risk Factors

Ergonomic risk factors such as design of the nurses work station and spaciousness of patient rooms, are related to harmful postures and the practicality of using assistive devices, such as trolleys, critical care beds, and patient platform support surfaces, to handle patients. Inadequate bed space affects manual handling techniques and the ability to carry out nursing care

tasks. Many nurses will join a hospital on the basis of the workspace design of the wards (Hignett & Keen, 2005).

Being a nurse, working at a poorly adapted work place, and having to maintain uncomfortable positions for a long time are related independently to spinal pain. CNAs have a higher risk of work absenteeism due to spinal pain (Genevay et al., 2011).

The American Nurses Association (ANA), is developing partnerships and coalitions, education and training, increasing use of assistive equipment and patient-handling devices, reshaping nursing education to incorporate safe patient handling, and pursuing federal and state ergonomics policy by highlighting technology-oriented safe-patient handling benefits for patients and nurses.

In the absence of ergonomics regulations at national or state levels that protect health care workers, the ANA has taken on alternative approaches to encourage a movement to control ergonomic hazards in the health care workplace and prevent back injuries among the nation's nursing workforce (de Castro, 2004).

Nurses continue to suffer debilitating injuries secondary to manual patient handling. Patient care ergonomics has emerged to redesign patient-care with reduced exposure to physical hazards. Safe patient handling programs are being increasingly accepted by healthcare organizations to prevent occupational injury and to enhance patient safety (de Castro, Hagan, & Nelson, 2006).

Poor working postures in the nursing profession not only occur during patient handling activities but also during administrative tasks. Focusing on

patient-handling in order to determine load on the musculoskeletal system would therefore lead to an underestimation of the total working posture load of nurses (Engels, Landeweerd, & Kant, 1994). It has been shown that many stressful trunk postures are assumed in nursing work during a shift. Future preventive measures should therefore consider not only load handling but also tasks with awkward postures (Freitag, Ellegast, Dulon, & Nienhaus, 2007).

Although overall perception of disability is decreased six months after injury to nurses, disability in job-related activities persist and residual disability after back injury should be addressed in workplace-based prevention programs (Cooper, Tate, & Yassi, 1998).

Hospitals and nursing homes with a higher number of staff have fewer injuries from awkward back postures and forceful lifting during patient handling activities. The use of ergonomic devices is high and associated with less forceful movements and awkward back postures (Koppelaar, Knibbe, Miedema, & Burdorf, 2012).

Educating nurses about body mechanics has not been the answer to preventing back injuries; however, changing the physical demands of the job (i.e., using an ergonomic approach) by using assistive devices (e.g., friction reducers) has been proven to decrease perceived stress and injury rates and increase patient comfort (Owen, 2000).

Lifting

Lifting is an art, not a random task. It is much easier to control the variables that lead to injury in a team of two lifting members than in a population

of nurses. A lifting team study showed that a 95% reduction in lost time injuries can be obtained if a professional lifting team, rather than nurses, lift clients (Charney, Zimmerman, & Walara, 1991)

Transferring equipment designed to assist a healthcare worker when moving someone who is able to take some weight through their legs showed loading on the spine during transferring tasks with or without equipment, was not considered harmful when good technique was employed (Allen, Jackson, Marsden, McLellan, & Gore, 2002).

In one study, more than half of participants had no lifting equipment on their unit, and 74% reported that they performed all patient lift or transfer tasks manually (S. J. Lee, Faucett, Gillen, Krause, & Landry, 2010).

Manually lifting patients has been called deplorable, inefficient, dangerous to nurses, and painful and brutal to patients. It can cause suffering and injury to patients, including pain, bruising, skin tears, abrasions, tube dislodgement, dislocations, fractures, and being dropped by nursing staff during attempts to manually lift. Manual patient lifting is hazardous to healthcare workers, creating substantial risk for lower-back injuries, whether with one or two patient handlers (Hudson, 2005). Handling heavy items during pregnancy is associated with an increased risk of spontaneous abortion (B. Lee & Jung, 2012).

Patient Handling

In response to staff shortages, an aging clinical workforce, and research on safe patient handling, manufacturers have provided an extensive array of patient-lifting technology, including ceiling, floor-based, and sit-to-stand lifts as

well as the slings that are required for their use. Expanded choice, however, may pose challenges to both healthcare facilities and individual clinicians. These challenges, if not successfully resolved, can preclude the consistent, safe, and efficient use of patient-handling devices (Baptiste, McCleerey, Matz, & Evitt, 2008).

Factors influencing moving and handling practice include insufficient equipment, lack of space, unsuitable uniforms, and negative attitudes towards changing practice. Nurses need to be aware of the factors that promote or hinder moving and handling practice (Green, 1996).

In addition to the use of mechanical lifts, there is need to examine other aspects of nursing, including patient care and other ancillary tasks, which comprise the majority of the work-shift and, while often unloaded, exhibit extreme postures that may also lead to injury (Hodder, Holmes, & Keir, 2010).

Back injury training may increase knowledge of risk factors and controls, and may impact behaviors over which individuals have control (e.g., how often they move patients), however, training effectiveness is limited when engineering controls such as patient transfer devices are unavailable (Lynch & Freund, 2000).

Transfer method and resident weight affect lower-back loading. The basket-sling and overhead lift devices significantly reduce back-compressive forces during the preparation phase of a resident transfer. The use of basket-sling, overhead, and stand-up lifts remove about two-thirds of the exposure to lower-back stress as compared to the baseline manual method, and will decrease the occurrence of handling-related lower back injuries.

Nurses risk the development of back pain as a consequence of sudden loadings during tasks in which they are handling patients. If a CNA tries to catch a patient who is falling, large compressive forces are applied to the spine (Andersen & Simonsen, 2005).

The strongest predictor of pain in the neck and shoulder is a previous history of the symptom, with the highest risks associated with specific patient handling tasks that involve reaching, pushing, and pulling. Nurses who report low mood or stress at baseline are more likely to develop neck and shoulder pain later. Workplace psychosocial factors such as job demands, satisfaction, and control, are not associated with incident neck/shoulder symptoms (Smedley et al., 2003).

Falls

Assessment of demographic and workplace risk factors of serious falls in healthcare workers shows that the median number of days lost was higher for females, long-term care workers, licensed practical nurses and CNAs (Alamgir, Ngan, Drebit, Guiyun Li, & Keen, 2011). Overexertion and slip, trip, and fall incidents, are two of the leading sources of workers' compensation claims and costs in healthcare settings (Collins, Bell, & Gronqvist, 2010).

CNAs at Greater Risk

Nursing aides are particularly susceptible to manual handling injuries because they have the primary responsibility for heavy lifting. While nursing aides' manual handling knowledge is adequate, they rarely use mechanical aids. This is partly due to an over-reliance on their strength and abilities, lack of

suitable mechanical aids on the wards, or a lack of familiarity with the available lifting aids. Neither training alone, nor the purchase of equipment alone, is likely to resolve manual handling problems (Bewick & Gardner, 2000).

CNAs and nurses all have high back injury rates compared to other occupations, however, CNAs in nursing and personal care facilities have the greatest problem with disabling back disorders (Jensen, 1987).

CNAs have higher overall injury rates compared to nurses, for no-lost work time and lost work time injuries. Risk of an injury due to lifting is greater among CNAs compared to nurses for both non-lost work time and lost work time injuries. Injury rates among CNAs are high in rehabilitation and orthopedics units. Most of the injuries requiring time away from work are related to the process of delivering direct patient care (Rodriguez-Acosta et al., 2009).

Disproportionate Share of Costs

The overall prevalence of musculoskeletal disorders is high, but a disproportionate share of costs is associated with a small number of cases with chronic pain. This is especially true for cases of occupational back pain, the single most common and costly musculoskeletal disorder in the workplace.

Workplace characteristics associated with prolonged disability among cases of work-related back pain include failure to receive job accommodations, receipt of disability benefit payments, and employment in high-risk industries or jobs that require heavy lifting (Baldwin, 2004).

Temporal Risk Factors

Occupational sprains and strains are related to the time of the day and time into the work-shift. They occur more frequently than expected in the morning hours and in the first 4 hours of the work-shift. They are not found to be related to the starting or ending time or the length of the work-shift. They occur more frequently than expected during the early part of a week, especially on Mondays, and the early part of a year (Choi, Levitsky, Lloyd, & Stones, 1996).

There are more injuries on Mondays than on Tuesdays, than on Wednesdays, than on Thursdays, than on Fridays. There are more injuries in the mornings than in the afternoons for every day of the working week (Wigglesworth, 2006).

Evening and night shift hospital employees were found to be at greater risk of sustaining an occupational injury than day shift workers. Those on the night shift report injuries of the greatest severity as measured by disability leave. Staffing levels and task differences between shifts may also affect injury risk (Horwitz & McCall, 2004).

Age, Gender, and Marital Status as Risk Factors

Workers younger than 25 years of age have an increased risk of back injury, although their claims tend to be low-cost. Older employees have a lower injury rate, but are at increased risk of incurring high-cost back injuries. Newer employees tend to have a significantly increased risk of back injury (Bigos et al., 1986). Those who file workers' compensation claims were more likely to be overweight and married (Fan, Bonauto, Foley, & Silverstein, 2006).

In males, adolescents and young adults have higher claim rates than adults while in females, adults have the highest claim rates and young adults the lowest. Permanent impairment rates indicate that age is positively associated with severity of injury (Breslin, Koehoorn, Smith, & Manno, 2003).

Women workers are significantly less likely than their male counterparts to have their occupational disease claims accepted (Lippel, 2003).

Occupation as a Risk Factor

In terms of occupations, nurses have a higher than expected risk for injury when compared to workers in other industries.

Environmental and Activities Risk Factors

A number of work environments and activities, such as overexertion, bodily reaction from involuntary motions, running and stretching, and slippery surfaces, are associated with a high risk of occurrence of sprains and strains (Choi et al., 1996).

Rurality

Claimants with higher rurality experience less work disability than those with lower rurality. Rurality is related to work disability, however, rather than being associated with more time off after an injury, increased rurality was found to be associated with less time off work. Features of rural environments, cultures, and behavioral patterns may facilitate return to work (Young, Wasiak, Webster, & Shayne, 2008).

Exposure to Body Fluids

Occupational exposure to blood and body fluids is common among health care workers but most exposures confer a low risk of blood borne infection. Occupational exposure assessment programs have many benefits, including optimal management of injuries and acquisition of data on infection control measures, and may protect health care institutions from false claims for compensation (Mallon, Shearwood, Mallal, French, & Dawkins, 1992).

HCWs are exposed to hepatitis B, hepatitis C, and human immunodeficiency viruses in non-hospital settings (Shah, Bonauto, Silverstein, & Foley, 2005). Needlestick injuries, infectious diseases and stress-related claims infrequently result in time-loss claims although they are known to cause great concern in the workplace (Yassi, Gilbert, & Cvitkovich, 2005).

The rate of exposure to HIV antibody positive patients is only 0.24/100 FTE years. Needlestick or other blood contaminated sharps injuries are likely due to failure to observe standard precautions. Occupational exposure to blood and body fluids is common among health care workers but most exposures confer a low risk of blood borne infection (Mallon et al., 1992). Exposure does not equal disease.

Risk factors for cuts and puncture wounds are related to a false move during a procedure, re-assembling devices and handing devices to a colleague. The highest proportion of needlestick injuries is related to recapping of used needles especially during the cleaning process (Butsashvili et al., 2012), (Frijstein, Hortensius, & Zaaijer, 2011).

Worker Characteristics as Risk Factors for Injury

Notable characteristics of injured employees include advancing age, female gender, long working hours, increased Body Mass Index (BMI), history of prior back and upper extremity injuries, no health and wellness activity attendance, and lost time with injury. Back and shoulder strain, falling accidents, and repetitive motion injuries, are the most severe and costly injuries (N. D. Brown & Thomas, 2003).

Risk factors for back injury include having a prior history of back injury claim, younger age, shorter duration of employment, recent job change, and history of a non-back injury claim. Among heavy lifters, working overtime and being female, increased the risk of injury (Daltroy et al., 1991).

Many workers with one workers' compensation claim make further claims. A reduced time to the second claim is associated with male gender, younger age, and some types of injury and accident (Cherry, Sithole, Beach, & Burstyn, 2010).

One-fourth of workers who receive work disability compensation for a back injury self-reported re-injury after returning to work (Keeney et al., 2012).

Ineffective Training of Nursing Students

The training of nursing students in manual handling of patients suggest that they do not practice the techniques they had been taught. The explanation for this theory-practice gap was the influence of other nurses. Male students and younger students were more susceptible to socialization into poor ward practice, than others. Other reasons for not using recommended techniques were unavailability of manual handling aids, lack of time, and patient needs. The

complexity of relationships within the nursing team emerges, with students ever aware of the impression they were making with regard to their assessment of practice, and their need to be accepted as a member of the team (Swain, Pufahl, & G, 2003).

Although great reliance is placed on clinically based mentors to ensure student nurses gain the required competencies for safe moving and handling practice, little attention is given to this topic during practice placements (Kneafsey, 2007).

Obesity as a Risk Factor for Injury

Obesity has become a major public health concern in the United States, and has ultimately affected occupational health, including workers' compensation. Obesity has been determined to contribute to work-related injuries. Clinical psychological distress, such as depression and anxiety, may be contributory factors to weight gain. Poor perceptions in food quality and caloric estimations may also relate to this problem (Betters, 2010).

Obese individuals have increased morbidity and use of health services. Less is known about the effect of obesity on workers' compensation. There is a clear linear relationship between Body Mass Index (BMI) and rate of claims. The claims most strongly affected by BMI are related to lower extremity, wrist/hand, and back. These injuries usually result in pain and inflammation due to sprain/strain, and contusion, or bruising from falls/slips, lifting, and exertion.

The combination of obesity and a high-risk occupation is particularly detrimental. Maintaining a healthy weight not only is important to workers but

should also be a high priority for employers, given the strong effect of BMI on workers' injuries (Ostbye, Dement, & Krause, 2007).

Healthcare staff working with bariatric patients are exposed to manual handling injury risk throughout the journey that such patients take within the healthcare system. The risks to which nurses are exposed are significant. Risk factors are influenced by the nature and design of the range of environments within which patient movement is undertaken, the limited range of handling equipment available for use with bariatric patients, and the efficacy of organizational procedures and training (Cowley & Leggett, 2011).

Lack of Safe Patient Handling Legislation

On June 17, 2005, Governor Rick Perry of Texas signed into law Senate Bill 1525, making Texas the first state in the nation to require hospitals and nursing homes to implement safe patient handling and movement programs.

California, Massachusetts, New York, Washington State, and Ohio have implemented similar safe patient handling regulations (Hudson, 2005). It would be advantageous to the state of Florida to follow with no manual lifting policies of its own, the benefits of which should be made clear with this current research project.

Lifestyle Risk Factors

Lifestyle risk factors are associated with a greater risk of back injuries. Workers with low Body Mass Index (BMI) are three times less likely to have back pain when compared to participants who have a high BMI (Bidassie, McGlothlin, Mena, Duffy, & Barany, 2010). High workers' compensation costs are related to

individual health risks, especially smoking, poor physical health, physical inactivity, and life dissatisfaction. Workers' compensation costs increase with increasing health risk status. Low-risk employees have the lowest costs. Focusing on employee health status provides an important additional strategy for health promotion programs (Musich, Napier, & Edington, 2001).

The most recent national data on obesity prevalence among the United States adults, adolescents and children, show that more than one-third of adults and almost 17% of children and adolescents were obese in 2009–2010. Differences in prevalence between men and women diminished between 1999–2000 and 2009–2010, with the prevalence of obesity among men reaching the same level as that among women.

Age differences in obesity prevalence vary between men and women. The prevalence of obesity is higher among older women compared with younger women, but there is no difference by age in obesity prevalence among men. Among children and adolescents, the prevalence of obesity is higher among adolescents than among preschool-aged children.

There has been no change in obesity prevalence in recent years; however, over the last decade there has been a significant increase in obesity prevalence among men and boys but not among women and girls overall. The Healthy People 2010 goals of 15% obesity among adults and 5% obesity among children were not met (Cynthia L. Ogden, 2012).

Tobacco users have more hospital admission days, a longer average length of stay, higher average outpatient payments, and higher average insured

payments, than non-smokers. Tobacco use is correlated with other high-risk behaviors. Tobacco users add to employer costs for health insurance as well as for absenteeism, workers' compensation, and life insurance (Penner & Penner, 1990).

Numerous studies have linked alcohol impairment on the job, to occupational injury. There is also an association between non-work drinking and occupational injury. Individuals with higher alcohol consumption are more likely to be male, and have high job-stress. Drinking off the job is associated with workers' compensation injury claims. Experience in life outside of work may influence work outcomes (Ragland et al., 2002).

Drug-free workplace interventions are associated with a decrease in injury rates for the services industry. It is associated with a reduction in the incidence rate of more serious injuries involving four or more days of lost work time (Wickizer, Kopjar, Franklin, & Joesch, 2004).

Job Stress as a Risk Factor for Injury

Workers' compensation "stress" claims symptoms are precipitated by interpersonal issues. It is believed that unfair treatment cause stress symptoms (Eliashof & Streltzer, 1992). Job strain and associated depression risks represent a substantial, preventable, and inequitably distributed public health problem. The social patterning of job strain-attributable depression parallels the social patterning of mental illness, suggesting that job strain is an important contributor to mental health inequalities. The number of compensated mental stress claims compared to job strain attributable depression cases, suggest that

there is substantial under-recognition and under-compensation of job strain attributable depression (LaMontagne, Keegel, Vallance, Ostry, & Wolfe, 2008).

There is growing evidence that occupational injuries influence workers emotional and physical wellbeing, extending healthcare use beyond what is covered by the Workers' Compensation Board (WCB). Although the WCB system is the primary mechanism for processing claims and providing information about workplace injury, the consequences of workplace injury extend beyond what is covered by the WCB into the public healthcare system (J. A. Brown, McDonough, Mustard, & Shannon, 2006).

The novel definition of job strain (high physical demand, low decision latitude) is more strongly associated with patient-handling injury than the traditional definition of job strain (high psychological demand, low decision latitude). Work organization factors affect employee mental health (Schoenfisch & Lipscomb, 2009). Work-related stress claims are the most expensive form of workers compensation claim. This is due to the lengthy period of absence and complicated medical care, which are characteristic of these claims (Guthrie, Ciccarelli, & Babic, 2010).

The work pressure that nurses experience during their normal duties could prevent them from working safely during everyday work (Engels, van der Gulden, Senden, Kolk, & Binkhorst, 1998). Personality factors are associated with poorer outcome, particularly cost and health. Individuals with extreme personality traits experienced poorer health and vocational rehabilitation outcomes. The combination of high neuroticism and low extraversion which is a pattern often

characterized as anxious and socially avoidant, was found to be consistently related to poor health outcomes (Wall, Ogloff, & Morrissey, 2006).

Physical Assault

Regarding non-fatal occupational assault injuries, women sustain a higher incidence than men. Nighttime work shifts are associated with greater risk of assault for female healthcare workers. Although the majority of healthcare sector employees are women, the risk of assault injuries is higher in male employees. (Islam, Edla, Mujuru, Doyle, & Ducatman, 2003).

Assault management training is associated with less severe injuries. Risk factors such as working in isolation, the occupation of mental health technician, and working on a geriatric medical hospital unit, are associated with more severe injuries. Assaults on staff in psychiatric hospitals represent a significant and under-recognized occupational hazard (Bensley et al., 1997).

Injuries are associated with resident lifting, and assaults are associated with contact with combative residents. A higher risk of assault is found among women and higher risks of injury and assault are observed among full-time employees compared to per diem or pool agency workers. Weekend shifts have a higher rate of injuries and a lower rate of assaults than weekday shifts (Myers, Kriebel, Karasek, Punnett, & Wegman, 2005).

Progress to reduce violence has been made in most of the highest hazard industries within the healthcare sector, with the notable exception of psychiatric hospitals and facilities caring for the developmentally disabled. State legislation requiring healthcare workplaces to address hazards for workplace violence has

had mixed results. Insufficient staffing, inadequate violence prevention training and sporadic management attention are seen as the key barriers to violence prevention in healthcare workplaces (Foley & Rauser, 2012).

Workers on evening and night shifts have significantly higher rates of being victims of violence, as do those working on weekends (McCall & Horwitz, 2004).

In Ontario, Canada, from 1987 to 1989, there were 100 or more allowed workers' compensation claims among nurses for injuries due to violence. The annual rates for such claims were higher among male nurses (13.9 per 1000) than among female nurses (1.4 per 1000). The rates for such claims were significantly higher among both male and female nurses compared to the general population. Nurses and other health care workers are at risk for violent injury in the workplace and workers compensation data likely underestimate the extent of the problem because no statistics are available for denied claims or claims with no lost time, and many assaults are unreported (Liss & McCaskell, 1994).

Sexual Assault

Sexual assault in the workplace and the related risk factors has not been well studied. Occupations of rape victims are similar to occupations identified as high risk for other intentional injuries. Rape incidents are characterized by isolation from the public and from co-workers (Alexander, Franklin, & Wolf, 1994).

Horizontal Violence among Nurses

It is clear and unfortunate that horizontal violence exists in nursing today. It affects nursing in all areas. When tension is elevated in patient care areas, nursing staff are not likely to perform at their best and the result is often poor patient care (Woelfle & McCaffrey, 2007).

Horizontal violence is defined as harmful behavior via attitudes, actions, words and other behavior that is directed towards workers by colleagues. Bullying in the workplace is described as repeated, health-harming mistreatment of one or more persons by one of more perpetrators in the form of verbal abuse, threatening, humiliating or offensive behavior or actions. Horizontal violence and bullying can be devastating and can negatively affect the work environment for all involved.

Horizontal violence and bullying can result in sleep disorders, poor self-esteem, hypertension, eating disorders, nervous conditions, low morale, disconnectedness, depression, impaired personal relationships, removal of self from the workplace, and suicide.

Horizontal violence can be costly to organizations, leading to job dissatisfaction, burnout and physical stress. Research indicates that where this behavior is allowed, many nurses will leave the environment and even the profession. In some instances, for example, when student clinical groups rotate through a unit, it may even affect an institution's ability to recruit new nurses.

Opioid Treatment as a Risk Factor for Prolonged Disability and Re-injury

Prescribing opioids for more than 7 days for workers with acute back injuries is a risk factor for long-term disability (Franklin, Stover, Turner, Fulton-Kehoe, & Wickizer, 2008). Opioid therapy does not arrest the cycle of work loss and pain (Volinn, Fargo, & Fine, 2009).

Given the negative association between receipt of early opioids for acute lower back pain and outcomes, the use of opioids for the management of acute lower back pain may be counter-productive to recovery and is a risk factor for continued disability. Opiate prescription is significantly associated with daily tobacco use, pain radiating below the knee, and being in severe injury categories (Stover et al., 2006).

Geographic variation of early opioid prescribing for acute lower back pain is important and almost fully explained by state-level contextual factors. Clinician and patient interaction and the subsequent decision to use opioids are substantially framed by social conditions and control systems (Webster, Cifuentes, Verma, & Pransky, 2009).

Workers' Compensation and Chronic Pain

Filing a workers' compensation claim for costs, retaining a lawyer, or higher pain intensities are limited predictors of longer claims. As the ratio of compensation to pre-injury wage increases, there is moderate evidence that the duration of the claim increases and that disability is more likely. Compensation status, particularly combined with higher pain intensities, is associated with poorer prognosis after rehabilitation treatment programs (Teasell, 2001).

Among individuals with acute work-related back pain, high pain and disability, low recovery expectations, and fears that work may increase pain or cause harm, are risk factors for chronic work disability (Turner et al., 2006).

One study showed that in 1999, the back pain claim rate was 60 times higher in Washington State than in Japan. Back pain is common among workers both in Japan and the United States, but there is no simple or necessary relationship between that symptom and how it manifests itself in one country or another. What causes the startling disparity in back pain claim rates between Japan and the United States is a puzzle which remains unsolved (Volinn, Nishikitani, Volinn, Nakamura, & Yano, 2005).

Chapter Three

Methods

Data Source

In order to investigate these hypotheses all open claims for CNAs, nurses (RNs and LPNs), and servers, for the year 2010 were reviewed from the claims database of the Florida Workers' Compensation Bureau of Data Quality and Collection. This database is a compilation of all recorded occupational injuries in the State of Florida for the year 2010.

There was a total of 40,460 open claims in the dataset of which were extracted all 501 open CNA claims, all 695 open nurse claims, and all 523 open server claims.

Figure 1 displays the numbers of open cases which were extracted from the claims database.

The principal investigator, Sheila Mohammed, extracted data based on the cause of injury, the nature of injury and body parts injured. Other information extracted included demographic and temporal data including age, gender, time of injury, day of injury, month of injury, year of injury, length of time workers were off-work, weekly wages received during off-duty periods, and city and county in which the injury took place.

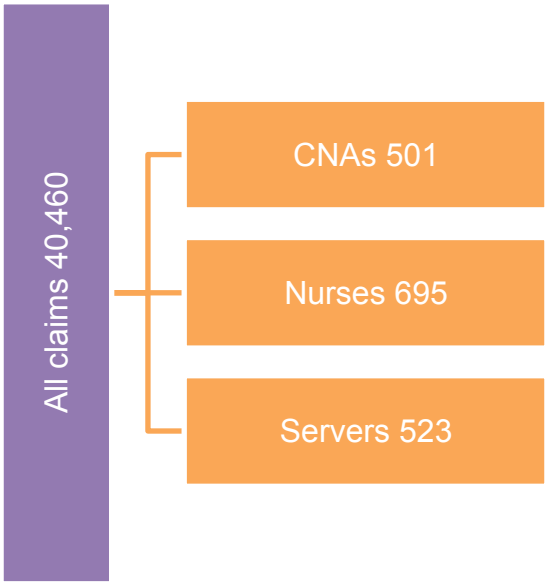

Figure 1: Data Extracted as Numbers of Open Cases for CNAs, Nurses, and Servers

Data from the claims database was available in a coded format and data codes dictionaries were downloaded from the website of the International Association of Industrial Accident Boards and Commissions (IAIABC) to decipher the codes. Please refer to the following website: http://www.iaiabc.org/i4a/pages/index.cfm?pageid=3370

The Workers' Compensation Insurance Organizations Injury Description Codes (see Appendices) were used to decipher the cause of injury, the nature of injury and the body part injured.

The data was evaluated as a cross-sectional study. In order to evaluate risk factors for the causes of injuries for CNAs, nurses, and servers, all cases of adverse health outcomes from falls, lifting, MVAs, push-pull, being struck, trip, handling, hold-carry, reaching, struck by object, toxic substance, body part caught in something, broken glass, hand tool, powered tool, repetitive motion,

animal/insect bite, psychological trauma, burn, not otherwise classified, twisting, and mold, were counted, and frequencies were calculated and expressed as a percentage. The data was then presented in tables and charts using Microsoft Excel software 2010 edition.

Descriptive Data Analysis

Risk factors for the cause of injury were then analyzed individually for all three study groups and displayed on charts. Risk factors for the causes of injury were narrowed to the four most common risk factors (other than falls) which were handling, push/pull, hold/carry, and lifting. Next, only lifting and handling risk factors were analyzed for all three groups.

The nature of injury was analyzed for fracture, contusion, sprain/strain, infection, laceration, puncture, burn, occupational disease, concussion, and hernia, as only these were in the database we analyzed. The nature of injury was analyzed for individual groups as well. The nature of low frequency injuries were also analyzed for laceration, puncture, burn, chemical exposure, concussion, hernia, and infection, first with all three groups together and then by individually groups.

Occupational disease by chemical exposure, puncture injuries, and infection were analyzed for all three study groups.

Injury to various body parts were analyzed for all three study groups by counting the number of injuries per body part, calculating the frequencies, and expressing it as a percentage. Injuries to multiple body parts, head/skull, face/eye/nose, neck, shoulder, arm, elbow, forearm, hand/wrist, finger/thumb,

chest/trunk, lower back, sacrum/coccyx, abdomen, hip, thigh, knee, leg/lower extremity, multiple body parts, ankle/foot, and toe were evaluated. Sprain/strain, contusion, and fracture injuries to these various body parts were analyzed.

Injury-related length of time off work was evaluated in six-month periods from 0 to 60 months for all three study groups. Weekly pay in dollars for injury-related time off work was evaluated from $0 then in increments of $250 until $1000 for all three study groups. The number of injuries by age groups was also evaluated.

Temporal risk factors were evaluated by counting the number of injuries by time of day in one hour increments over 24 hours for CNAs, nurses, and servers. Injuries that occurred during three eight-hour shifts (23:01-07:00, 07:01-15:00, 15:01-23:00) were evaluated and injuries by the day of the week and the month of the year were also evaluated for temporal risk factors.

The numbers of injuries were evaluated for each group by city and by county in the state of Florida. All data extracted and analyzed were displayed on data tables, charts and graphs.

Data analysis was conducted using student t-tests to determine statistically significant differences among the groups for the major risk factors of interest. Substantial differences in demographic factors were analyzed by further t-tests conducted by stratifying each population by the demographic of interest.

Logistic Regression Analysis

Logistic regression analysis and linear regression analysis for outcomes of interest were performed to produce prevalence odds ratios and parameter

estimates respectively, to help determine whether there was increased association with an adverse health outcome, compared to the baseline population, and to determine the magnitude of such an association. The Statistical Analysis System (SAS) version 9.2 was used to analyze the data.

Logistic regression was used to analyze nature of injury among the study groups. Worker gender and age categories of <=45yrs vs >45yrs were analyzed for statistical significance. Time to filing a claim was calculated as the difference between the date of injury and date the employer was made aware that an injury had occurred. Logistic regression was also used to analyze the causes of injury and to analyze permanent impairment to evaluate whether or not groups that are associated with a claim have some degree of permanent impairment.

Linear Regression Analysis

Linear regression was used to analyze time to recovery which was calculated by subtracting the date of maximum medical improvement from the date of injury. The duration of workers' compensation benefit was calculated by subtracting the benefit through date from the date of injury, evaluated as a possible insight into relative costs.

In order to evaluate how the results compared to findings in other studies, a comprehensive literature search and review was conducted using key search terms in PubMed. Data on injuries presented in the scientific literature, was compared to the results of this research project to determine if there were similar findings.

Other risk factors for injuries within the study populations such as age, gender, BMI, lifestyle and personal traits, shift work, time of day, previous injuries, workplace violence, horizontal violence among nurses, mental stress and job strain, overexertion, bodily reaction to sudden load, and falls, were evaluated. Interventions to prevent injuries such as the use of lift teams, tag teams, adequate staffing and training, mechanical lifts, fall prevention, and health and fitness programs, were evaluated and discussed.

Chapter Four

Findings and Analysis

In analyzing the data, we found 22 causes of injury for the three study groups. The number one risk factor for injury across all groups was falls followed by lifting, being struck and pushing and pulling

Table 1: Causes of Injuries for CNAs, Nurses, and Servers

Causes	**CNAs**	**Freq.**	**%**	**Nurses**	**Freq.**	**%**	**Servers**	**Freq.**	**%**
Fall	110	0.2196	21.96	235	0.3381	33.81	218	0.4168	41.68
Lifting	92	0.1836	18.36	61	0.0878	8.78	22	0.0421	4.21
MVA	5	0.0100	1	21	0.0302	3.02	2	0.0038	0.38
Push-Pull	23	0.0459	4.59	38	0.0547	5.47	2	0.0038	0.38
Struck	42	0.0838	8.38	46	0.0662	6.62	3	0.0057	0.57
Trip	1	0.0012	0.12	3	0.0043	0.43	8	0.0153	1.53
Handling	8	0.0160	1.6	9	0.0130	1.3	10	0.0191	1.91
Hold-Carry	11	0.0220	2.2	7	0.0101	1.01	4	0.0076	0.76
Reaching	3	0.0060	0.6	6	0.0086	0.86	6	0.0115	1.15
Struck-Object	3	0.0060	0.6	7	0.0101	0.86	12	0.0229	2.29
Toxic Substance	5	0.0100	1	3	0.0043	0.43	4	0.0076	0.76
Caught In	6	0.0120	1.2	11	0.0158	1.58	2	0.0038	0.38
Broken Glass	0	0	0	0	0	0	20	0.0382	3.82
Hand Tool	0	0	0	0	0	0	11	0.0210	2.1
Powered Tool	0	0	0	1	0.0014	0.14	10	0.0191	1.91
Repetitive Motion	1	0.0012	0.12	1	0.0014	0.14	1	0.0019	0.19
Animal/Insect Bite	0	0	0	1	0.0014	0.14	2	0.0038	0.38
Psych. Trauma	0	0	0	1	0.0014	0.14	3	0.0057	0.57
Burn	1	0.0012	0.12	0	0	0	8	0.0153	1.53
NOC	53	0.1058	10.58	57	0.0820	8.2	23	0.0440	4.4
Twisting	6	0.0120	1.2	14	0.0201	2.01	7	0.0134	1.34
Mold	0	0	0	1	0.0014	0.14	0	0	0

Table 1 summarizes the causes of injury presented in the dataset. Among the three groups, servers had the greatest percentage of claims related to falls at 41.68%, followed by nurses with 33.81% falls and CNAs at 21.96% had the least injury from falls. In terms of lifting injuries, CNAs had the greatest percentage at

21.96% as compared to nurses at 8.78% and the baseline population, servers, at 4.21%. Push/pull injuries were similar for nurses and CNAs at 5.47%, and 4.59% respectively, while for the baseline population, servers, there were only 0.38% injuries from pushing and pulling. Logistic regression analysis showed that CNAs were 7 times as likely to claim a push/pull type injury, while nurses were 10 times as likely to claim this type of injury compared to servers.

CNAs were most often struck at 8.38%, while that for nurses was 6.62%. The baseline population was being struck at the relatively low percentage of 0.57%.

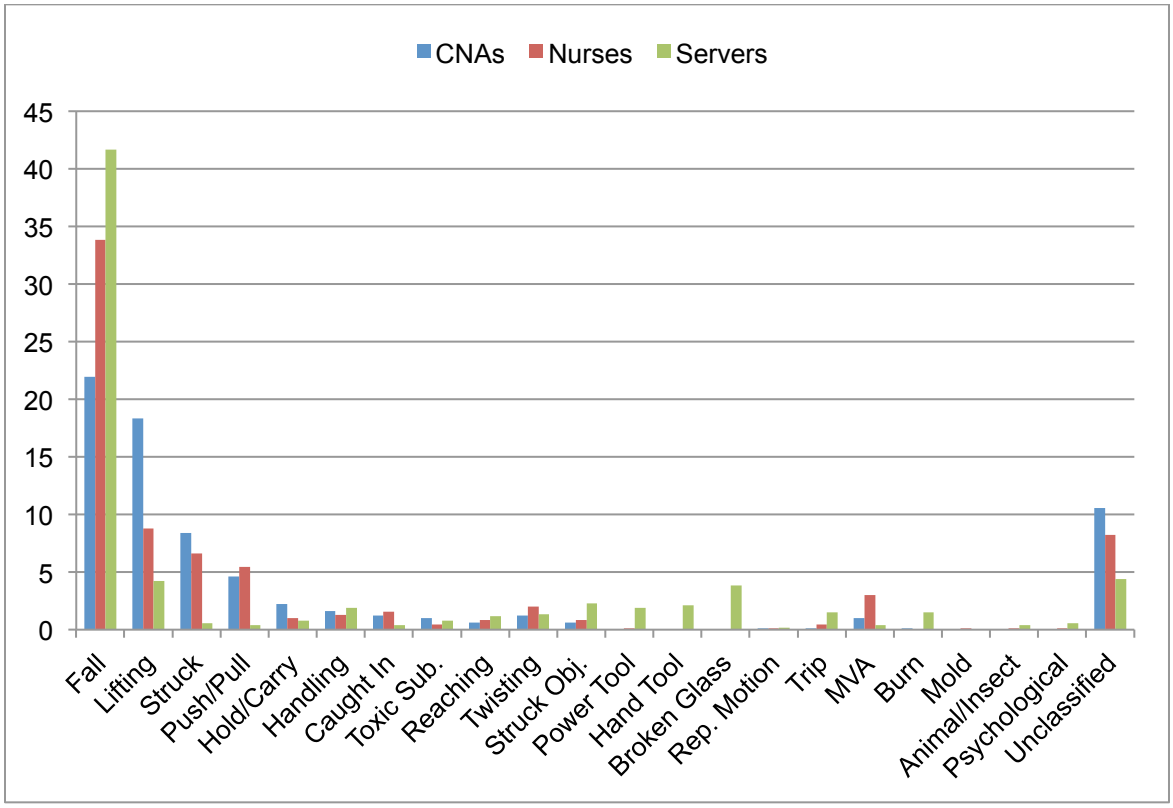

Figure 2: Causes of Injury for CNAs, Nurses, and Servers

Figure 2 displays the results of causes of injury across all three research groups and it shows that falls, lifting, being struck and pushing and pulling

injuries, were the four main risk factors for injuries. Risk factors for injury to each individual group showed varying results.

Table 2: Risk Factors for % Injury for CNAs

Risk Factors	% CNAs	Risk Factors	% CNAs
Fall	21.96	Powered Tool	0
Lifting	18.36	Hand Tool	0
Struck	8.38	Broken Glass	0
Push/Pull	4.59	Repetitive Motion	0.12
Hold/Carry	2.2	Trip	0.12
Handling	1.6	Motor Vehicle Accident	1
Caught In	1.2	Burn	0.12
Toxic Substances	1	Mold	0
Reaching	0.6	Animal/Insect	0
Twisting	1.2	Psychological	0
Struck by an Object	0.6	Unclassified	10.58

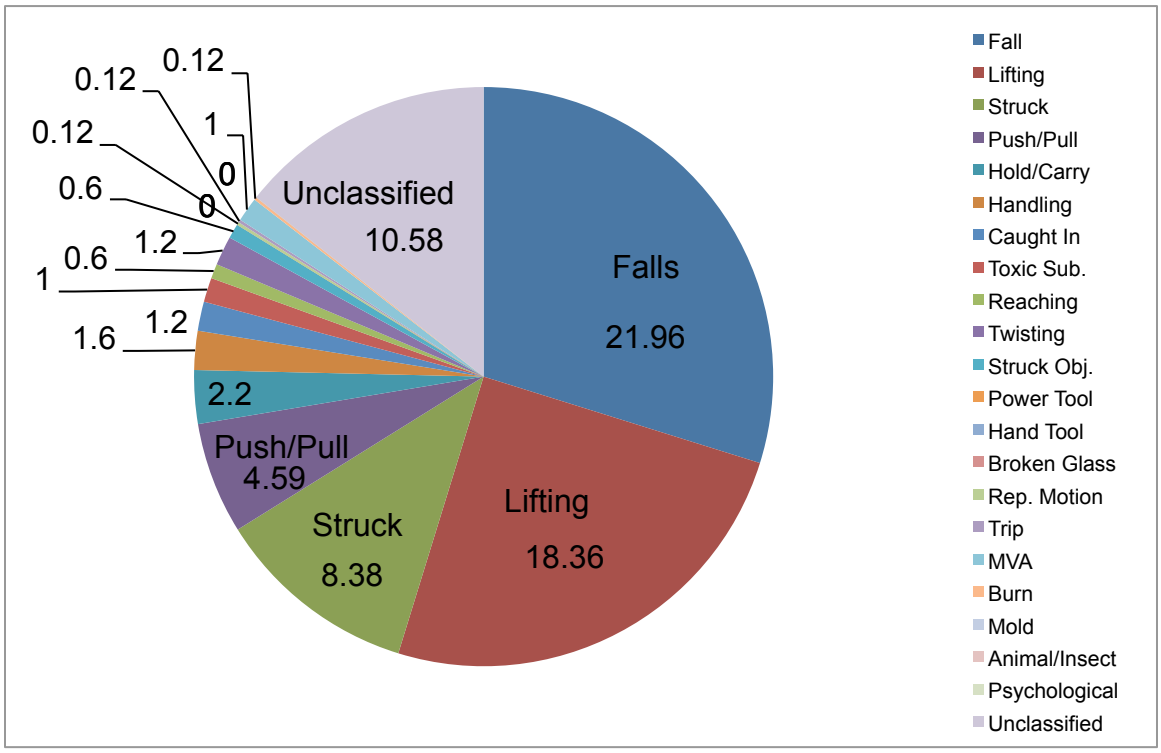

Figure 3: Risk Factors for % Injury for CNAs

Table 2 presents the results of the causes of injury for CNAs alone. The main risk factors for injury were falls, lifting, being struck, and pushing and pulling. Figure 3 displays the risk factors for injury to CNAs.

Table 3: Risk factors for % Injuries for Nurses

Risk Factors	% Nurses	Risk Factors	% Nurses
Fall	33.81	Powered Tool	0.14
Lifting	8.78	Hand Tool	0
Struck	6.62	Broken Glass	0
Push/Pull	5.47	Repetitive Motion	0.14
Hold/Carry	1.01	Trip	0.43
Handling	1.3	Motor Vehicle Accident	3.02
Caught In	1.58	Burn	0
Toxic Substances	0.43	Mold	0.14
Reaching	0.86	Animal/Insect Bite	0.14
Twisting	2.01	Psychological	0.14
Struck by Object	0.86	Unclassified	8.2

Table 3 shows risk factors for injury to nurses.

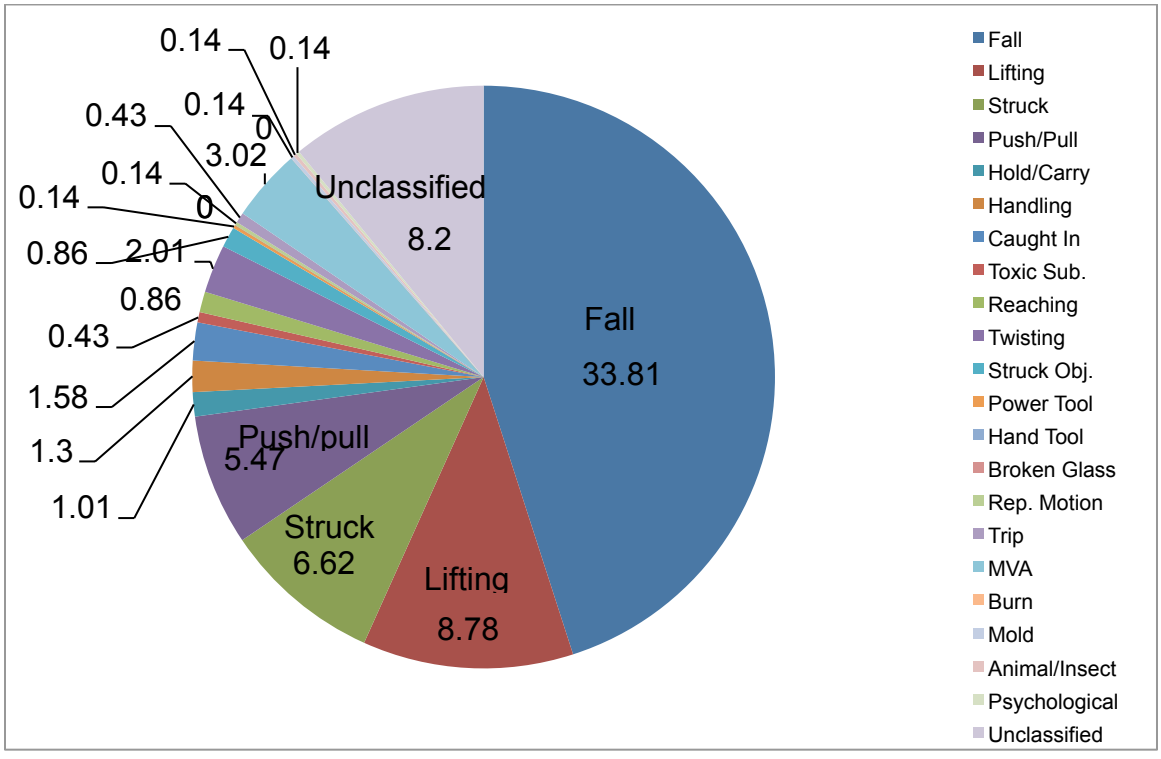

Figure 4: Risk Factors for % Injuries for Nurses

Figure 4 displays the percentages of injury to nurses based on the risk factors.

Table 4: Risk Factors for % Injuries for Servers

Risk Factors	# Servers	Risk Factors	# Servers
Fall	41.68	Trip	1.53
Lifting	4.21	Motor Vehicle Accident	0.38
Struck	0.57	Burn	1.53
Push/Pull	0.38	Mold	0
Hold/Carry	0.76	Animal/Insect Bite	0.38
Handling	1.91	Psychological	0.57
Caught In	0.38	Unclassified	4.4
Toxic Substance	0.76	Powered Tool	1.19
Reaching	1.15	Hand Tool	2.1
Twisting	1.34	Broken Glass	3.82
Struck by Object	2.29	Repetitive Motion	0.19

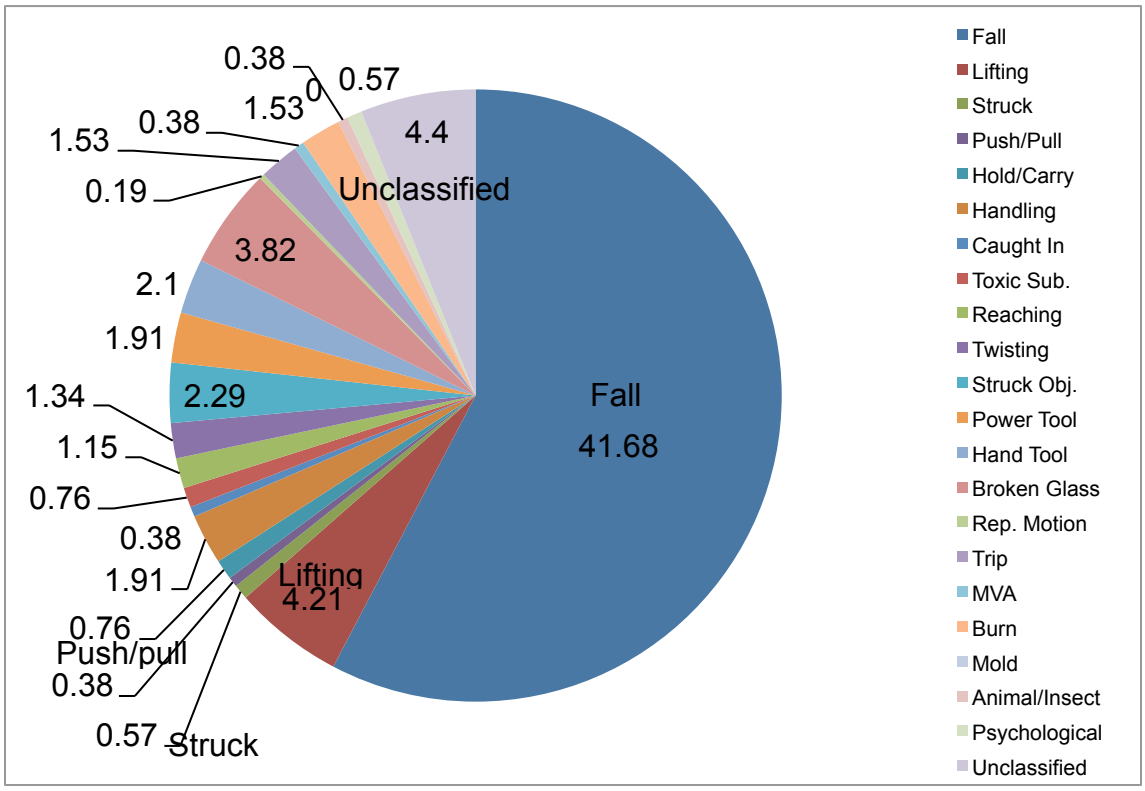

Figure 5: Risk Factors for % Injuries for Servers

Table 4 shows the risk actors and percentage injuries for servers, our baseline population. Figure 5 displays the findings for servers in a more conspicuous manner. Fall injuries for servers are very high compared with the other two study groups.

Table 5: Narrowing Risk Factors to Four Main Causes of Injury in CNAs, Nurses, and Servers

Risk Factor	CNAs	Nurses	Servers
Handling	1.6	1.3	1.91
Push/Pull	4.59	5.47	0.38
Hold/Carry	2.2	1.01	0.76
Lifting	18.3	8.78	4.21

Table 5 focuses on handling, push/pull, hold/carry, and lifting as risk factors for injury to our three study groups. Lifting is the greatest risk factor across all groups with CNAs bearing the greatest burden at 18.3%. Lifting injuries for nurses is at 8.78% while our comparison group, servers, only has 4.21% injuries from lifting. Similarly, injuries from hold/carry job tasks are highest for CNAs at 2.2% while for nurses it is 1.01% and only o.76% for servers. This is surprising as one would expect servers to have a higher percentage of hold/carry related injuries in light of their work demands.

Another unexpected finding relates to handling injuries which, although similar in all three study groups is highest in servers, a group which one would think would have the lowest in handling injuries. Push/pull injuries have the highest percentage at 5.47% in nurses while for CNAs it is 4.59% and a low 0.38% in the baseline population of servers.

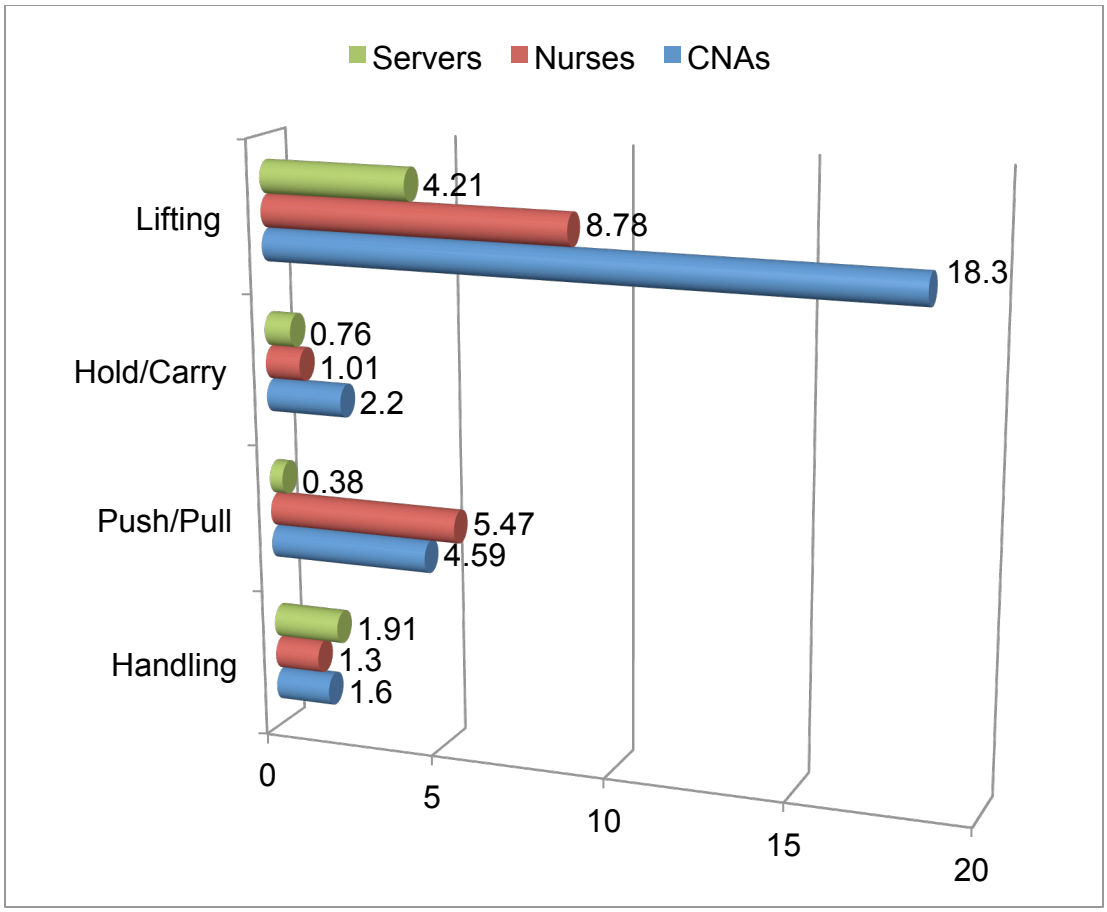

Figure 6: Narrowing Risk Factors to Four Main Causes of Injury in CNAs, Nurses, and Servers

Figure 6 displays the results of percentage injuries for the risk factors of lifting, hold/carry, push/pull, and handling for the three study groups.

Table 6: Comparison of Handling and Lifting Risk Factors for CNAs, Nurses, and Servers

Risk Factor	**CNAs**	**Nurses**	**Servers**
Handling	8.39	7.78	7.26
Lifting	18.3	8.78	4.21

Table 6 compares handling and lifting risk factors for all three study groups. The handling risk factor is similar across the three groups at 8.93% for

CNAs, 7.78% for nurses, and 7.26% for servers. The lifting risk factor is most prominent for CNAs at 18.3%. In nurses lifting accounted for 8.78% of injuries and for the baseline population, only 4.21% of injuries was from lifting.

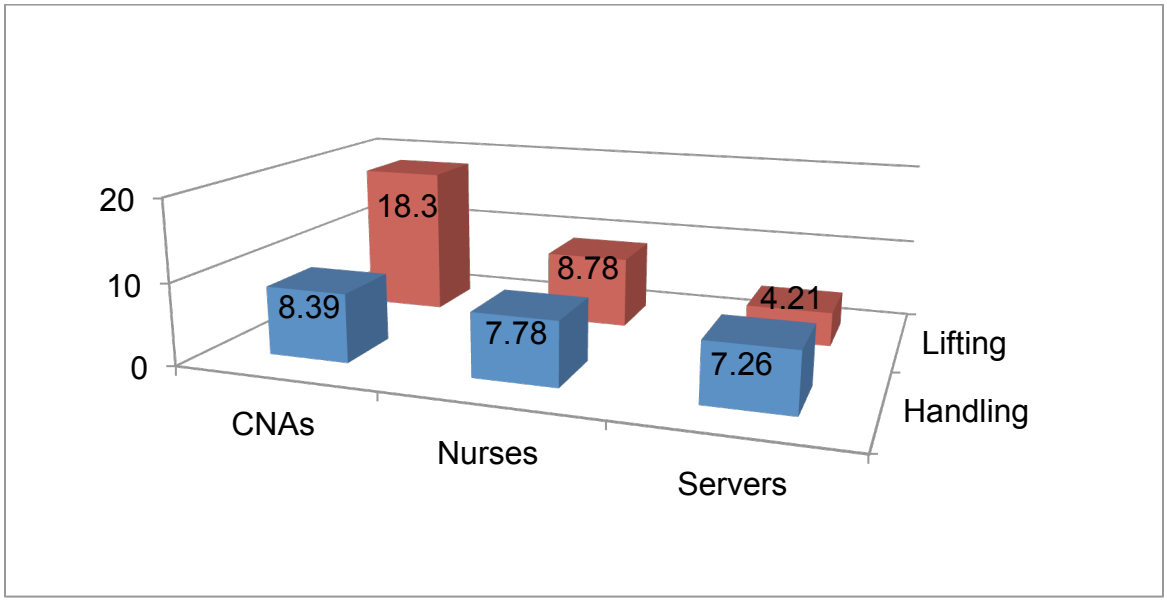

Figure 7: Comparison of Handling and Lifting Risk Factors for CNAs, Nurses, and Servers as a % Injury

Figure 7 displays the percentages of injuries to CNAs, nurses, and servers due to the risk factors of handling and lifting.

The research data was also evaluated for risk factors based on the nature of injury. Sprains and strains were the most prominent type of injury, followed by contusion and fracture.

Table 7 shows the nature of injury and their percentages in the Florida workers' compensation claims data for the year 2010 which were analyzed. The nature of injuries includes fracture, contusion, sprain/strain, infection, laceration, puncture, burn, occupational disease through chemical exposure, concussion

Table 7: Nature of Injury by % for CNAs, Nurses, and Servers

Nature of Injury	CNAs	Freq.	%	Nurses	Freq.	%	Servers	Freq.	%
Fracture	25	0.0499	4.99	103	0.1482	14.82	80	0.1530	15.30
Contusion	64	0.1277	12.77	90	0.1295	12.95	53	0.1013	10.13
Strain/Sprain	259	0.5170	51.70	289	0.4158	41.58	164	0.3136	31.36
Infection	2	0.0040	0.4	0	0	0	0	0	0
Laceration	2	0.0040	0.4	9	0.0129	1.29	59	0.1128	11.25
Puncture	0	0	0	2	0.0029	0.29	3	0.0057	0.57
Burn	1	0.0020	0.2	0	0	0	13	0.0249	2.49
Occupational Disease	3	0.0060	0.6	6	0.0086	0.86	2	0.0038	0.38
Concussion	1	0.0020	0.2	4	0.0058	0.58	2	0.0038	0.38
Hernia	1	0.0020	0.2	4	0.0058	0.58	3	0.0057	0.57

and hernia. Sprains and strains were by far the most common nature of injury across all three study groups with the highest percentage being for CNAs at 51.7%, nurses at 41.58% and the baseline population group, servers, at 31.36%.

Contusion injuries among the three groups were similar at 12.77% for CNAs, 12.95% for nurses and 10.13% for servers. Fracture injuries were most prominent in the baseline server population at 15.3%, closely followed by nurses at 14.84%. CNAs had the lowest percentage of fractures at 4.99%.

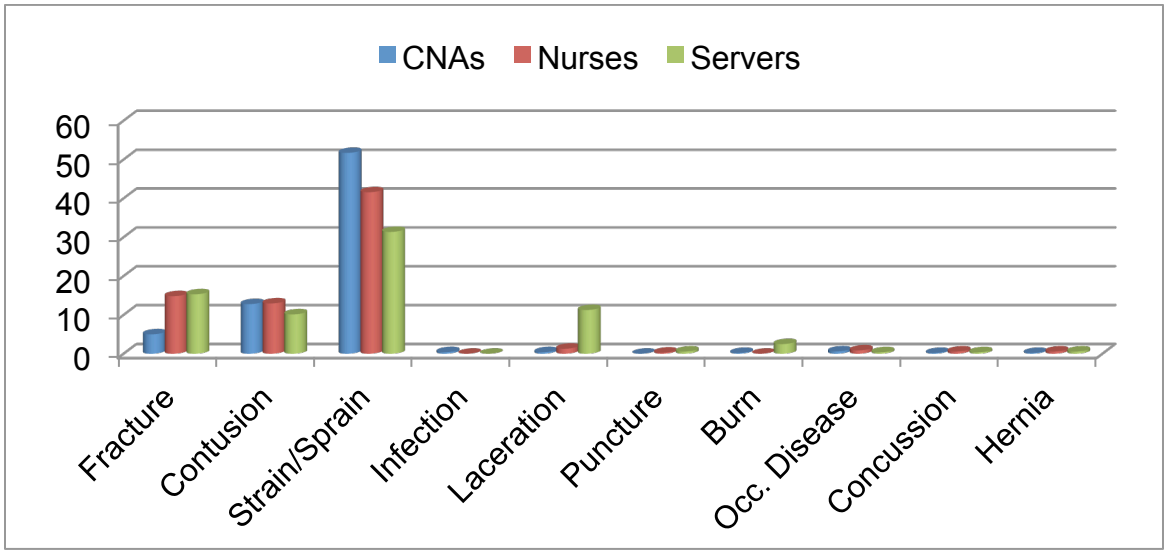

Figure 8: Nature of Injury by % for CNAs, Nurses, and Servers

CNAs were 1.5 times as likely to claim injury for occupational disease by chemical exposure at a low frequency of 0.6% as compared to servers with a claim frequency of 0.38%. Nurses were twice as likely to claim injury from chemical exposure at a low frequency of 0.86% as compared to servers at 0.6%.

Figure 8 displays the nature of injury percentages for all three study groups.

Table 8: Nature of Injury as a % for CNAs

Nature of Injury	**CNAs**
Fracture	4.99
Contusion	12.77
Sprain/Strain	51.7
Infection	0.4
Laceration	0.4
Puncture	0
Burn	0.2
Chemical Exposure	0.6
Concussion	0.2
Hernia	0.2

Table 8 shows the nature of injury as a percentage for CNAs, the group with the highest percentage of sprain and strain injury and the group with the only infection related adverse health outcome at 0.4%. Figure 9 displays the nature of injury by percentage for CNAs only. Table 9 shows the nature of injury for nurses as a percentage. This group had the highest frequency of occupational disease at a percentage of 0.86% compared to CNAs at 0.6% and servers at 0.38%. Nurses also had the highest frequency of concussion injuries at 0.58% compared to CNAs at 0.2% and servers at 0.38%. Nurses had the highest

frequency of hernia health outcome compared to CNAs at 0.2% and servers at 0.57%.

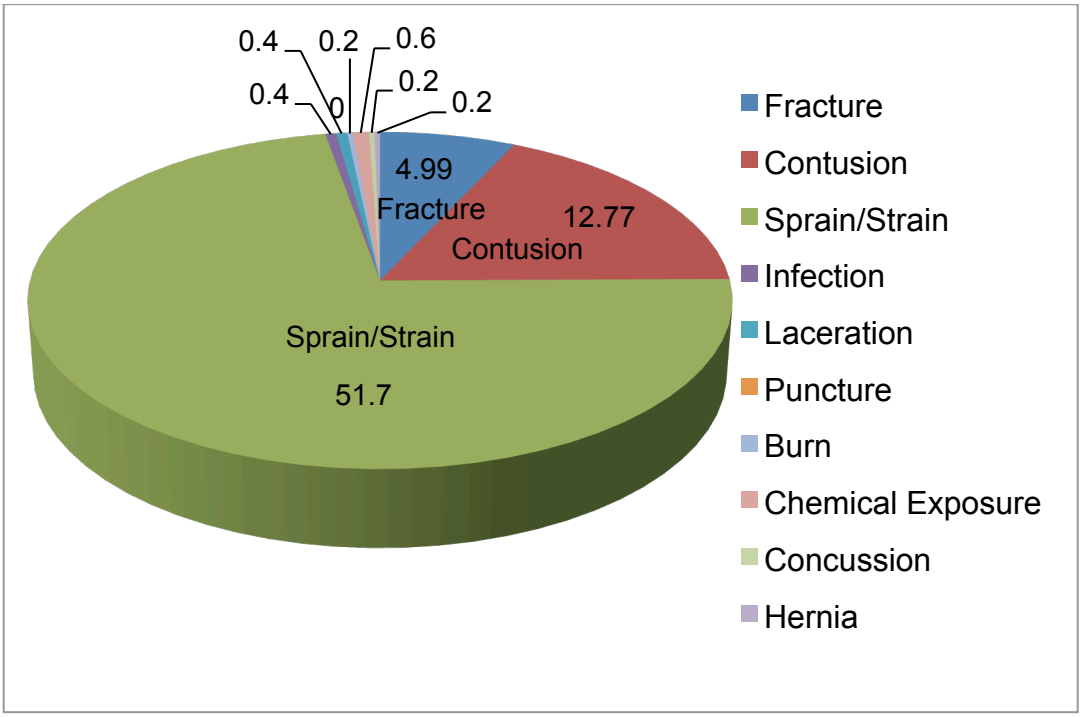

Figure 9: Nature of Injury by % for CNAs

Table 9: Nature of Injury by % for Nurses

Nature of Injury	Nurses
Fracture	14.82
Contusion	12.95
Sprain/Strain	41.58
Infection	0
Laceration	1.29
Puncture	0.29
Burn	0
Chemical Exposure	0.86
Concussion	0.58
Hernia	0.58

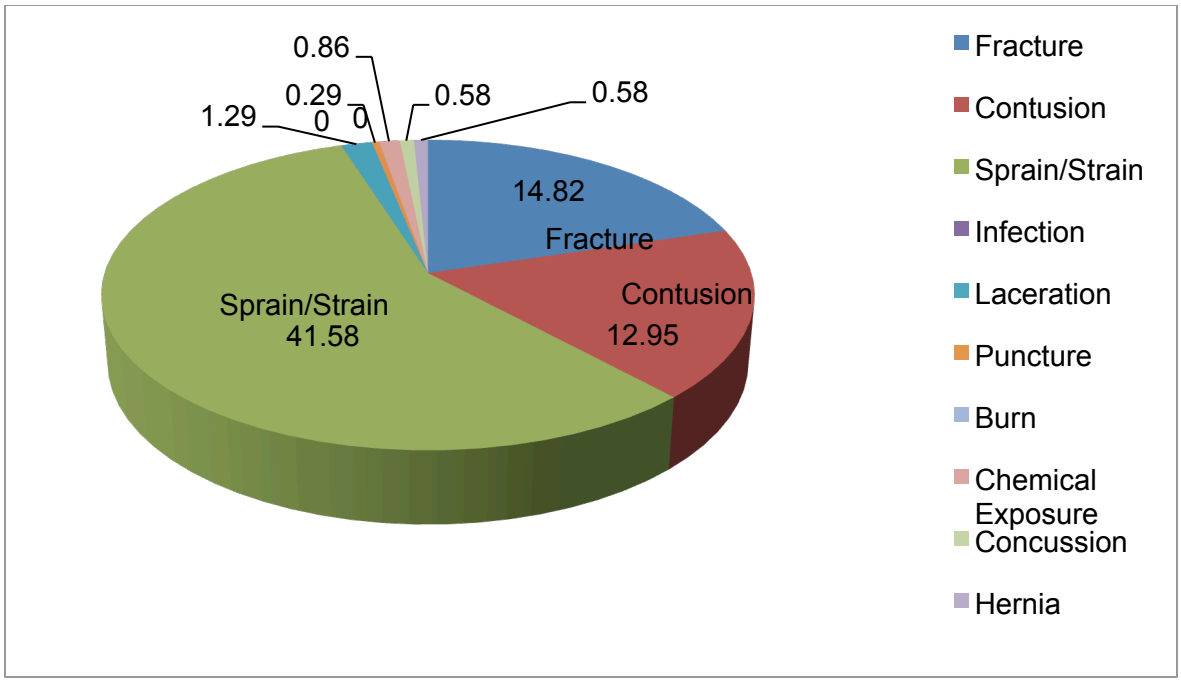

Figure10: Nature of Injury by % for Nurses

Figure 10 displays the nature of injury by percentage for nurses only.

Table 10: Nature of Injury by % for Servers

Nature of Injury	**Servers**
Fracture	15.3
Contusion	10.13
Sprain/Strain	31.36
Infection	0
Laceration	11.25
Puncture	0.57
Burn	2.49
Chemical Exposure	0.38
Concussion	0.38
Hernia	0.57

Table 10 shows the nature of injury for our baseline population, servers, as a percentage. This baseline population had the highest frequency of fracture injuries at a 15.3% compared to 14.82%for nurses and only 4.99% for CNAs.

The baseline population also had the highest frequency of lacerations at 11.25% compared to nurses at 1.29% and CNAs at 0.4%. The baseline population also had the highest frequency of puncture injuries at 0.57% compared to nurses at 0.29% and CNAs at 0%. The baseline population had the highest burn rate at 2.49% compared to nurses at 0% and CNAs at 0.2%.

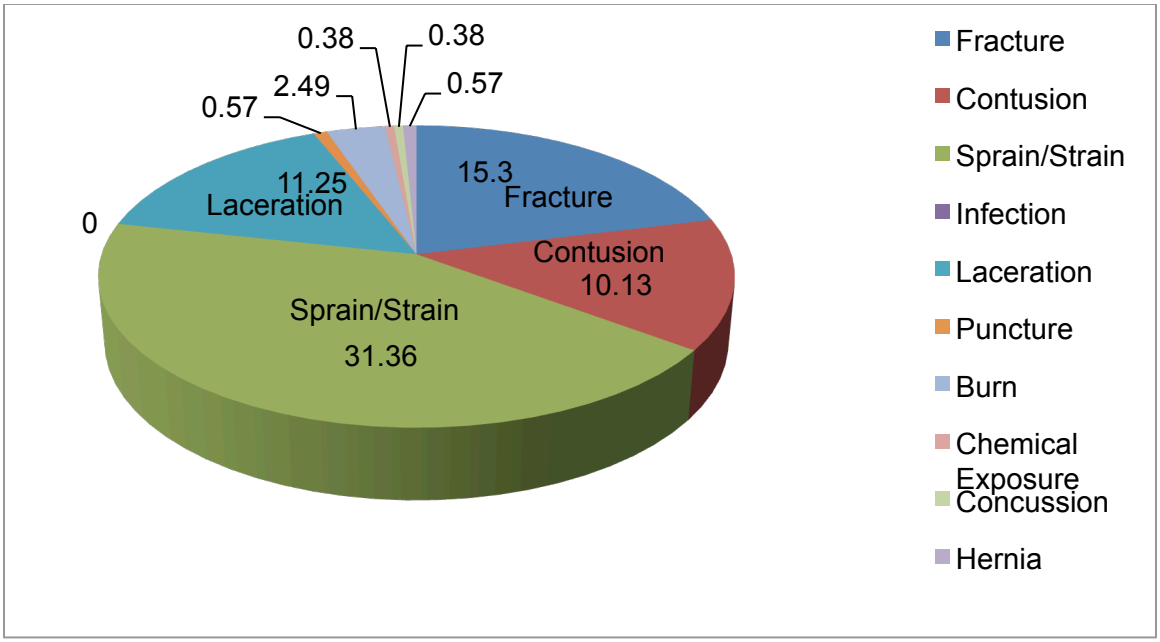

Figure 11: Nature of Injury by % for Servers

Figure 11 displays the nature of injuries for our baseline population, servers.

Table 11: Nature of Low Frequency Injuries by % for CNAs, Nurses, and Servers

Nature of Injury	CNAs	Nurses	Servers
Laceration	0.4	1.29	11.25
Puncture	0	0.29	0.57
Burn	0.2	0	2.49
Chemical Exposure	0.6	0.86	0.38
Concussion	0.2	0.58	0.57
Hernia	0.2	0.58	0.57
Infection	0.4	0	0

Table 11 shows the nature of injury for low frequency health outcomes for all three study groups. Puncture injuries for nurses occurred at a frequency of 0.29% for CNAs the frequency was 0%. Infection only occurred in CNAs at a frequency of 0.4%. Adverse health outcomes by chemical exposure occurred across all groups at 0.6% for CNAs, 0.86% for nurses and 0.38% for the baseline population.

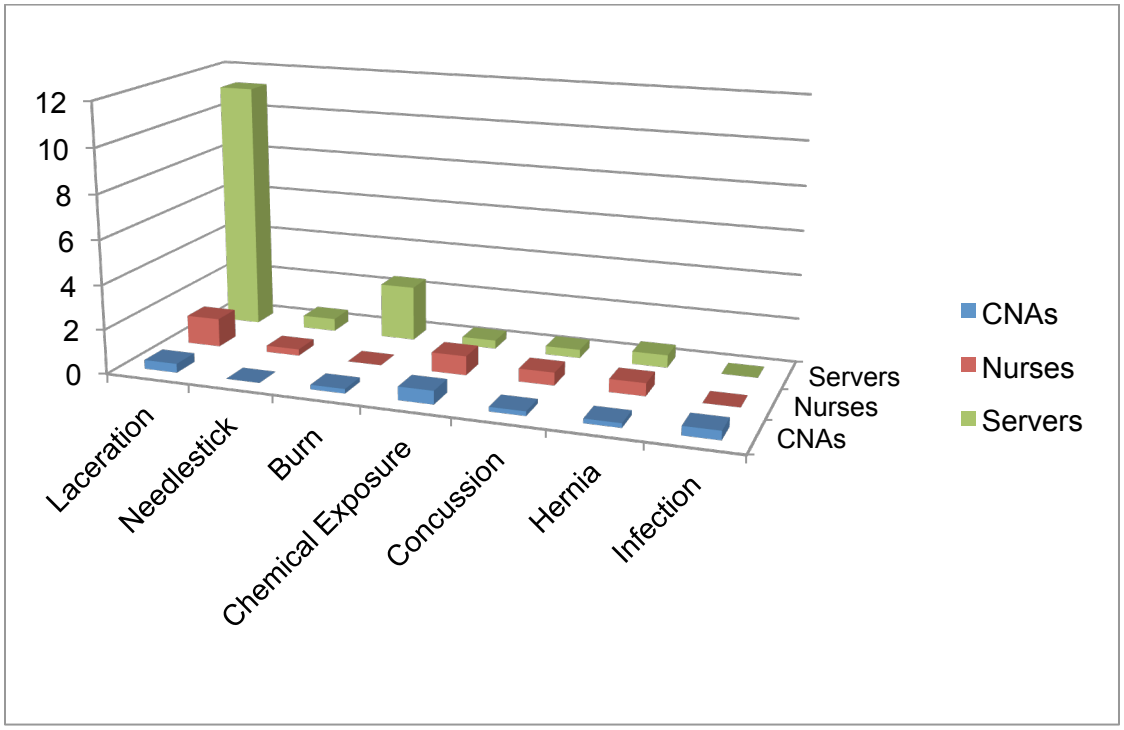

Figure 12: Nature of Low Frequency Injuries by % for CNAs, Nurses, and Servers

Figure 12 displays the nature of low frequency injuries by percentages for all three study groups.

Table 12: Nature of Low Frequency Injuries by % for CNAs

Nature of Injury	CNAs
Laceration	0.4
Needlstick	0
Burn	0.2
Chemical Exposure	0.6
Concussion	0.2
Hernia	0.2
Infection	0.4

Table 12 shows the frequency of injuries by percentages for CNAs alone.

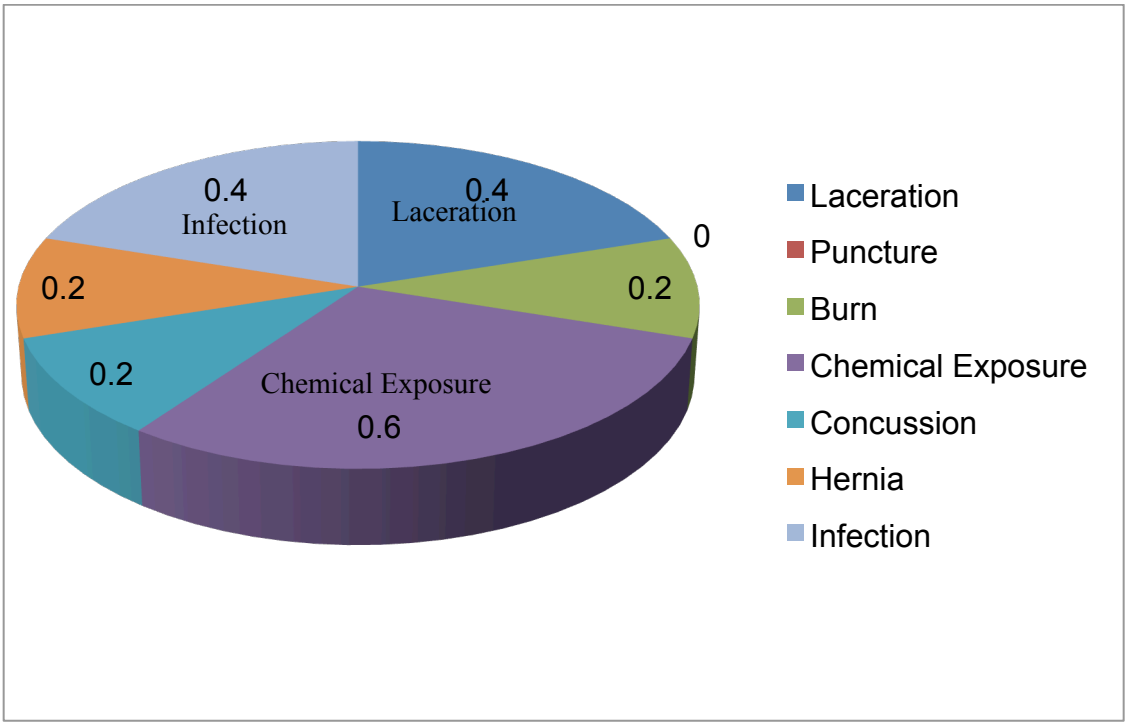

Figure 13: Nature of Low Frequency Injuries by % for CNAs

Figure 13 displays the nature of low frequency injuries for CNAs.

Table 13: Nature of Low Frequency Injuries by % for Nurses

Nature of Injury	Nurses
Laceration	1.29
Puncture	0.29
Burn	0
Chemical Exposure	0.86
Concussion	0.58
Hernia	0.58
Infection	0

Table 13 shows the nature of low frequency injuries for nurses.

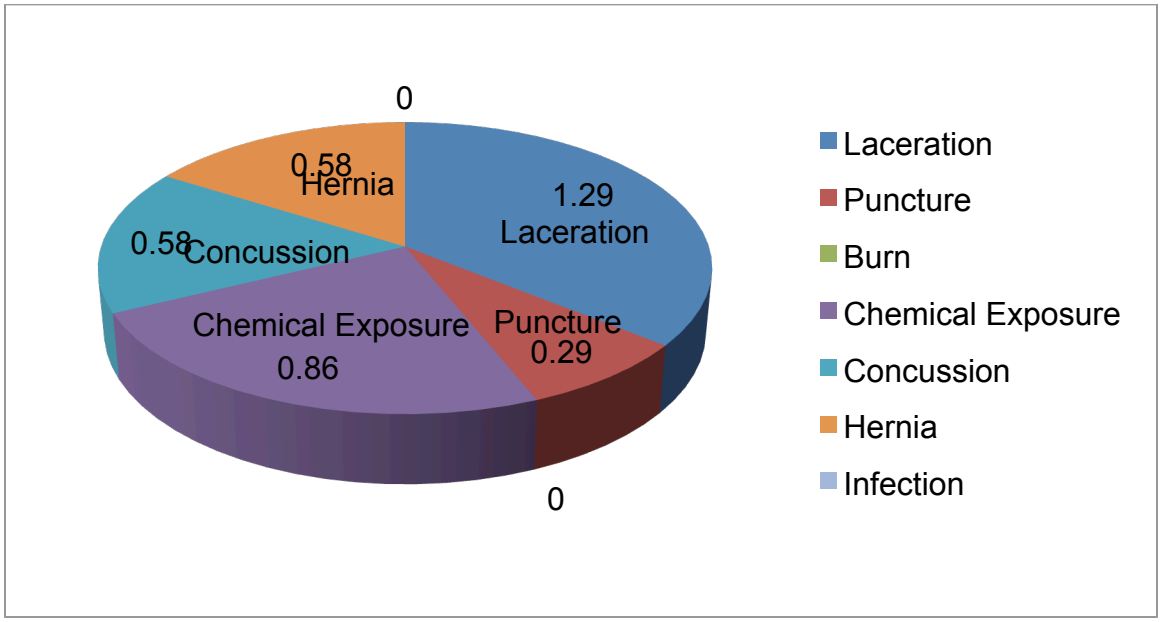

Figure 14: Nature of Low Frequency Injuries by % for Nurses

Figure 14 displays the nature of low frequency injuries for nurses.

Table 14: Nature of Low Frequency Injuries by % for Servers

Nature of Injury	Servers
Laceration	11.25
Puncture	0.57
Burn	2.49
Chemical Exposure	0.38
Concussion	0.38
Hernia	0.57
Infection	0

Table 14 displays the nature of low frequency injuries by percentage for our baseline population, servers.

Figure 15 displays the nature of low frequency injuries by percentage for our baseline population, servers.

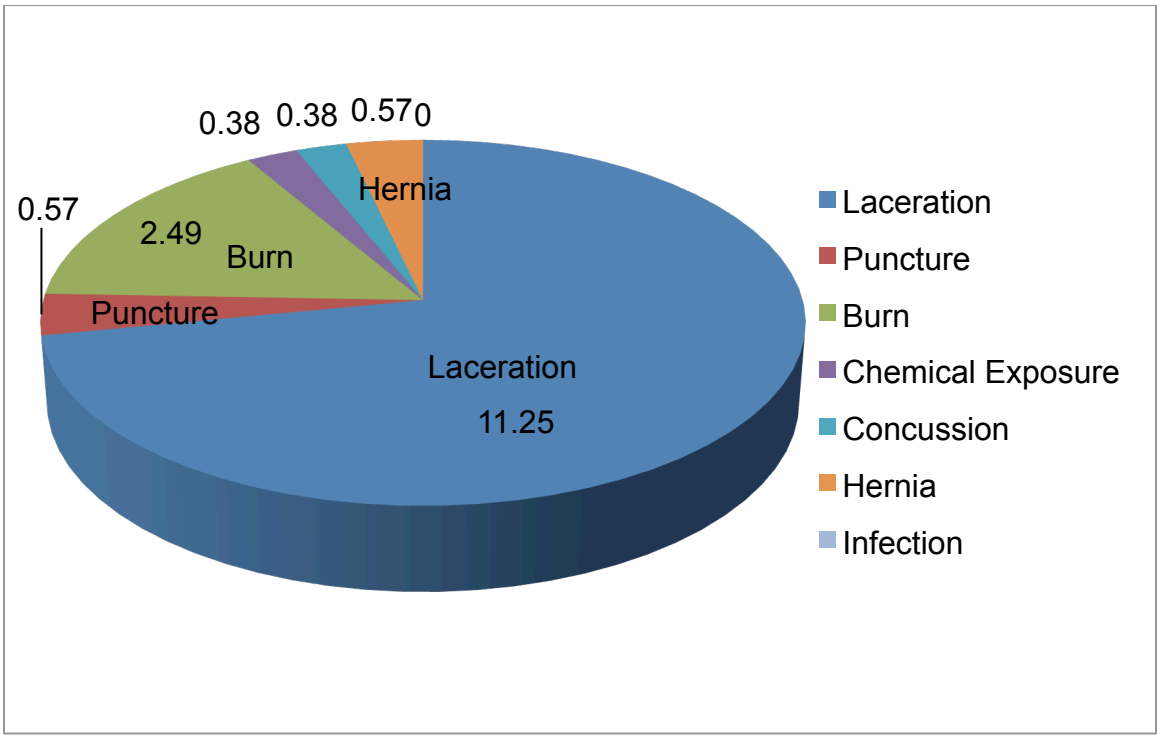

Figure 15: Nature of Low Frequency Injuries by % for Servers

Table 15: Occupational Disease by Chemical Exposure as a % for CNAs, Nurses, and Servers

Nature of Injury	CNAs	Nurses	Servers
Chemical Exposure	0.6	0.86	0.38

Table 15 displays the percentage of adverse health outcomes from chemical exposure across all three groups. Nurses had the highest frequency at 0.86% while that for CNAs was 0.6% compared to the baseline population at 0.38%. CNAs were 1.5 times as likely to claim injury at a low frequency of 0.6% as compared to servers with a claim frequency of 0.38%. Nurses were twice as likely to claim injury from chemical exposure at a low frequency of 0.86% as compared to servers at 0.6%.

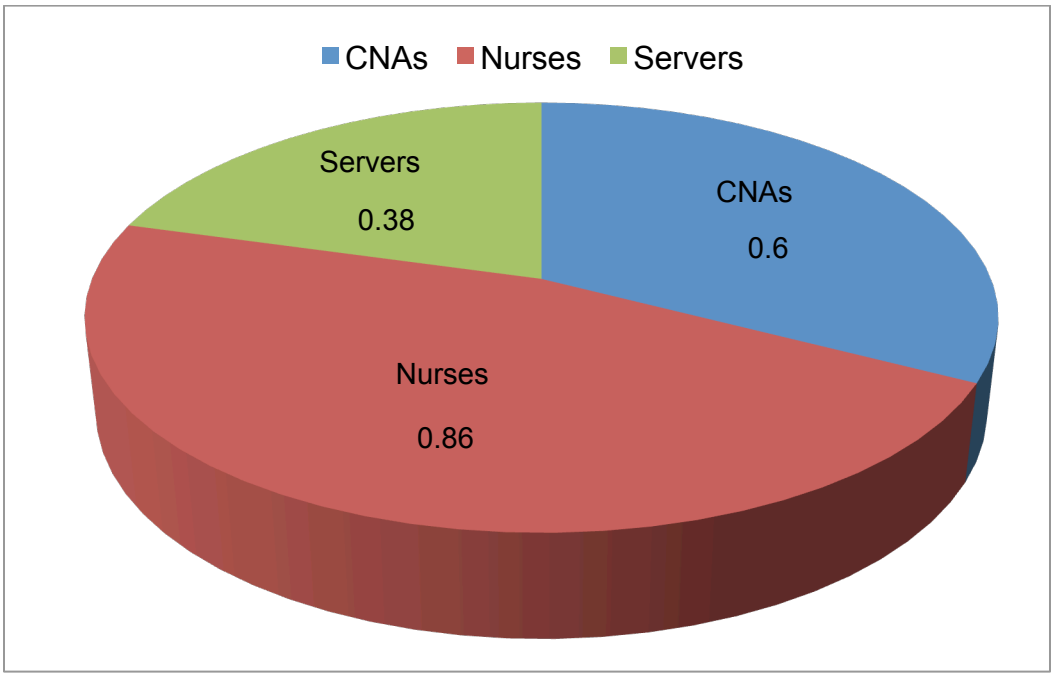

Figure 16: Occupational Disease by Chemical Exposure as a % for CNAs, Nurses, and Servers

Figure 16 displays adverse health outcomes from chemical exposure across all three groups.

Table 16: Puncture Wound Injuries as a % for CNAs, Nurses and Servers

Nature of Injury	CNAs	Nurses	Servers
Puncture Wound	0	0.29	0.57

Table 16 shows the frequency of puncture wound injuries for all three study groups. Our baseline population had the highest frequency of puncture injuries.

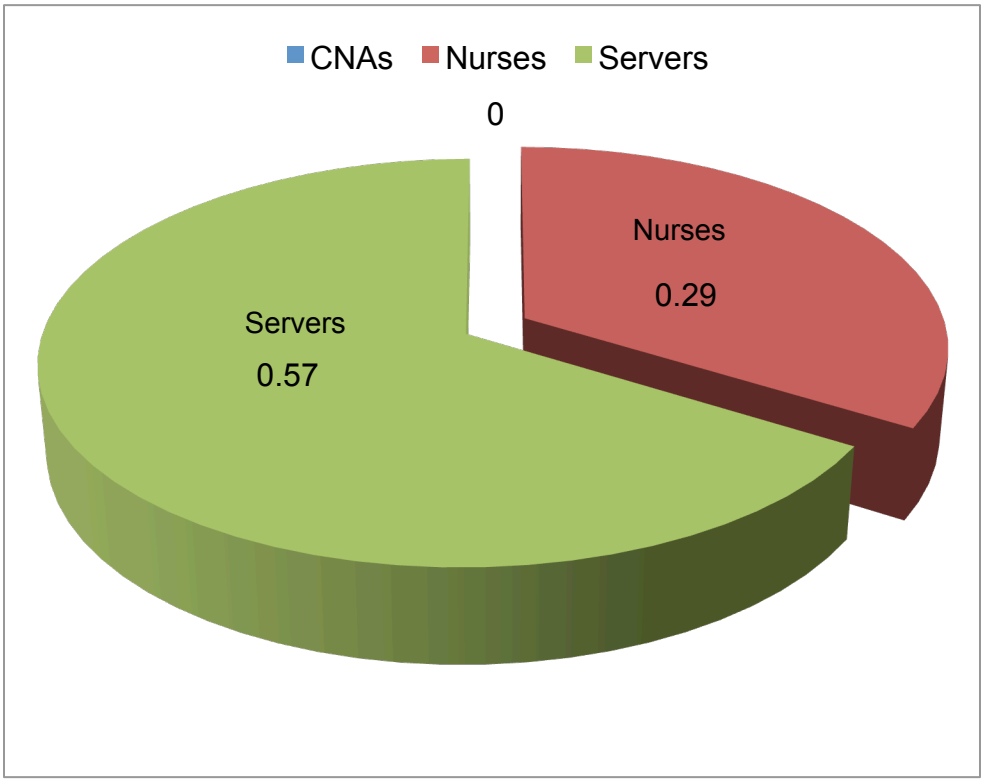

Figure 17: Puncture Wound Injuries as a % for CNAs, Nurses, and Servers

Figure 17 displays the percentages of puncture wound injuries for all three study groups. There were no puncture injuries to CNAs in this study.

Table 17: Infectious Disease as a % for CNAs, Nurses, and Servers

Nature of Injury	CNAs	Nurses	Servers
Infection	0.4	0	0

Table 17 shows the frequency of infectious health outcomes across all three study groups. CNAs were the only group with adverse health outcomes at a frequency of 0.4% compared to nurses at 0% and our baseline population at 0%.

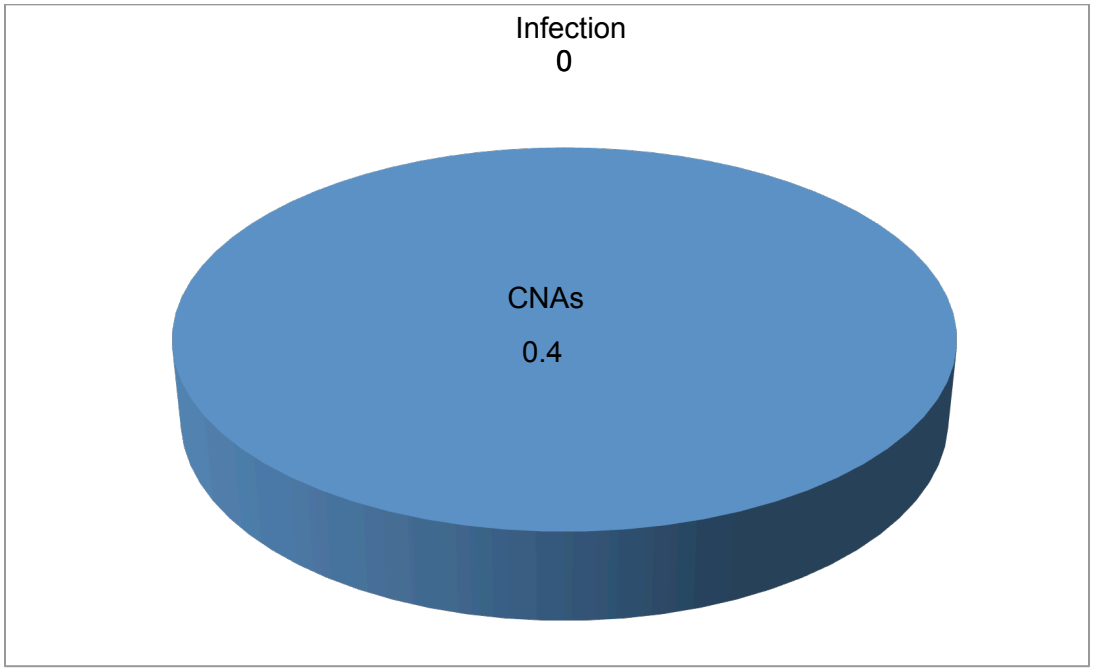

Figure 18: Infectious Disease as a % for CNAs, Nurses, and Servers

Figure 18 displays the results of the frequency of infection related adverse health outcomes across all three study groups.

The study data was also analyzed based on the body part that was injured. We looked at the various body parts that were injured by sprain/strain, contusion and fracture injuries.

Table 18: Sprain and Strain Injuries as a % to Various Body Parts for CNAs, Nurses, and Servers

Body Part	**CNAs**	**Freq.**	**%**	**Nurses**	**Freq.**	**%**	**Servers**	**Freq.**	**%**
Multiple	40	0.1487	14.87	38	0.1234	12.34	16	0.0952	9.52
Head/Skull	0	0	0	0	0	0	0	0	0
Face/Eye/Nose	0	0	0	0	0	0	0	0	0
Neck	2	0.0074	0.74	4	0.0130	1.30	4	0.0238	2.38
Shoulder	29	0.1078	10.78	28	0.0909	9.09	7	0.0417	4.17
Arm	6	0.0223	2.23	7	0.0227	2.27	1	0.0060	0.60
Elbow	0	0	0	2	0.0065	0.65	2	0.0119	1.19
Forearm	4	0.0149	1.49	1	0.0032	0.32	2	0.0119	1.19
Hand/Wrist	9	0.0335	3.35	7	0.0227	2.27	6	0.0357	3.57
Finger/Thumb	2	0.0074	0.74	2	0.0065	0.65	1	0.0060	0.60
Chest/Trunk	12	0.0446	4.46	15	0.0487	4.87	8	0.0476	4.76
Low Back	113	0.4201	42.01	120	0.3896	38.96	45	0.2679	26.79
Sacrum/Coccyx	0	0	0	1	0.0032	0.32	0	0	0
Abdomen	6	0.0223	2.23	1	0.0032	0.32	1	0.0060	0.60
Hip	6	0.0223	2.23	2	0.0065	0.65	2	0.0119	1.19
Thigh	2	0.0074	0.74	3	0.0097	0.97	1	0.0060	0.60
Knee	17	0.0632	6.32	36	0.1169	11.69	39	0.2321	23.21
Leg/LowExtM	2	0.0074	0.74	2	0.0065	0.65	4	0.0238	2.38
Ankle/Foot	9	0.0335	3.35	17	0.0552	5.52	25	0.1488	14.88
Toe	0	0	0	2	0.0065	0.65	0	0	0

Table 18 shows various body parts that were injured by sprains or strains expressed as a percentage. Lower back injuries occurred at the highest frequency across all study groups. It occurred at a frequency of 26.79% for the baseline study group and twice as often in CNAs at 42.01%. Lower back injury for nurses occurred at a frequency of 38.96% which is 1.5 times higher than that of our baseline population.

Injuries to multiple body parts occurred at a frequency of 9.52% for our baseline population. Results were slightly higher for nurses at 12.34% and highest of CNAs at 14.87%. Shoulder injuries occurred at the highest frequency in CNAs at 10.78% followed by nurses at 9.09% and the baseline population at 4.17%. CNAs and nurses were twice as likely to file a claim for shoulder injury compared to servers. Knee injuries were highest in our population of servers at a frequency of 23.21% compared to that of nurses at 11.69% and that of CNAs at 6.32%.

Injuries to the ankle and foot body part occurred at the highest frequency in our baseline population at a frequency of 14.88% as compared to 5.52% for nurses and 3.35% for CNAs.

Figure 19 displays the results for injury due to sprains and strains to various body parts expressed as a percentage.

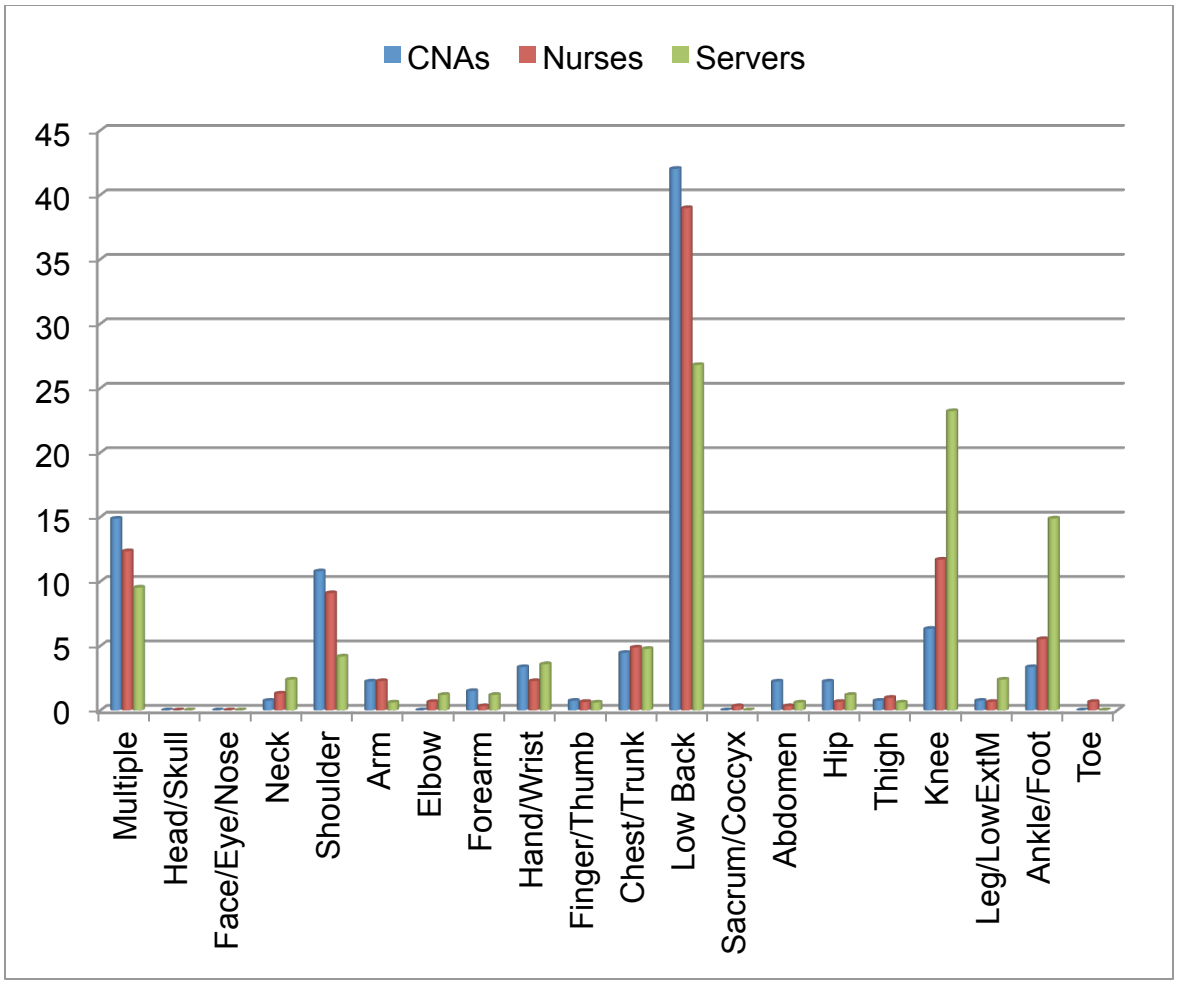

Figure 19: Sprain and Strain Injures as a % for Various Body Parts for CNAs, Nurses, and Servers

Table 19: Contusion Injuries as a % for Various Body Parts for CNAs, Nurses, and Servers

Body Part	CNAs	Freq.	%	Nurses	Freq.	%	Servers	Freq.	%
Multiple	20	0.2985	29.85	30	0.3226	32.26	15	0.2727	27.27
Head/Skull	2	0.0299	2.99	8	0.0861	8.61	3	0.0545	5.45
Face/Eye/Nose	0	0	0	4	0.0430	4.30	1	0.0182	1.82
Neck	1	0.0149	1.49	2	0.0215	2.15	0	0	0
Shoulder	3	0.0448	4.48	3	0.0323	3.23	0	0	0
Arm	2	0.0299	2.99	3	0.0323	3.23	3	0.0545	5.45
Elbow	2	0.0299	2.99	3	0.0323	3.23	1	0.0182	1.82
Forearm	2	0.0299	2.99	1	0.0108	1.08	1	0.0182	1.82
Hand/Wrist	2	0.0299	2.99	3	0.0323	3.23	1	0.0182	1.82
Finger/Thumb	1	0.0149	1.49	1	0.0108	1.08	0	0	0

Table 19 continued

Body Part	CNAs	Freq.	%	Nurses	Freq.	%	Servers	Freq.	%
Chest/Trunk	3	0.0448	4.48	2	0.0215	2.15	0	0	0
Low Back	4	0.0597	5.97	3	0.0323	3.23	2	0.0364	3.64
Sacrum/Coccyx	0	0	0	0	0	0	1	0.0182	1.82
Abdomen	2	0.0299	2.99	0	0	0	2	0.0364	3.64
Hip	1	0.0149	1.49	2	0.0215	2.15	3	0.0545	5.45
Thigh	0	0	0	1	0.0108	1.08	0	0	0
Knee	15	0.2239	22.39	19	0.2043	20.43	15	0.2727	27.27
Leg/LowExtM	0	0	0	1	0.0108	1.08	2	0.0364	3.64
Ankle/Foot	3	0.0448	4.48	4	0.0430	4.30	2	0.0364	3.64
Toe	0	0	0	0	0	0	0	0	0

Results of body part injured due to contusion type injury are shown in Table 19. Contusion injuries occurred at the greatest frequency to multiple body parts at 32.26% for nurses, followed by 29.85% for CNAs and 27.27% for the baseline population. Contusion injuries to the knee were also high across all three study groups with servers having a frequency of 27.27% followed by CNAs with 22.39% and nurses with 20.43%.

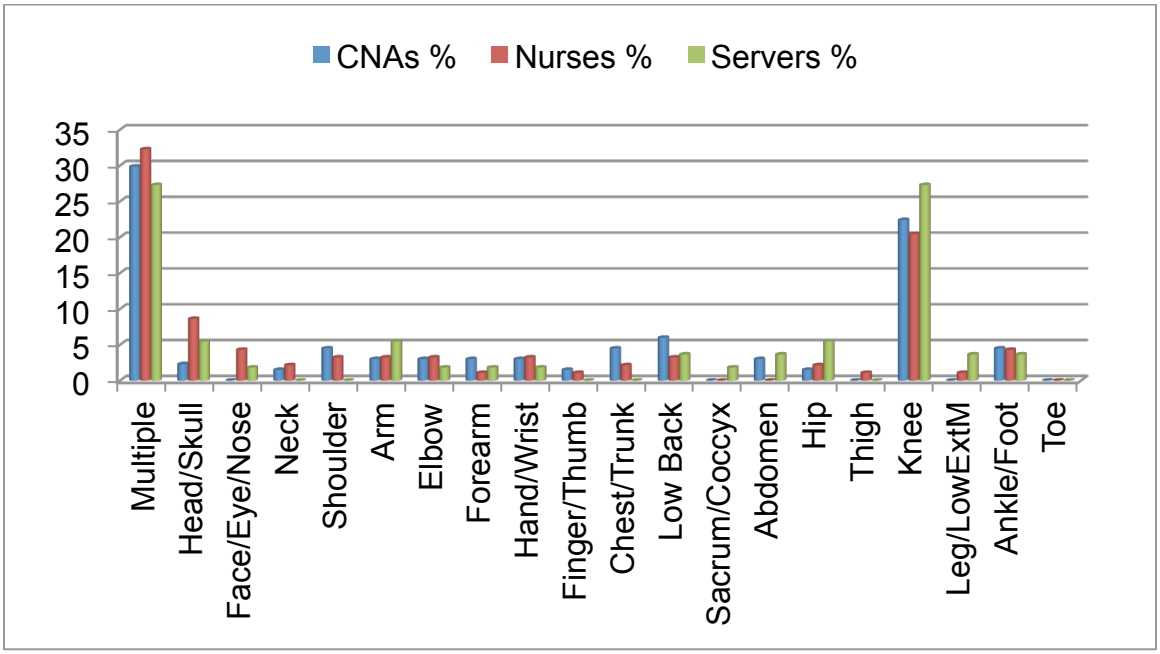

Figure 20: Contusion Injuries as a % for Various Body Parts for CNAs, Nurses, and Servers

Figure 20 displays the frequency of contusion injuries to various body parts expressed as a percentage. Contusion injuries occurred most frequently to multiple body parts and to the knee across all study groups.

Table 20: Fracture Injuries to Various Body Parts as a % for CNAs, Nurses, and Servers

Body Part	CNAs	Freq.	%	Nurses	Freq.	%	Servers	Freq.	%
Multiple	0	0	0	14	0.1346	13.46	4	0.0471	4.71
Head/Skull	0	0	0	3	0.0288	2.88	0	0	0
Face/Eye/Nose	0	0	0	2	0.0192	1.92	0	0	0
Neck	0	0	0	0	0	0	0	0	0
Shoulder	1	0.0385	3.85	9	0.0865	8.65	5	0.0588	5.88
Arm	2	0.0769	7.69	5	0.0481	4.81	3	0.0353	3.53
Elbow	0	0	0	6	0.0577	5.77	5	0.0588	5.88
Forearm	2	0.0769	7.69	8	0.0769	7.69	3	0.0353	3.53
Hand/Wrist	6	0.2308	23.08	12	0.1154	11.54	12	0.1412	14.12
Finger/Thumb	1	0.0385	3.85	3	0.0288	2.88	3	0.0353	3.53
Chest/Trunk	1	0.0385	3.85	4	0.0385	3.85	1	0.0118	1.18
Low Back	0	0	0	1	0.0096	0.96	0	0	0
Sacrum/Coccyx	1	0.0385	3.85	1	0.0096	0.96	2	0.0235	2.35
Abdomen	0	0	0	0	0	0	0	0	0
Hip	2	0.0769	7.69	8	0.0769	7.69	3	0.0353	3.53
Thigh	0	0	0	2	0.0192	1.92	4	0.0471	4.71
Knee	2	0.0769	7.69	4	0.0385	3.85	10	0.1176	11.76
Leg/LowExtM	1	0.0385	3.85	3	0.0288	2.88	4	0.0471	4.71
Ankle/Foot	5	0.1923	19.23	17	0.1635	16.35	21	0.2471	24.71
Toe	1	0.0385	3.85	0	0	0	0	0	0

Table 20 shows the frequency of fracture injuries to various body parts across all three study groups. The frequencies of hand/wrist fractures were highest in CNAs at 23.08% which is higher than the baseline population of servers with a frequency of 14.12%. Fractures to the hand/wrist in nurses occurred at a frequency below that of the baseline population at 11.54%.

Fracture injuries to the ankle/foot body part occurred at high frequency across all study groups with that of the baseline population being 24.71%. The frequency in CNAs was 19.23% and in nurses 16.35%. The frequencies of contusion injuries were high in the nurses and CNAs study groups, however, they were below that in the general population.

Fracture injuries to multiple body parts occurred most frequently in nurses at 14.36% compared to the baseline population at 4.71% and the CNAs group at 0%.

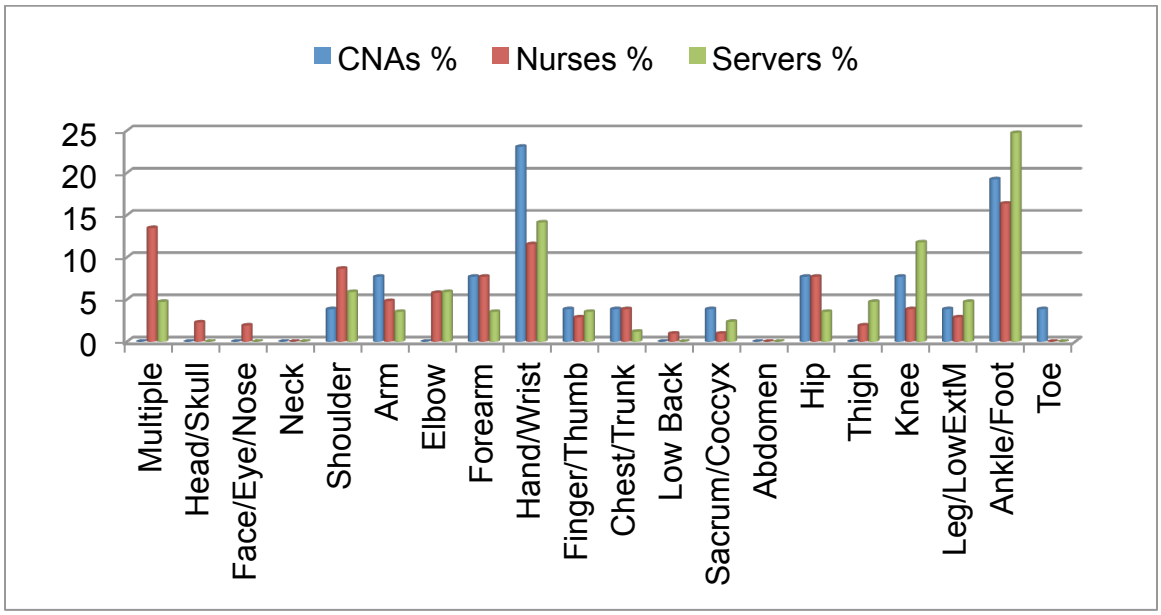

Figure 21: Fracture Injuries to Various Body Parts as a % for CNAs, Nurses, and Servers

Figure 21 displays the results of the frequency of fracture injuries to various body parts. Fractures occurred most frequently to the hand/wrist and ankle/ foot body parts in all three study groups. Nurses had the most fracture injuries to multiple body parts.

The study data was also evaluated for injury-related length of time off work for all three study groups for a time range of 0 – 60 months. The frequency of time off work was similar across all three groups with the highest time off work being in the 0 – 6 months range with the baseline population at 85.66% compared to CNAs at 88.62% and nurses at 90.65%. In the 7 – 12 month range, the frequency of injury was 3.82% for the baseline population as compared with 5.99% for CNAs and 4.03% for nurses.

Table 21: Frequency of Injuries by Age Groups for CNAs, Nurses, and Servers

Age Groups	CNAs			Nurses			Servers		
	#	Freq.	%	#	Freq.	%	#	Freq.	%
17-21	14	0.0318	3.18	1	0.0017	0.17	55	0.1233	12.33
22-32	89	0.2023	20.23	39	0.0648	6.48	110	0.2466	24.66
33-43	110	0.25	25	149	0.2475	24.75	105	0.2354	23.54
44-54	140	0.3182	31.82	207	0.3439	34.39	99	0.2230	22.30
55-65	79	0.1795	17.95	173	0.2874	28.74	62	0.1390	13.90
66-80	8	0.0182	1.82	33	0.0548	5.48	15	0.0336	3.36

Table 21 shows the number of injuries by age groups for CNAs, nurses, and servers. In the youngest age group, servers are much more likely to file a claim than CNAs or nurses. This may be due to a younger population working as servers. Most claims for CNAs and nurses were filed by the 44-54 age group.

There was a high rate of claim for nurses in the 55-65 age group and this is perhaps due to the ageing nursing population and/or reducing level of fitness with age.

Figure 22 displays the number of injuries by age group for CNAs, nurses, and servers. The age group 44-54 had the highest number of claims for CNAs and nurses. The group of nurses had the highest number of claims as age increased. The results summarized in Table 22 show that the frequency of injuries tapered off with length of time. In the 49 – 60 month range, the baseline population was at 0.19%, nurses were at 0.58% and CNAs were at 0%.

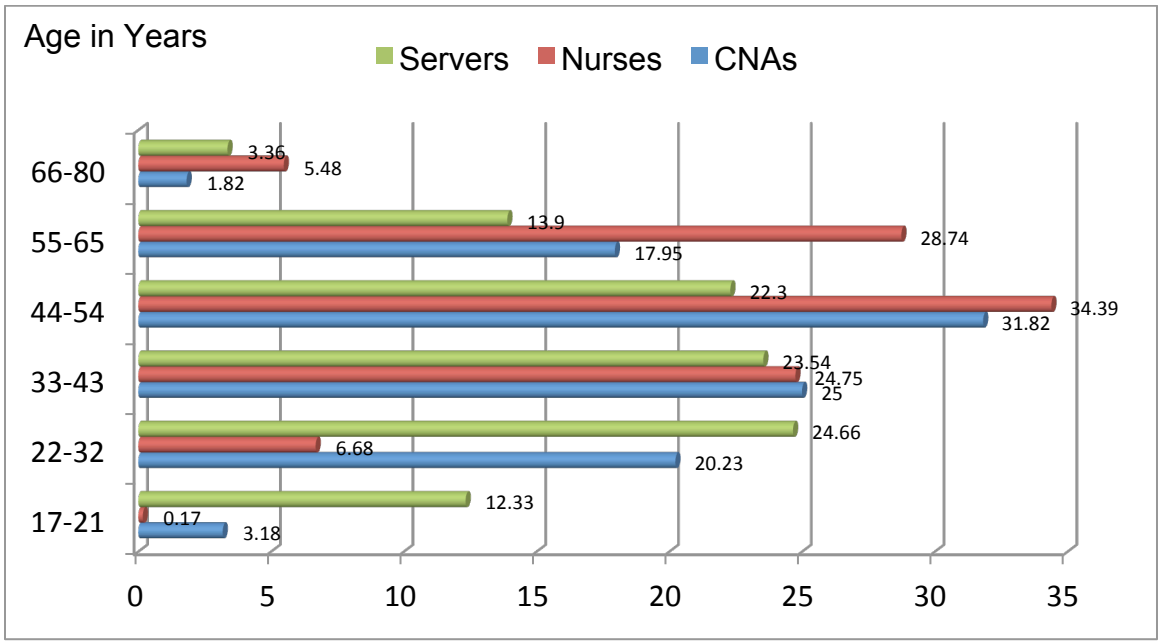

Figure 22: Number of Injuries by Age Groups for CNAs, Nurses. And Servers

Table 22: Injury-related Length of Time Off-work in Months for CNAs, Nurses and Servers

Months	CNAs			Nurses			Servers		
	Number	Freq.	%	Number	Freq.	%	Number	Freq.	%
0 - 6	444	0.8862	88.62	630	0.9065	90.65	448	0.8566	85.66
7 - 12	30	0.0599	5.99	28	0.0403	4.03	20	0.0382	3.82
13 - 24	21	0.0419	4.19	18	0.0259	2.59	8	0.0153	1.53
25 - 36	3	0.006	0.6	8	0.0115	1.15	3	0.0057	0.57
37 – 48	1	0.002	0.2	5	0.0072	0.72	1	0.0019	0.19
49 - 60	0	0	0	4	0.0058	0.58	1	0.0019	0.19

Figure 23 displays the length of time off work for all study groups. The majority of workers returned to duty within 6 months of the injury in all study groups.

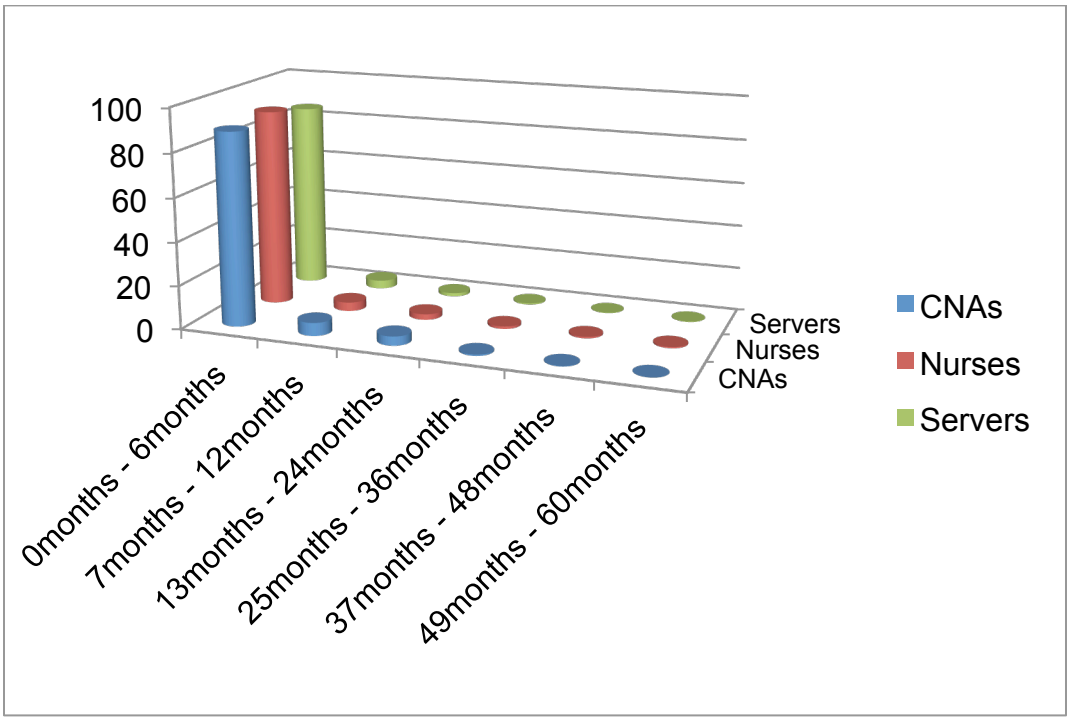

Figure 23: Injury-related Length of Time Off-work in Months for CNAs, Nurses and Servers

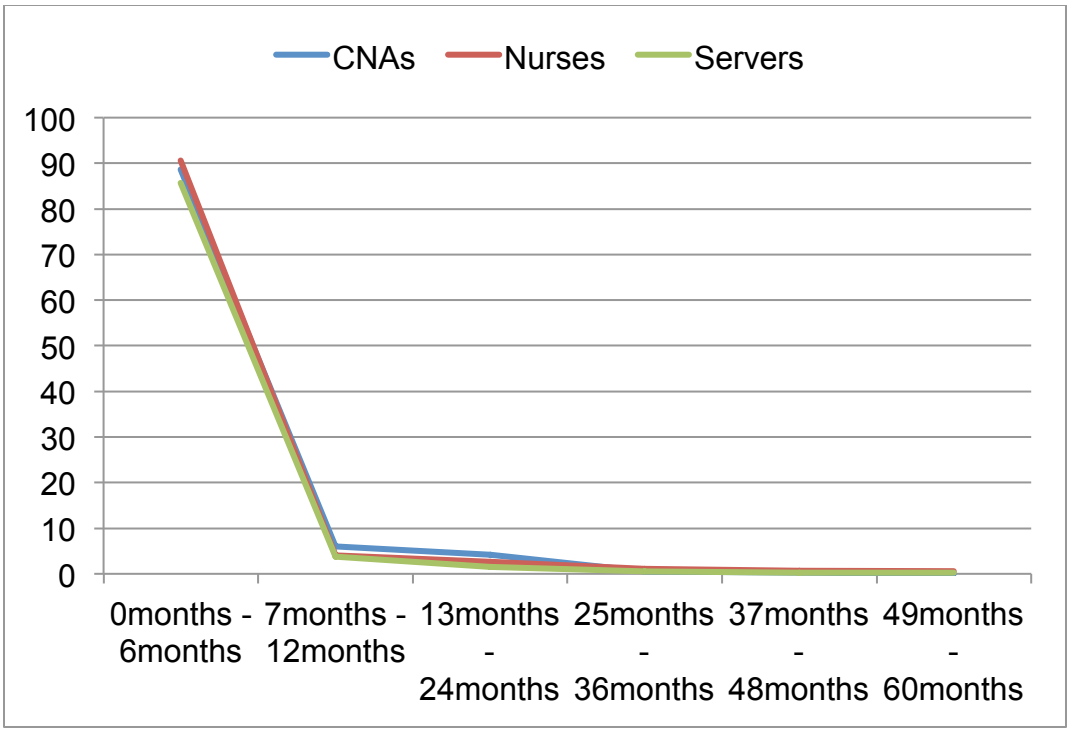

Figure 24: Injury-related Length of Time Off-work in Months for CNAs, Nurses and Servers – Time Off-work Tapers

Figure 24 displays the injury related time off work for all three study groups. The majority of workers returned to duty within the first 6 months of the injury and the frequency of injury related time off-work tapered off with increasing months from the injury.

Table 23: Weekly Pay in Dollars for Injury Related Time Off-work for CNAs, Nurses, and Servers

Weekly Pay in $	CNAs			Nurses			Servers		
	Num	Freq.	%	Num	Freq.	%	Num	Freq.	%
0.00	442	0.8822	88.22	592	0.8518	85.18	448	0.8566	85.66
1 - 250	19	0.0379	3.79	9	0.0129	1.29	47	0.0899	8.99
251 - 500	39	0.0778	7.78	24	0.0345	3.45	27	0.0516	5.16
501 -750	1	0.002	0.2	36	0.0518	5.18	1	0.0019	0.19
751 - 1000	0	0	0	34	0.0489	4.89	0	0	0

Table 23 shows the weekly pay in dollars received during time off-work for all three study groups. The majority of workers did not receive monetary compensation after an injury. In the baseline population, 85.66% received $0 during injury related time off work while 88.22% of CNAs and 85.18% of nurses also received $0 monetary compensation during injury related time off work.

Nurses received compensation in the higher weekly pay range of $751 to $1000 at a frequency of 4.89% compared to CNAs at 0% in that pay range and the baseline population at 0% in that pay range.

Figure 25 displays the weekly pay in dollars for the three study groups. The majority of workers received no monetary compensation and nurses were at the higher pay range.

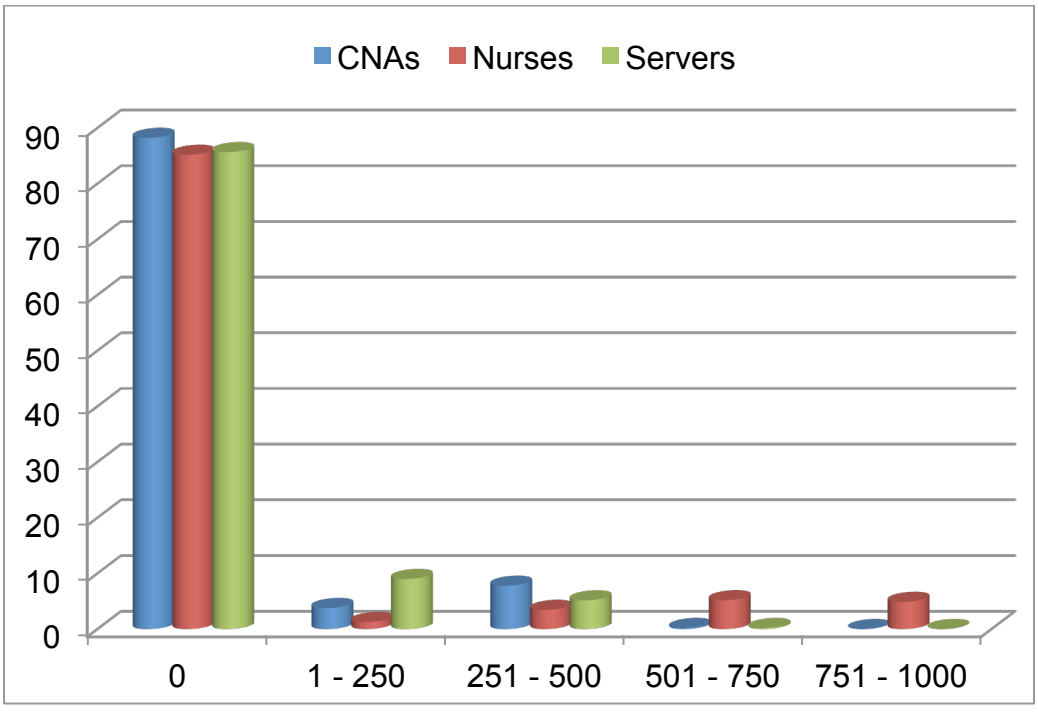

Figure 25: Weekly Pay in Dollars for Injury Related Time Off-work for CNAs, Nurses, and Servers

Table 24: Injuries by Time of Day as a % for CNAs, Nurses and Servers

Time of Day	CNAs			Nurses			Servers		
	# Injuries	Freq.	%	# Injuries	Freq.	%	# Injuries	Freq.	%
00:01-01:00	17	0.0339	3.39	22	0.0317	3.17	14	0.0268	2.68
01:01-02:00	6	0.012	1.2	24	0.0345	3.45	10	0.0191	1.91
02:01-03:00	13	0.026	2.6	10	0.0144	1.44	10	0.0191	1.91
03:01-04:00	8	0.016	1.6	16	0.023	2.3	3	0.0057	0.57
04:01-05:00	14	0.028	2.8	15	0.0216	2.16	4	0.0076	0.76
05:01-06:00	17	0.034	3.4	21	0.0320	3.2	15	0.0287	2.87
06:01-07:00	20	0.04	4.0	29	0.0417	4.17	9	0.0172	1.72
07:01-08:00	38	0.0758	7.58	28	0.0403	4.03	23	0.044	4.4
08:01-09:00	25	o.05	5.0	38	0.0547	5.47	28	0.0535	5.35
09:01-10:00	38	0.0758	7.58	39	0.0561	5.61	34	0.065	6.5
10:01-11:00	33	0.0659	6.59	42	0.0604	6.04	32	0.0612	6.12
11:01-12:00	38	0.0758	7.58	36	0.0518	5.18	37	0.0707	7.07
12:01-13:00	23	0.0459	4.59	40	0.0576	5.76	41	0.0784	7.84
13:01-14:00	17	0.034	3.4	32	0.046	4.6	20	0.0382	3.82
14:01-15:00	14	0.028	2.8	35	0.0504	5.04	13	0.0249	2.49
15:01-16:00	17	0.034	3.4	25	0.036	3.6	12	0.0229	2.29
16:01-17:00	18	0.0359	3.59	29	0.0417	4.17	14	0.0268	2.68
17:01-18:00	14	0.028	2.8	14	0.0201	2.01	13	0.0249	2.49
18:01-19:00	17	0.034	3.4	16	0.023	2.3	16	0.0306	3.06
19:01-20:00	19	0.0379	3.79	16	0.023	2.3	36	0.0688	6.88
20:01-21:00	13	0.026	2.6	23	0.0331	3.31	15	0.0287	2.87
21:01-22:00	10	0.02	2.0	19	0.0273	2.73	20	0.0382	3.82
22:01-23:00	7	0.014	1.4	9	0.0129	1.29	10	0.0191	1.91
23:01-00:00	26	0.0519	5.19	32	0.046	4.6	36	0.0688	6.88

Table 24 shows the percentage injuries by time of day. The majority of injuries occurred from 7:00 am to 1:00 pm during the day. There is another peak 11:00pm to 1:00am.

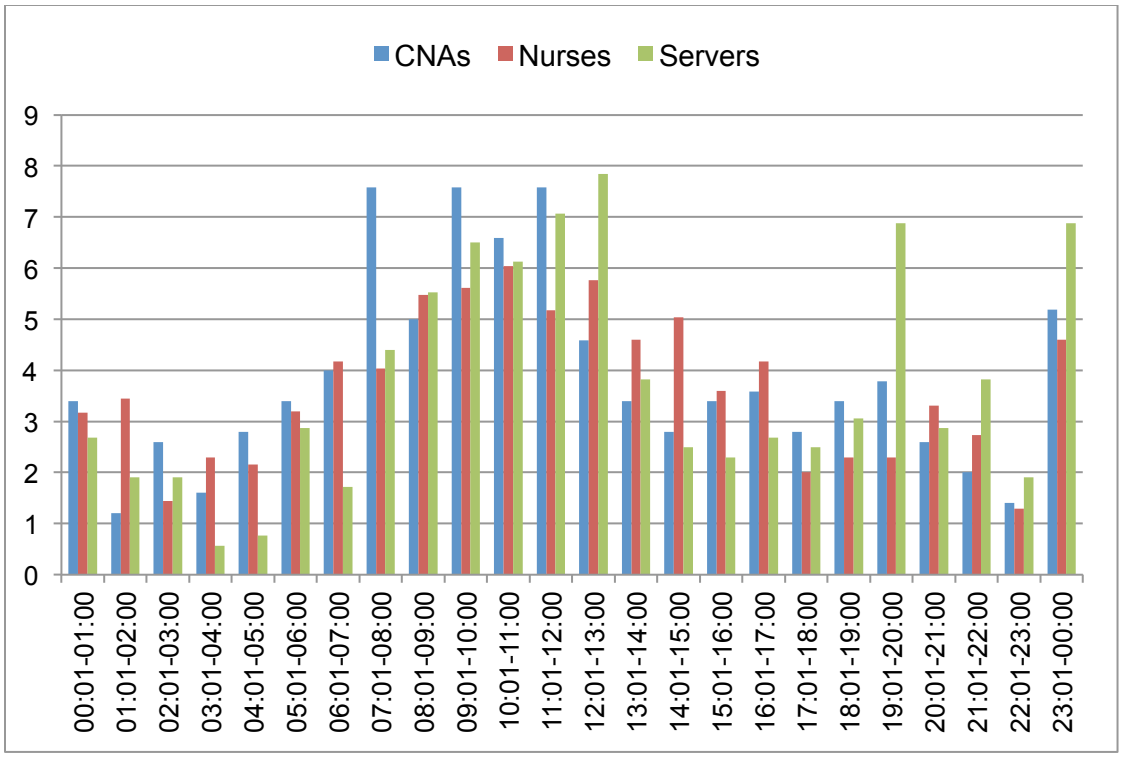

Figure 26: Injuries by Time of Day as a % for CNAs, Nurses and Servers

Figure 26 displays the results of the frequency of injuries by time of day for all three study groups. There is a tendency towards a bell-shaped curve.

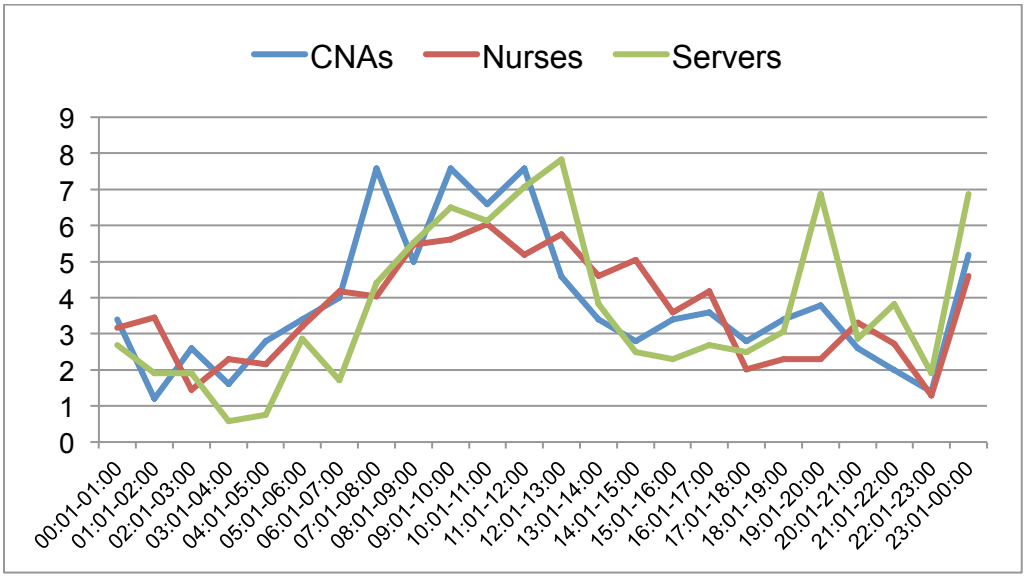

Figure 27: Injuries by Time of Day as a % for CNAs, Nurses and Servers – Line plot

Figure 27 displays a line plot of injuries by time of day for all three study groups, CNAs, nurses, and servers.

Table 25: Injuries During 8hr Shifts as a % for CNAs, Nurses, and Servers

Time	CNAs			Nurses			Servers		
	#	Freq.	%	#	Freq.	%	#	Freq.	%
23:01-07:00	119	0.2698	26.98	170	0.2916	29.16	98	0.2144	21.44
07:01- 15:00	213	0.483	48.3	273	0.4683	46.83	225	0.4823	48.23
15.01-23:00	109	0.2472	24.72	40	0.2401	24.01	134	0.2932	29.32

Table 25 shows the results for the frequency of injuries during eight hour shifts for the three study groups. The majority of injuries occur during the 7:00am to 3:00pm shift with the frequency being the highest for nurses at 29.16%, compared to CNAs at 26.98% and to the baseline population at 21.44%.

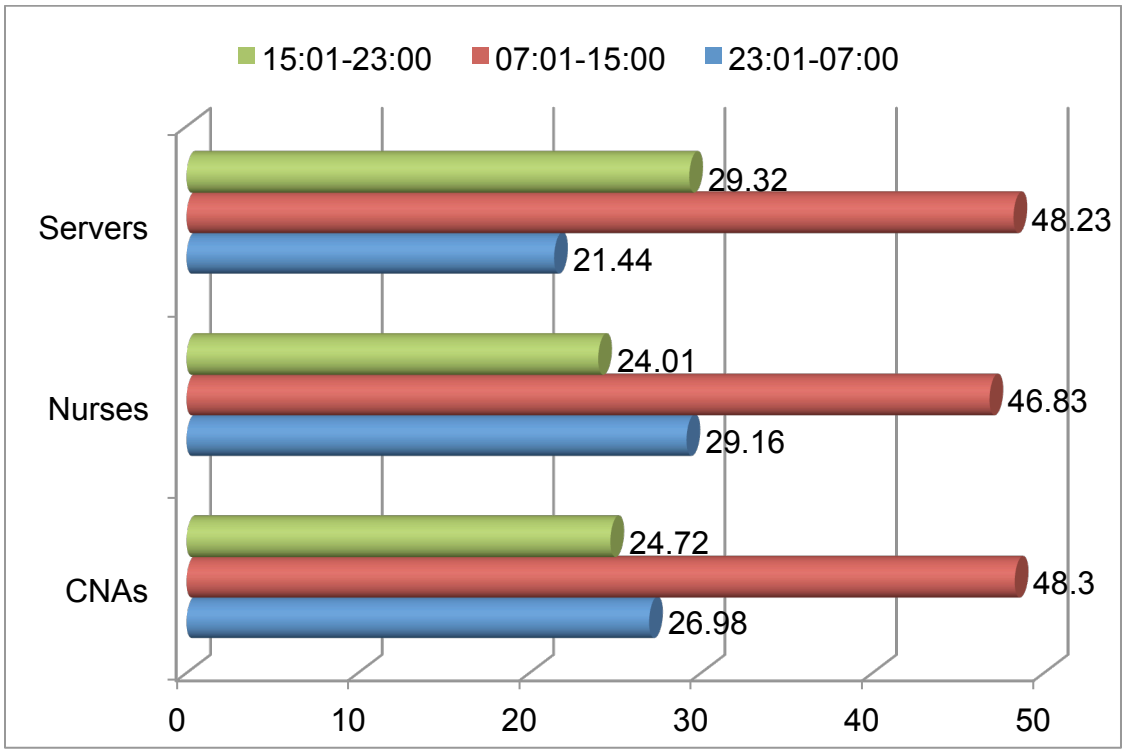

Figure 28: Injuries during 8hr Shifts as a % for CNAs, Nurses, and Servers

Figure 28 displays the frequency of injuries that occur during 8hr shifts for CNAs, nurses and servers. The majority of injuries occur during the 7:00am to 3:00pm shift for all three study groups.

Table 26: Injuries by Day of the Week as a % for CNAs, Nurses, and Servers

Day	CNAs			Nurses			Servers		
	#	Freq.	%	#	Freq.	%	#	Freq.	%
Sunday	70	0.1397	13.97	78	0.1122	11.22	67	0.1281	12.81
Monday	76	0.1517	15.17	125	0.1799	17.99	73	0.1396	13.96
Tuesday	90	0.1796	17.96	121	0.1741	17.41	65	0.1243	12.43
Wednesday	66	0.1317	13.17	103	0.1482	14.82	83	0.1587	15.87
Thursday	81	0.1617	16.17	118	0.1698	16.98	67	0.1281	12.81
Friday	58	0.1158	11.58	80	0.1151	11.51	73	0.1396	13.96
Saturday	60	0.1198	11.98	70	0.1007	10.07	95	0.1816	18.16

Table 26 shows the frequency of injuries by day of the week for all three study groups. Most of the injuries occur earlier in the week with nurses at 17.99%, CNAs at 15.17% and the baseline population at 13.96% on a Monday. The frequency of injuries is reduced to 11.51% for nurses, 11.58% for CNAs, and 13.96% for the baseline population, on a Friday.

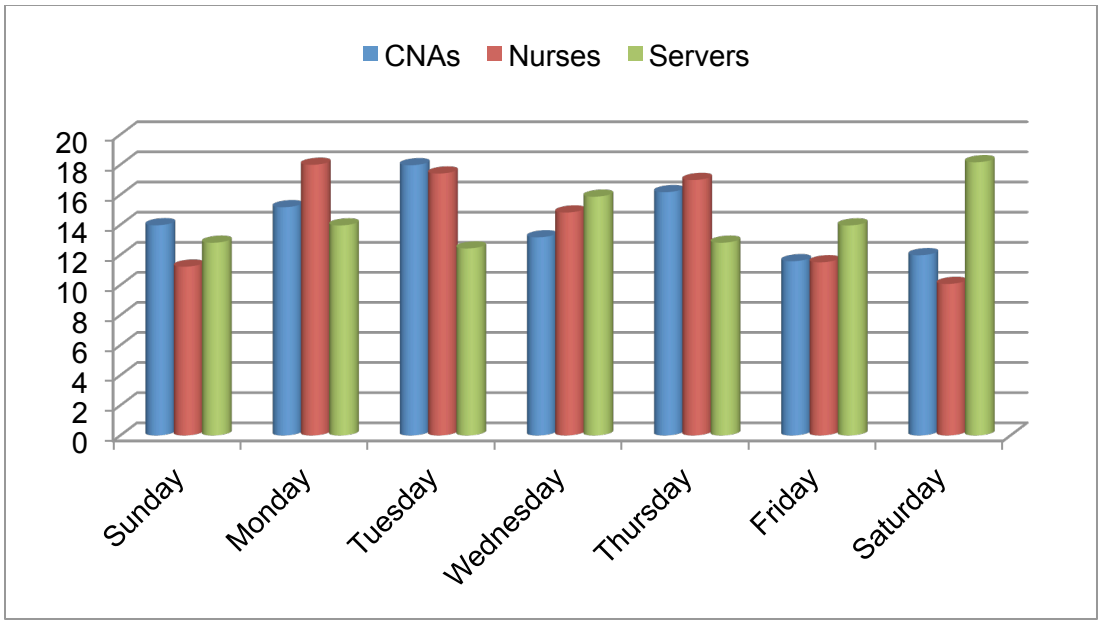

Figure 29: Injuries by Day of the Week as a % for CNAs Nurses and Servers

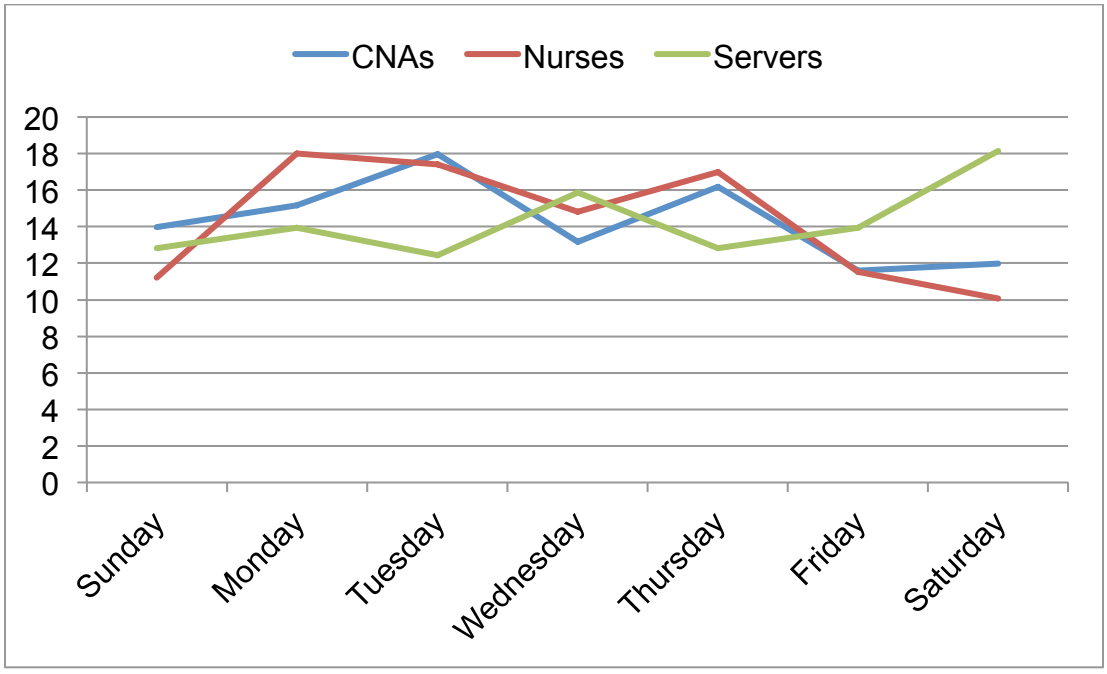

Figure 30: Injuries by Day of the Week as a % for CNAs Nurses and Servers – Line Plot

Figure 29 displays the results of frequency of injuries by day of the week for CNAs, nurses, and servers. The distribution is bimodal which peaks on

Mondays and Tuesdays and then again on Thursdays as compared to the baseline population of servers.

Figure 30 displays the results of frequency of injuries by day of the week, as a line plot and the bimodal distribution is more visible.

Table 27: Injuries by Month of the Year as a % for CNAs, Nurses and Servers

Month	CNAs			Nurses			Servers		
	#	Freq.	%	#	Freq.	%	#	Freq.	%
January	49	0.0978	9.78	76	0.1094	10.94	50	0.0956	9.56
February	45	0.09	9	68	0.0978	9.78	53	0.1013	10.13
March	58	0.1158	11.58	69	0.0993	9.93	61	0.1166	11.66
April	44	0.0878	8.78	79	0.1137	11.37	48	0.0918	9.18
May	43	0.0858	8.58	60	0.0863	8.63	69	0.1319	13.19
June	51	0.1018	10.18	52	0.0748	7.48	36	0.0688	6.88
July	33	0.0659	6.59	46	0.0662	6.62	25	0.0478	4.78
August	30	0.0599	5.99	50	0.0719	7.19	32	0.0612	6.12
September	35	0.0699	6.99	47	0.0676	6.76	36	0.0688	6.88
October	47	0.0938	9.38	52	0.0748	7.48	39	0.0746	7.46
November	35	0.0699	6.99	49	0.0705	7.05	29	0.0554	5.54
December	31	0.0619	6.19	45	0.0647	6.47	45	0.086	8.6

The frequency of injuries by month of the year for all three study groups is shown on Table 27. The first six months of the year had the greatest percentages of injuries across all study groups.

Figure 31 displays the results for injuries by month of the year for all three study groups. The first half of the year from January to June had the most injuries across all three groups.

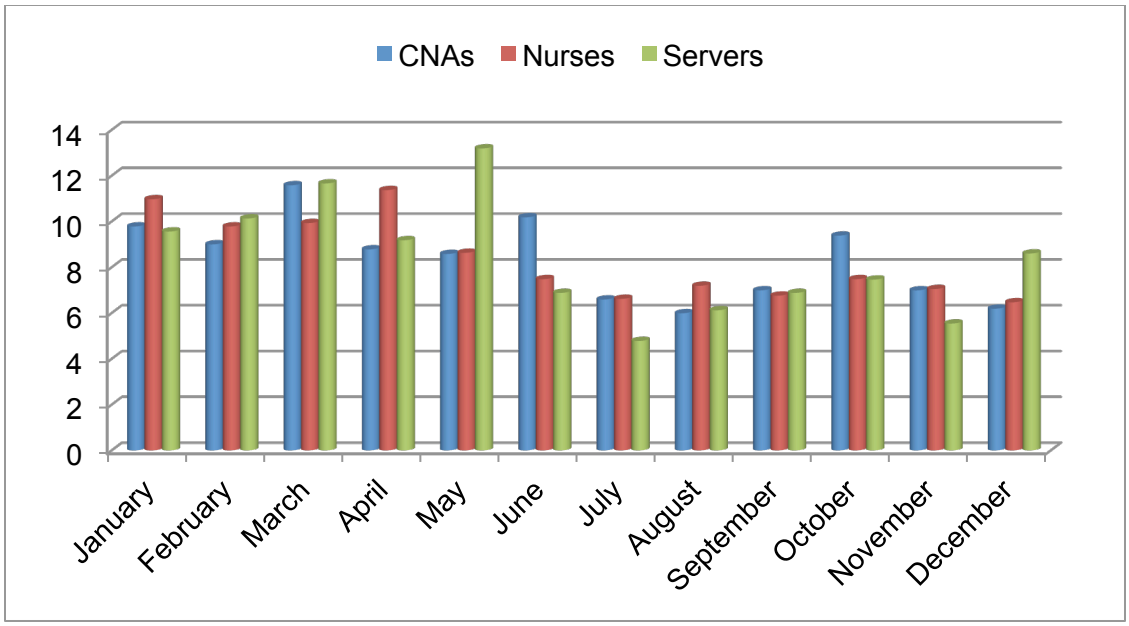

Figure 31: Injuries by Month of the Year as a % for CNAs, Nurses and Servers

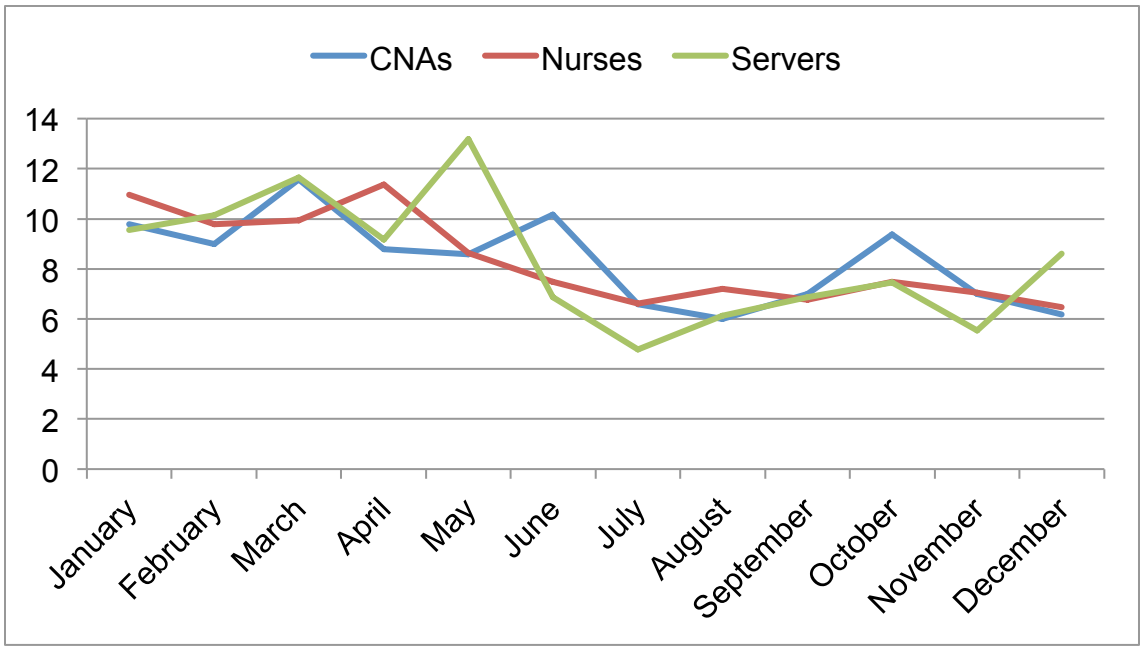

Figure 32: Injuries by Month of the Year as a % for CNAs, Nurses and Servers – Line Plot

Figure 32 is a line plot of the results for injuries by month of the year for all three study groups showing a preponderance of injuries during the first part of the year.

This research project data was also analyzed for the number of injuries by city in the state of Florida.

Figure 33: Major Cities of the State of Florida

Figure 33 shows the major cities in Florida.

Table 28: Number of CNAs Injured by City

City	# of CNAs	City	# of CNAs
Boca Raton	7	Merritt island	8
Bradenton	6	Miami	48
Brooksville	8	Miami Beach	7
Clearwater	7	Naples	15
Daytona	11	Ocala	4
Defuniak Springs	4	Orlando	13

Table 28 Continued

Fernandia	5	Palatka	4
Fort Lauderdale	12	Pensacola	12
Fort Myers	8	Port Charlotte	4
Gainesville	6	Port St. Lucie	7
Graceville	6	Punta Gorda	4
Hialeah	13	Sarasota	8
Hobe Sound	6	Sebastian	6
Hudson	4	St. Petersburg	21
Inverness	6	Stuart	8
Jacksonville	10	Tallahassee	5
Lake City	7	Tampa	10
Lakeland	5	Titusville	4
Largo	4	Venice	6
Mananna	6	Vero Beach	9
Melbourne	21	West Palm Beach	4

Table 28 shows the number of injuries in CNAs by cities in the state of Florida which had four or more injuries during the study year, 2010. The Miami/Fort Lauderdale/Melbourne area at the South-Eastern side of the state had the most injuries numbering 48, 12, and 21 respectively. On the South-Western side of the peninsula, the Naples/St. Petersburg/Tampa area had 15, 21, 10 injuries respectively. In the panhandle area, Pensacola had 12 injuries, the highest number for the area.

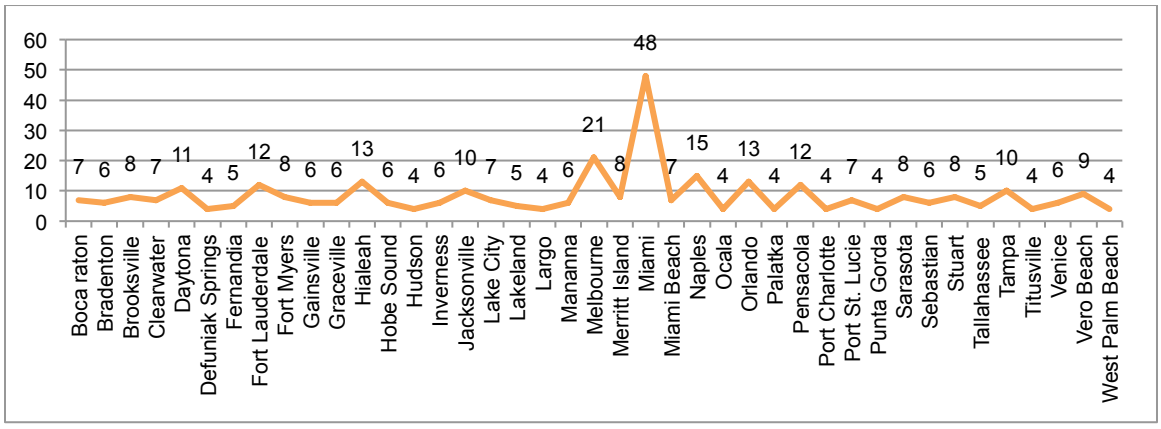

Figure 34: Number of CNAs Injured by City

Figure 34 displays the number of injuries for CNAs by city in the state of Florida. The Miami/Melbourne had the highest numbers of injuries.

Table 29: Number of Nurses Injured by City

City	# of Nurses	City	# of Nurses
Arcadia	4	Miami	33
Bartow	4	Naples	9
Boca Raton	15	Ocala	5
Boynton Beach	12	Ocoee	6
Bradenton	9	Orlando	27
Brooksville	8	Panama City	4
Clearwater	12	Pensacola	15
Cocoa Beach	5	Pompano Beach	5
Daytona	21	Port Charlotte	4
Fort Lauderdale	31	Port St. Lucie	8
Fort Myers	11	Sanford	4
Fort Walton	6	Sarasota	13
Gainesville	10	Sebastian	4
Hialeah	7	Spring Hill	4
Hollywood	7	St. Augustine	4
Homestead	5	St. Petersburg	11
Inverness	6	Tallahassee	21
Jacksonville	15	Tampa	25
Jupiter	5	Venice	7
Lakeland	8	Vero Beach	6
Largo	7	West Palm Beach	9
Leesburg	7	Winter Park	5
Melbourne	10		

Table 29 shows the number of injuries for nurses by cities in Florida. Cities with the highest number of injuries for nurses include Miami with 33, Fort Lauderdale with 31, Orlando with 27, Tampa with 25, Daytona with 21, Tallahassee with 21, Boca Raton with 15, Jacksonville with 15, and Pensacola with 15 nursing injuries for 2010. There is a scattered distribution of injuries for nurses.

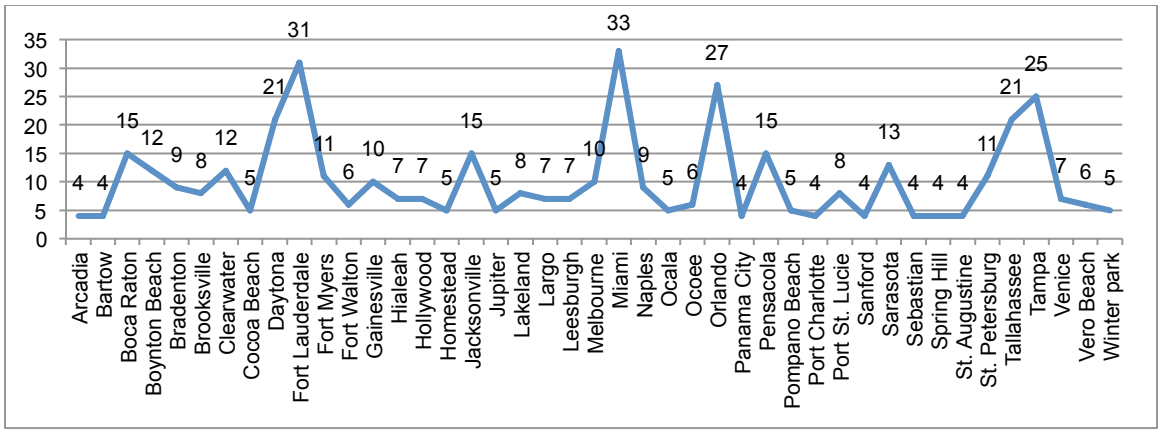

Figure 35: Number of Nurses Injured by City

Figure 35 displays the cities with the largest number of injuries in this study. Fort Lauderdale, Miami, Orlando and Tampa had the highest number of injuries for nurses.

Table 30: Number of Servers injured by City

City	# of Servers	City	# of Servers
Altamonte Springs	4	Miami	28
Boca Raton	10	Naples	19
Boynton Beach	8	New Port Ritchey	4
Bradenton	5	Orlando	33
Brandon	5	Ormond Beach	4
Brooksville	4	Panama City	11
Clearwater	8	Pensacola	11
Daytona	6	Pompano Beach	7
Delray	5	Port Charlotte	4
Destin	6	Port Ritchey	6
Fort Lauderdale	15	Port St. Lucie	5
Fort Myers	13	Sarasota	8
Hollywood	8	Sebring	4
Jacksonville	16	St. Petersburg	14
Kissimmee	10	Stuart	7
Lake Worth	5	Tallahassee	9
Lakeland	5	Tampa	22
Largo	5	West Palm Beach	26

Table 30 shows the number of servers injured by city in Florida. Orlando, Miami, West Palm Beach, Tampa, and Naples had the highest numbers of injuries at 33, 28, 26, 22, 19 respectively.

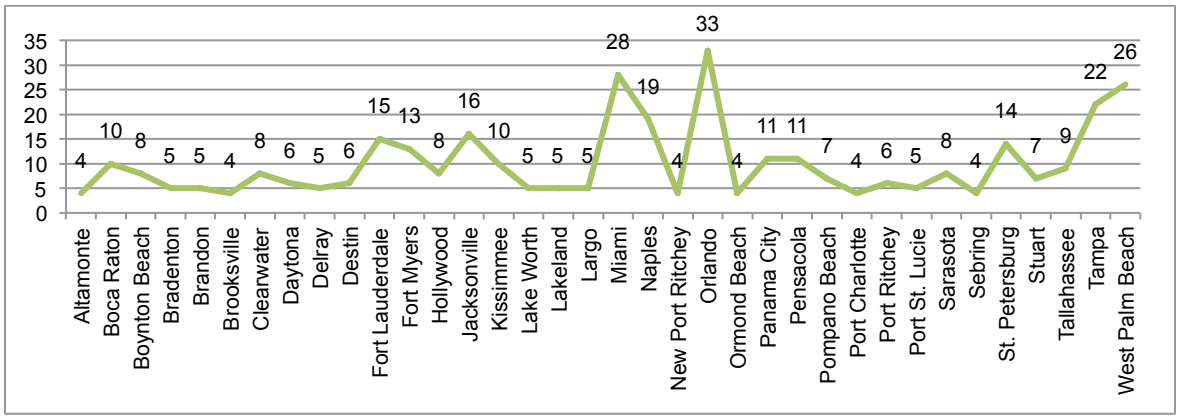

Figure 36: Number of Servers Injured by City

Figure 36 displays the number of injuries by city in Florida, for servers, our baseline population.

This research project data was also analyzed for number of injuries by county for all three study groups. Figure 37 is a map of the State of Florida showing the 67 counties of the state. Counties with four or more injuries were included in the results.

Table 31 shows the number of CNAs injured by county. Miami-Dade county had the most injured CNAs at 73. Pinellas county had 41 injuries and Brevard county had 26 injured CNAs.

Figure 38 displays the counties with the highest numbers of injuries for CNAs. Miami-Dade county, Pinellas county and Brevard county had the highest numbers of CNAs injured.

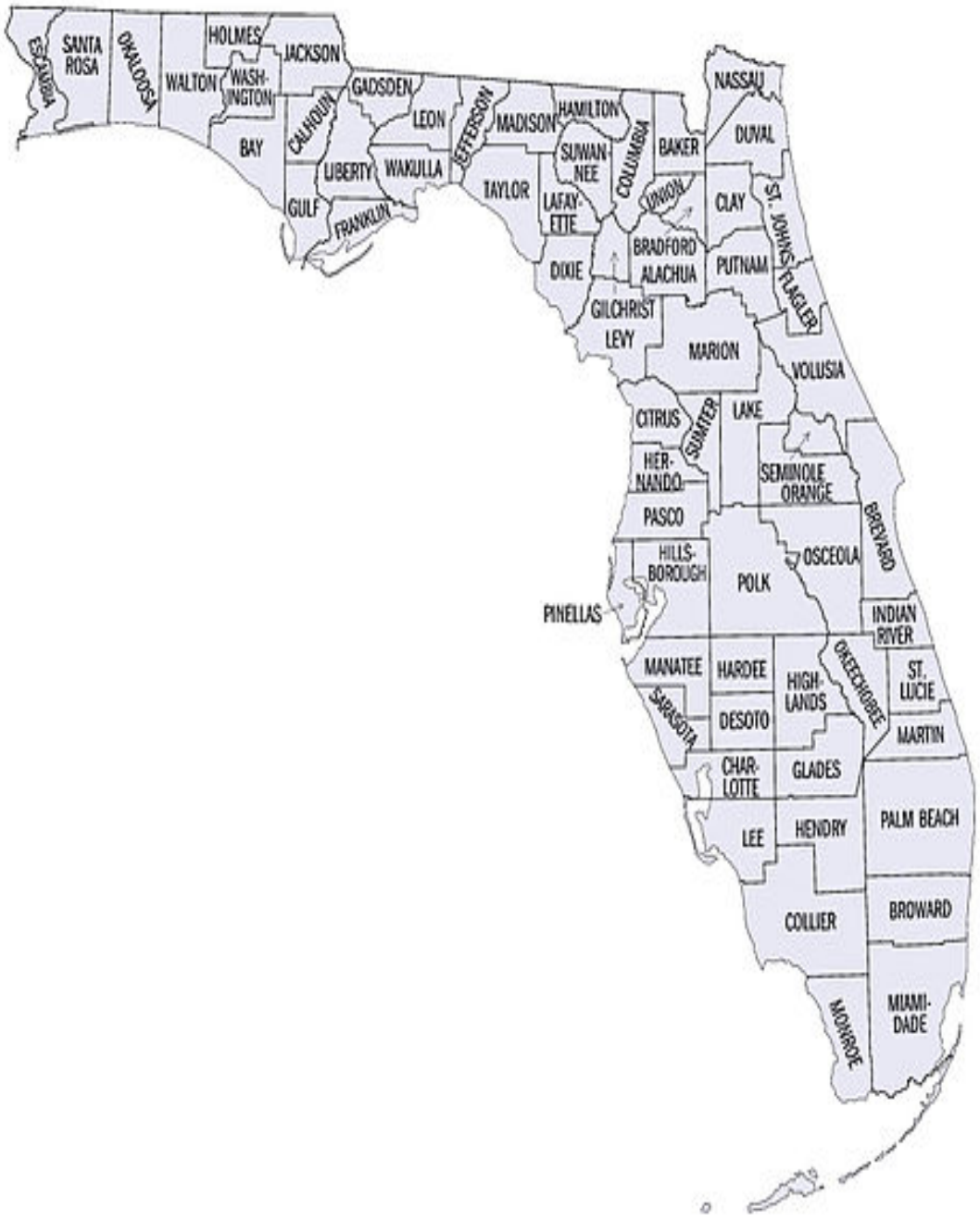

Figure 37: Map of Counties of Florida

Table 31: Number of CNAs Injured by County

County	# of CNAs	City	# of CNAs
Alachua	6	Manatee	8
Bay County	9	Marion	5
Brevard	26	Martin	15
Broward	17	Miami-Dade County	73
Calhoun	5	Monroe	4
Charlotte	4	Nassau	7
Citrus	11	Okaloosa	5
Collier	15	Orange	19
Columbia	8	Palm Beach	18
Duval	12	Pasco	14
Escambia	12	Pinellas	41
Hernando	13	Polk	10
Hillsborough	16	Putnam	5
Indian River	13	Sarasota	15
Jackson	13	St. Lucie	8
Lake County	10	Volusia	14
Lee County	13	Walton	4
Leon County	5		

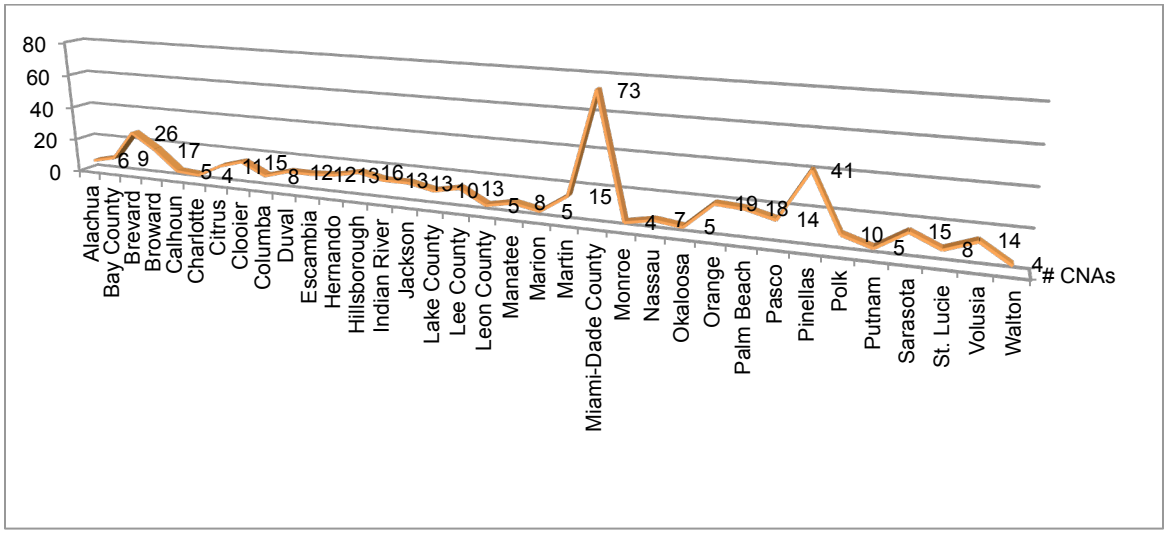

Figure 38: Number of CNAs Injured by County

Table 32: Number of Nurses Injured by County

County	# Nurses	County	# Nurses
Alachua	12	Manatee	11
Bay County	4	Marion	5
Brevard	23	Martin	4
Broward	44	Miami-Dade County	47
Charlotte	4	Okaloosa	10
Citrus	10	Orange	40
Collier	9	Palm Beach	47
Desoto	4	Pasco	11
Duval	17	Pinellas	41
Escambia	15	Polk	15
Hernando	11	Sarasota	21
Hillsborough	29	Seminole	5
Indian River	10	St. John's	4
Lake County	10	St. Lucie	8
Lee County	13	Volusia	29
Leon County	21		

The number of nurses injured by county is shown in Table 32. Miami-Dade county and Palm Beach county had the highest number of injured nurses at 47 each. Broward county, Pinellas county, and Orange county had high numbers of injured nurses in 2010.

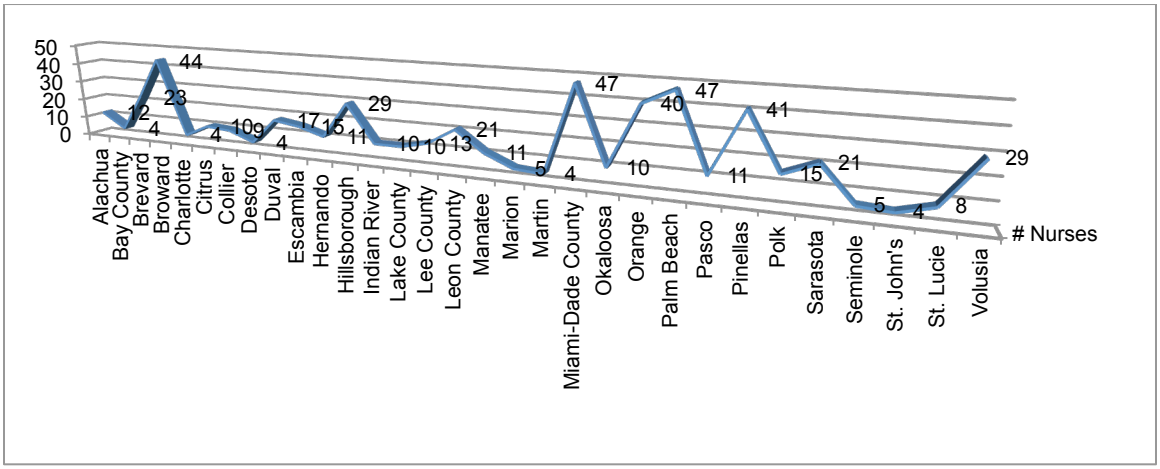

Figure 39: Number of Nurses Injured by County

Figure 39 displays the number of nurses injured by county. Miami-Dade, Palm Beach, Broward and Pinellas counties had the highest numbers of injured nurses.

Table 33: Number of Servers Injured by County

County	# Servers	County	# Servers
Alachua	4	Manatee	9
Bay County	16	Miami-Dade County	45
Brevard	7	Monroe	7
Broward	38	Okaloosa	13
Charlotte	4	Orange	39
Clay	5	Osceola	11
Collier	20	Palm Beach	61
Duval	19	Pasco	10
Escambia	11	Pinellas	30
Hernando	6	Polk	13
Highlands	4	Sarasota	14
Hillsborough	31	Seminole	8
Lake County	8	St. Lucie	6
Lee County	24	Volusia	17
Leon County	9		

Table 33 shows the number of servers injured by county. Palm Beach county had the highest number of injured servers at 61, followed by Miami-Dade county with 45. Orange, Broward, Hillsborough, and Pinellas counties had 39, 38, 31, and 30 injured servers respectively.

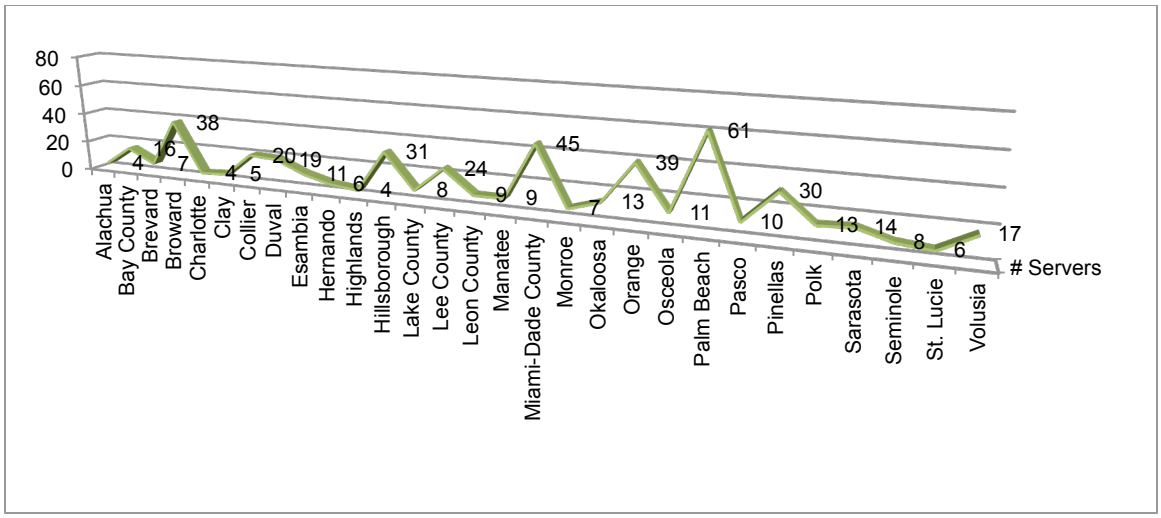

Figure 40: # Servers Injured by County

Figure 40 displays the number of injured servers by county. Palm Beach county and Miami-Dade county had the highest occurrence of injured servers in 2010.

Data Analysis

Logistic Regression Data Analysis

Table 34: Logistic Regression Analysis for Nature of Injury Showing Odds Ratio Estimates and Confidence Intervals

Effect	Nature of Injury	Odds Ratio	95% Confidence Limits
CNAs vs. Servers	Contusion	1.581	0.971 – 2.576
CNAs vs. Servers	Fracture	0.413	0.246 – 0.695
CNAs vs. Servers	Laceration	0.055	0.013 – 0.232
CNAs vs. Servers	Sprain/Strain	2.288	1.628 – 3.215
Nurses vs. Servers	Contusion	1.886	1.184 – 3.003
Nurses vs. Servers	Fracture	0.909	0.598 – 1.381
Nurses vs. Servers	Laceration	0.251	0.119 – 0.527
Nurses vs. Servers	Sprain/Strain	2.005	1.433 – 2.807
Age Category <=45yrs vs. >45yrs	Contusion	1.095	0.750 – 1.599
Age Category <=45yrs vs. >45yrs	Fracture	0.559	0.377 – 0.830
Age Category <=45yrs vs. >45yrs	Laceration	2.292	1.248 – 4.209
Age Category <=45yrs vs. >45yrs	Sprain/Strain	1.593	1.213 – 2.092
Gender F vs. M	Contusion	0.770	0.405 – 1.464

Table 34 Continued

Gender F vs. M	Fracture	2.349	1.003 – 5.499
Gender F vs. M	Laceration	0.538	0.262 – 1.104
Gender F vs.. M	Sprain/Strain	0.630	0.397 – 0.998
Time to Filing <3days vs. >=3days	Contusion	0.796	0.545 – 1.163
Time to Filing <3days vs. >=3days	Fracture	2.144	1.377 – 3.337
Time to Filing <3days vs. >=3days	Laceration	1.325	0.727 – 2.414
Time to Filing <3days vs. >=3days	Sprain/Strain	0.726	0.551 – 0.955

Table 34 shows the odds ratio and confidence intervals for contusion, fracture, laceration and sprain/strain injuries for CNAs and nurses as compared to the baseline population of servers. Significant findings include the following:

i) CNAs were less than half as likely to claim a fracture injury as compared to servers

ii) Servers were 20 times more likely to report laceration than CNAs

iii) Both CNAs and nurses were twice as likely to report sprain/strain injuries as compared to servers

iv) Younger workers less than 45yrs of age were twice as likely to report laceration and about half as likely to report fracture

v) Younger workers less than 45 years of age, were 1.5 times more likely to report sprains and strains

vi) Females were about half as likely to claim strains and sprains, but twice as likely to claim fracture

vii) Sprains and strains, and fracture were more likely to have delayed reporting of more than 3 days from the time of injury

Table 35: Logistic Regression Analysis for Cause of Injury Showing Odds Ratios and Confidence Intervals

Effect	Cause of Injury	Odds Ratio	95% Confidence Limits
CNAs vs. Servers	Fall	0.956	0.676 – 1.351
CNAs vs. Servers	Lifting	5.918	3.522 – 9.944
CNAs vs. Servers	Pushing/Pulling	7.608	2.557 – 22.637
CNAs vs. Servers	Struck or Injured By Fellow-Worker, Patient, or other Person, Motor Vehicle, Object Handled by others, Struck or Injured NOC	3.830	2.064 – 7.108
Nurses vs. Servers	Fall	0.941	0.683 – 1.295
Nurses vs. Servers	Lifting	2.643	1.517 – 4.603
Nurses vs. Servers	Pushing/Pulling	10.746	3.722 – 31.028
Nurses vs. Servers	Struck or Injured By Fellow-Worker, Patient, or other Person, Motor Vehicle, Object Handled by others, Struck or Injured NOC	3.871	2.107 – 7.112
Age Category <=45yrs vs. >45yrs	Fall	0.755	0.572 – 0.996
Age Category <=45yrs vs. >45yrs	Lifting	1.429	0.988 – 2.066
Age Category <=45yrs vs. >45yrs	Pushing/Pulling	1.124	0.667 – 1.892
Age Category <45yrs vs. >45yrs	Struck or Injured By Fellow-Worker, Patient, or other Person, Motor Vehicle, Object Handled by others, Struck or Injured NOC	1.194	0.787 – 1.812
Gender F vs. M	Fall	2.067	1.194 – 3.575
Gender F vs. M	Lifting	0.484	0.276 – 0.847
Gender F vs. M	Pushing/Pulling	0.809	0.307 – 2.127
Gender F vs. M	Struck or Injured By Fellow-Worker, Patient, or other Person, Motor Vehicle, Object Handled by others, Struck or Injured NOC	0.556	0.290 – 1.065
Time to Filing <3days vs. >=3days	Fall	1.441	1.077 – 1.928
Time to Filing <3days vs. >=3days	Lifting	0.620	0.433 – 0.887
Time to Filing <3days vs. >=3days	Pushing/Pulling	0.766	0.457 – 1.285
Time to Filing 3days vs. >=3days	Struck or Injured By Fellow-Worker, Patient, or other Person, Motor Vehicle, Object Handled by others, Struck or Injured NOC	1.313	0.847 – 2.036

Table 35 shows the odds ratios and confidence limits for causes of injury due to fall, lifting, pushing/pulling, and being struck or injured by a fellow-worker, patient, another person, a motor vehicle, an object handled by others, or being struck or injured not otherwise classified. Significant findings included the following:

i) CNA's were almost 6 times as likely to claim lifting injuries and 7 times as likely to claim pushing/pulling injuries compared to servers.

ii) CNA's were almost 4 times as likely to claim being 'struck' by something or someone in the workplace compared to servers.

iii) Nurses were 10 times as likely to claim pushing/pulling injuries, as well as having increased 'struck' and 'lifting' injuries.

iv) Younger workers (less than 45yrs old) were less likely to report falls.

v) Females were twice as likely to report a fall injury compared to males.

vi) Fall injuries were 1.5 times likely to have delayed filing 3 days or more after the injury.

vii) Females were half as likely to claim 'lifting' injuries as males. Lifting injuries were also almost twice as likely to have delayed filing (3 days or more).

Table 36: Logistic Regression Evaluating Permanent Impairment for the Various Groups

Effect	Permanent Impairment	Odds Ratio	95% Confidence Limits
CNAs vs. Servers	0	0.962	0.682 – 1.398
Nurses vs. Servers	0	0.781	0.566 – 1.079
Age Category <=45yrs vs. >45yrs	0	1.358	1.038 – 1.777
Gender F vs. M	0	0.701	0.429 – 1.146
Time to Filing <3days vs. >=3days	0	0.784	0.593 – 1.036

Table 36 shows the results of a logistic regression analysis performed to determine whether or not groups which are associated with a claim have some degree of permanent impairment. A significant finding was that younger workers (45 years of age, or less) were slightly more likely to claim some degree of permanent impairment than older workers.

Linear Regression Data Analysis

Table 37: Linear Regression Analysis of Time to Recovery

Parameter	Estimate	Standard Error	t Value	Pr > [t]
Intercept	245.4099070	55.13404058	4.45	<.0001
CNAs	-89.1738657	29.94658995	-2.98	0.0030
Nurses	-43.1738147	29.07357755	-1.48	0.1382
Servers	0.0000000	.	.	.
Age at Injury	-0.0799480	0.92508195	-0.09	0.9312
Time to Filing	1.1464600	0.61356479	1.87	0.0623
Gender - F	44.7656236	42.57993890	1.05	0.2936
Gender - M	0.0000000	.	.	.

Table 37 shows the results of a linear regression analysis of time to recovery which was calculated from the date of maximum medical improvement minus the date of injury. CNA's on average, reached maximum medical improvement 89 days faster than servers while the findings for nurses were not significant. Another finding which was not significant but close, is that for every 1 day filing was delayed, time to recovery increased to 1.14 days.

Table 38: Linear Regression Analysis of Duration of Workers' Compensation Benefits

Parameter	Estimate	Standard Error	t Value	Pr > [t]
Intercept	0.57825977	12.69942104	0.05	0.9637
CNAs	12.64443100	7.53213227	1.68	0.0935
Nurses	2.82238692	7.23279147	0.39	0.6965
Servers	0.00000000	.	.	.
Age at Injury	0.49337337	0.21769478	2.27	0.0237
Time to Filing	0.38066646	0.24391632	1.56	0.1190
Gender – F	25.13081141	9.63467047	2.61	0.0092
Gender – M	0.00000000	.	.	.

Table 38 shows the results of a linear regression analysis to determine the significance of the length of benefits for the various groups. Duration of benefits was calculated by taking the difference of benefit through date from benefit start date. It was hoped that we might be able to look at relative costs by this method. A finding which was not significant, but close was that CNAs on average received benefits about 12 days more than servers.

A significant finding was that for every 1 year increase in age, claimants received on average about a half day more benefits. This means that for every 10 years increase in age, about 5 more days of benefits was received. Another significant finding was that, on average, females received benefits about 25 days longer than males.

Chapter Five

Discussion and Recommendations

Evaluation of Research Hypotheses

To determine how well the results of this study supported the overall goals of the research, the postulated hypotheses will be examined below:

Hypothesis1: The most important adverse health outcomes for CNAs and nurses are related to musculoskeletal sprains and strains.

Based on both the descriptive evaluation of the dataset and the data analysis using logistic regression, sprains and strains were the number one cause of injury in all three study groups. CNAs had the highest frequency of strain/sprain type of injuries at 51.7%, followed by nurses at 41.58% compared to our baseline population at 31.36%.

Data regression analysis showed a significant finding, in that, both CNAs and nurses were twice as likely to report sprains and strains compared to our baseline population of servers. CNAs are most at risk as the burden of assisting patients with their activities of daily living (ADL) is a major part of their job tasks.

CNAs have the primary responsibility for heavy lifting and rarely use mechanical aids. Most of the strains and sprains occur from sudden load to the body as when a patient moves suddenly and shifts his body weight and the CNAs body performs an involuntary reaction to that sudden movement.

Hypothesis 2: CNAs and nurses are at no greater risks of infectious disease, puncture wounds and chemical exposures, compared to a baseline population.

Upon examining the results of the descriptive analysis for infectious disease, puncture wounds and chemical exposures, it was found that CNAs are at greater risk for infection even though it is at a relative low frequency of 0.4% compared to nurses and servers, both at 0%. One explanation for this finding is that CNAs are mostly responsible for assisting patients with cleaning and toileting activities which bring them in close contact with patients and bodily fluids and excreta.

Perhaps providing CNAs with adequate barrier supplies such as gloves, face masks, and disposable aprons will serve as preventive measures. Providing CNAs with adequate time to don and doff protective gear must be practiced. CNAs as a group, must be targeted for adequate training in infectious disease control in preference to the other study groups. They are also the group that must be targeted for research as a single entity and not in combination with other healthcare workers, due to their special situation and needs.

Puncture wounds, including needlestick injuries were uncommon for the group of CNAs with a frequency of 0%. Nurses had a low 0.29% frequency for puncture wounds compared to the baseline population of servers with a frequency of 0.57%. Nurses were half as likely to suffer a puncture wound as compared to servers. Needlestick injuries, infectious diseases and stress-related

claims infrequently resulted in time-loss claims although they are known to cause great concern in the workplace. The rate of exposure to HIV antibody positive patients is only 0.24/100 FTE years and exposure does not equal disease. Occupational exposure to blood and body fluids is common among health care workers but most exposures confer a low risk of blood borne infection.

Needlestick or other blood contaminated sharps injuries are likely due to failure to observe standard precautions. Risk factors for cuts and puncture wounds are related to a false move during a procedure, re-assembling devices and handing devices to a colleague. The highest proportion of needlestick injuries is related to recapping of used needles especially during the cleaning process. Blood borne pathogen legislation have reduced injury.

Healthcare workers are also exposed to hepatitis B, hepatitis C, and human immunodeficiency viruses in non-hospital settings. The introduction of an occupational exposure assessment program will have many benefits, including optimal management of injuries and acquisition of data on infection control measures, and may protect health care institutions from false claims for compensation.

Regarding occupational disease by chemical exposure, CNAs were 1.5 times as likely to claim injury at a low frequency of 0.6% as compared to servers with a claim frequency of 0.38%. Nurses were twice as likely to claim injury from chemical exposure at a low frequency of 0.86% as compared to servers at 0.38%. This finding is likely due to nurses doing the majority of handling of medications and doing sterilization work and other tasks that require the use of

chemicals. CNAs would be exposed to chemicals during cleaning tasks. Engineering controls such as good ventilation, hoods and Personal Protective Equipment (PPE) such as appropriate gloves, eye protection and gowns will help to reduce chemical exposure claims.

Hypothesis 3: The most important risk factors leading to the adverse health effects in nurses and CNAs are falls and heavy lifting.

The highest frequency of claims for cause of injury was due to falls at a frequency of 21.96% for CNAs and 33.81% for nurses as compared to servers at 41.68%. The descriptive analysis showed that CNAs were half as likely to file a claim for an injury due to a fall as compared to our baseline population of servers.

On logistic regression analysis of fall injuries, results were insignificant for both the CNAs and nurses groups when compared to the group of servers. Workers less than 45yeals old claimed more fall injuries perhaps they are more active, and females were twice as likely to file a claim for a fall injury as compared to males. This may be due to less conditioning of females compared to males. A study by Collins et. al. that assessed demographic and workplace risk factors of serious falls in healthcare workers, showed that the median number of days lost due to fall injury was higher for females, long-term care workers, nurses and CNAs.

Healthcare workers must be required to be physically fit for duty as they do much manual work. The healthcare industry should take a page from the

requirements of air-force corps which mandates a prescribed level of fitness to meet the requirements of the job. This should not be too difficult to implement as the nursing profession does operate by a similar stratified command system.

Healthcare establishments will do well to facilitate the body conditioning process by offering free of charge to workers, rehabilitation program enrollment, discounted gym memberships with a requirement to work-out for a certain number sessions per month in order to receive continued benefits.

Management must be committed and workers must participate. Management can schedule lectures by health professionals to educate workers on how to become healthy and to stay healthy by making healthy choices in food selection and other lifestyle factors. Management must realize that these interventions will increase productivity and reduce the number of compensable injuries and the cost of workers' compensation insurance premiums. In other words, companies will make money by not spending money.

The descriptive analysis of lifting injuries showed that CNAs made the most claims for injuries due to lifting at a frequency of 18.36%. They were 4 times more likely to file a workers' compensation claim as compared to the baseline population of servers at 4.21%. This correlates well with the logistic regression analysis which was significant for the likelihood of CNAs filing a claim for a lifting injury to be 6 times greater as compared to servers.

Our descriptive analysis showed that nurses were 2 times more likely (8.78%) to file a workers' compensation claim caused by a lifting injury as compared to servers at 4.21%. Logistic regression analysis correlated well for

the significant finding that nurses are twice as likely to file a claim for a lifting injury as compared to servers. There are many skills designed to assist CNAs and nurses in lifting tasks. In terms of manual lifting, the barrow lift leads to most injuries while the Australian lift is touted as the safest way to manually lift a patient.

Lifting is an art, and not a random task. It is much easier to control variables that lead to injury in a team of two lifting members than in a population of nurses. A lifting team study showed that a 95% reduction in lost time injuries can be obtained if a professional lifting team, lift clients, as opposed to CNAs and nurses doing the lifting. The "lift team" method was devised to remove nursing personnel from the everyday task of moving patients. This type of intervention assumes that lifting is a specialized skill to be performed only by expert professional patient movers who have been thoroughly trained in the latest lifting device techniques(Hefti et al., 2003).

A study which evaluated transferring equipment designed to assist a healthcare worker when moving someone who is able to take some weight through their legs, showed that loading on the spine during transferring tasks, with or without equipment, was not considered harmful when good technique was employed.

CNAs and nurses are trained in good lifting and handling technique, however, one study showed a striking finding that although 82% of nurses surveyed believed they used safe manual handling practices, only 18% of these

nurses correctly answered items assessing manual handling knowledge (Kay & Glass, 2011).

Due to the dynamic and sensitive nature of their work, CNAs and nurses are often not able to take the time to go to another ward and look for a lift machine to lift a patient who fell on the floor, so taking risks and shortcuts to help the patients out of compassion, result in CNAs and nurses injuring their backs. Reasons for not using recommended techniques are unavailability of manual handling aids, lack of time, and patient needs.

One study discussed a judgment in English Law which stated that where the human rights of disabled people were in issue--where their right to "dignity" was offended--then healthcare workers would, in certain situations, have to find ways to lift those people manually. This article concluded that the law does not suggest that healthcare workers can be expected to be caused a physical harm to their persons, in order to assuage the "dignity" and rights of those they lift (Fullbrook, 2004).

In another study, more than half of participants had no lifting equipment on their unit, and 74% reported that they performed all patient lift, or transfer tasks, manually. Inadequate bed space affects manual handling techniques and the ability to carry out nursing care tasks. Many nurses will join a healthcare establishment on the basis of the workspace design of the wards. Bed space dimensions need to be increased (Hignett & Keen, 2005).

Manually lifting patients has been called deplorable, inefficient, dangerous to nurses, and painful and brutal to patients. It can cause suffering and injury to

patients, including pain, bruising, skin tears, abrasions, tube dislodgement, dislocations, fractures, and being dropped by nursing staff during attempts to manually lift. Manual patient lifting is hazardous to healthcare workers, creating substantial risk of lower-back injury, whether with one or two patient handlers.

Injuries to CNAs are also brought about due to the job-stress of staff shortage and having to work quickly to be in the good graces of the supervisor – a reality and practicality of the nature of the work. A number of work environments and activities, such as overexertion, bodily reaction from involuntary motions, running and stretching, and slippery surfaces, are associated with a high risk of sprains and strains.

Safe work behaviors are best understood as socio-cultural phenomena influenced by organizational, psychosocial, and job factors. It does not appear to be related to personal risk perception. Management efforts to improve working conditions and enhance safety culture in hospitals could prove to be crucial in promoting nurses' safe work behavior and reducing the risk of musculoskeletal injury.

Overtime work and being of female gender, increases risk for injury among heavy lifters, as is the influence of other nurses. One possible lifting solution is a "tag-team" approach to care delivery for patients. In this method, nurses and clinical assistants work in pairs as they provide care. No single-person positioning and transfers are done when there is a clear need for two people. One staff member is not assigned to complete total care for patients when two staff members could complete the task more safely and efficiently. In

one study, this "tag-team" approach produced positive outcomes with regard to patient and staff satisfaction.

There is need for policies to be in place to prevent lifting injuries. One such policy is the “Zero Lift” policy which nurses have been researching and promoting for many years. The goal of zero lift policies is to replace manual lifting with mechanical lifting during transferring, and re-positioning of patients. Use of patient assist devices reduce patient-handling injury claims by 43% and time lost frequency rate by 50% (Charney, Simmons, Lary, & Metz, 2006).

Implementation of patient lifts is effective in reducing occupational musculoskeletal injuries to nursing personnel in both long-term care and acute care settings (Evanoff, Wolf, Aton, Canos, & Collins, 2003).

Individual and organizational factors play a substantial role in the successful implementation of lifting devices in healthcare. CNAs and nurses are not always involved in the process of evaluating and selecting lifting equipment and this should change to include them in the buying process. The Guldmann ceiling-mounted hoist system is highly regarded by healthcare workers. It consists of a wide range of lifting units, rail components, and a complete assortment of lifting slings and accessories.

Lack of safe patient handling and lifting legislation is a risk factor for injury. On June 17, 2005, Governor Rick Perry of Texas signed into law Senate Bill 1525, making Texas the first state in the nation to require hospitals and nursing homes to implement safe patient handling and movement programs.

California, Massachusetts, New York, Washington State, and Ohio have implemented similar safe patient handling regulations. It would be advantageous for the state of Florida to follow suite with no manual lifting policies of its own, the benefits of which should be made clear with this current research project.

Hypothesis 4: Demographic, environmental and temporal risk factors play a role in adverse health outcomes for CNAs and nurses compared to a baseline population of servers.

Logistic regression analysis showed a significant finding in evaluating whether or not groups that are associated with a claim have some degree of permanent impairment. It was found that younger workers, who are 45yrs old or less, were slightly more likely to claim some degree of permanent impairment compared to older workers more than 45 years old. This is perhaps due to younger people trusting their bodies more than older workers, and taking more physical risks leading to serious injuries to body parts.

The descriptive analysis showed that in the younger age groups, servers had more injures as compared to CNAs, and nurses. The number of injuries evened out at age group 33-43 years. At age group 44-54 years, CNAs and nurses were much more likely to file a claim than our baseline population. At the older age group of 55-65 years, nurses were much more likely to file a claim, than CNAs or servers. There was a similar trend in the 66-80 age group. This may be due to the ageing nursing workforce, as well as diminishing levels of fitness with age.

Linear regression analysis was used to evaluate time to recovery (date of Maximum Medical Improvement (MMI) – date of injury). A significant finding was that CNAs, on average, reached MMI 89 days faster than the baseline population of servers. One explanation for this could be that CNAs may be more inclined to return to work to have a continuous income and to them their job is a career. CNAs may also prefer to negotiate an earlier settlement in a workers' compensation claim. There are not many servers who view their job as a career and it may be more beneficial for them to prolong a workers' compensation claim. Findings for the nurses group were not significant.

Another finding from the linear regression analyses which was not significant, but close, was that for every 1 day the claim filing was delayed, time to recovery increased by 1.14 days. It may be that the injury did not, in fact, occur at work, hence the delay in filing with subsequent malingering behavior.

Duration of benefits (benefit through date – benefit start date) were analyzed by linear regression. A finding which was close to being significant showed that on average, CNAs received benefits about 12 days more than servers. This could be due to the more serious nature of injury from which CNAs suffer, and the chronicity and repetitive nature of aggravating factors leading to such injuries. A significant finding was that for every 1 year increase in age, claimants received, on average, about half a day more in benefits. This means that for every 10 years increase in age, about five more days of benefits were received. Another significant finding was that females received benefits of about 25 days longer than males.

Descriptive analysis of injury-related length of time off work, showed that the vast majority of workers in all three study groups, returned to work within six months of an injury. The percentages of workers who returned to work within six months of an injury were 88.62% for CNAs and 90.65% for nurses as compared to 85.66% for servers.

There was a sharp decline in the number of claims in the 7 – 12 month time frame after an injury with the percentage for CNAs being 5.99%, nurses at 4.03% compared to servers at 3.82%. This finding suggests that the majority of workers get better after an injury and continue with their working lives. Studies have shown that the majority of expenditures are for the remaining 5 – 10% of workers.

A disproportionate share of costs is associated with a small number of cases with chronic pain. This is especially true for cases of occupational back pain, the single most common and costly musculoskeletal disorder in the workplace. Workplace characteristics associated with prolonged disability include failure to receive job accommodations, receipt of disability benefit payments, employment in high-risk industries, and jobs that require heavy lifting, such as in the healthcare industry.

Weekly pay in dollars was analyzed and it was found that the majority of workers received $0 after being injured. The frequency of claims receiving $0 for CNAs and nurses were 88.22% and 85.18% respectively, compared to 85.66% for servers. This is because the majority of workers return to duty within a few

days of an injury. The general trend in this study was that as the weekly pay increased the number of workers who benefitted declined, with the group of nurses alone receiving benefits at the higher end of the pay scale.

Injuries by time of the day, day of the week and month of the year were descriptively analyzed. It was found that from 7:00am to 1:00pm the majority of injuries occurred. The curve is bell shaped with a tendency towards normal and with another peak from 11:00pm to 2:00am. One possible explanation for this phenomenon is that healthcare workers are busy on mornings getting patients to do their ADLs and taking them to have tests done etc.. Another explanation is the effects of the circadian rhythm with cortisol release at around 9:00am due to low blood glucose.

A study by Choi et. al. showed a similar pattern with injuries occurring more frequently than expected in the morning hours and in the first 4 hours of the work-shift. Another study by Wigglesworth et. al. found that there are more injuries in the mornings than in the afternoons for every day of the working week. These findings correlate well with findings from this research.

Injuries by day of the week were analyzed. More injuries occurred earlier in the week on Mondays and Tuesdays with another peak on Thursdays. It is possible that after a weekend rest period, the body needs to adjust to the job tasks. Another explanation is that the injury occurred over the weekend and the worker is pretending that it happened at work on Monday, so as to claim benefits.

Two other studies had similar findings. Choi et. al. found that injuries occur more frequently during the early part of the week, especially on a Monday, and Wigglesworth et. al. found that most injuries occurred on a Monday and decreased progressively through Friday. This research study had similar findings.

Injuries by month of the year were analyzed. It was found that the majority of injuries occurred during the first half of the year and declined over the rest of the year. A possible explanation for this is that there is no good explanation, however, it stands to reason that people in general are busier and have more goals during the early part of the year. They begin to relax at summertime and this trend continues for the rest of the year. A similar pattern of injuries is seen for the time of the day and day of the week, with the majority of injuries occurring earlier in day and earlier in the week. This pattern warrants further investigation.

A descriptive analysis was also performed for the three typical nursing shifts which are from 3:00pm to 11:00pm, 11:00pm to 7:00am and from 7:00am to 3:00pm. Most injuries occurred during the 7:00am to 3:00pm shift and correlates with the above pattern.

This study also looked at the number of injuries by cities in the state of Florida. The groups were analyzed separately. Most injuries for CNAs occurred in the Miami area. This is probably due to the large working population and other socio-economic and cultural factors. St. Petersburg had half as many injuries as Miami.

In the group of servers, by comparison, Orlando had the highest number of injuries followed by Miami. These two cities have a high immigrant population and preventive measures should consider cultural differences when planning safety and training exercises. West Palm Beach also has a high number of injuries and the reason may simply be due to a high number of restaurants with a greater population of servers.

Nurses had high numbers of injuries in many cities with more in the Miami, Melbourne, Fort Lauderdale, Daytona Beach area along the East Coast. Tampa and Tallahassee also had high numbers of claims. Knowledge of the cities where there are higher numbers of claims, can be targeted for preventive measures.

The data was also analyzed by number of claims by county in Florida. CNAs had the highest number of claims in Miami-Dade County at 73 for the year 2010. Pinellas county had 41 and Brevard county, 26. The baseline population of servers had by comparison, the most claims in Palm Beach, Miami-Dade, Broward and Orange counties.

Nurses had the majority of claims in Miami-Dade County and Palm Beach County with 47 claims each. Broward County had 44 claims and orange county 40 claims. The number of claims probably reflects the size of the working population and socio-economic and cultural factors may play a role in the numbers of claims. These counties could be targeted for preventive measures.

Hypotheses 5: Violence in the workplace is a greater risk factor for nurses and CNAs as compared to a baseline population.

Logistic regression analysis of the data was significant for the finding that CNAs were almost 4 times as likely to claim being struck by someone or something in the workplace, compared to servers. Nurses too were almost 4 times as likely to claim being struck by someone or something as compared to the baseline population of servers.

Healthcare workers are at greater risk for physical and sexual violence in the workplace and CNAs and nurses are exposed to the majority of risk factors which end in violence. Regarding non-fatal occupational assault injuries, women sustain a higher incidence than men. Nighttime work shifts are associated with greater risk of assault for female healthcare workers. Although the majority of healthcare-sector employees are women, the risk of assault injuries is higher in male employees perhaps due to intervening as the first line of protection for female nurses.

Assault management training is associated with less severe injuries. Risk factors such as working in isolation, the occupation of mental health technician, and working on a geriatric-medical hospital unit, are associated with more severe injuries. Assaults on staff in psychiatric hospitals represent a significant and under-recognized occupational hazard.

Assaults are associated with contact with combative residents. A higher risk of assault is found among women. Higher risks of injury and assault are

observed among full-time employees compared to per diem or pool agency workers. Weekend shifts have a higher rate of injuries and a lower rate of assaults than weekday shifts perhaps due to the isolation factor and insufficient staff to cater to the needs of patients.

Progress to reduce violence has been made within the healthcare industry with the notable exception of psychiatric hospitals and facilities caring for the developmentally disabled. State legislation requiring healthcare workplaces to address hazards for workplace violence has had mixed results. Insufficient staffing, inadequate violence prevention training, and sporadic management attention, are seen as key barriers to violence prevention in healthcare workplaces.

A study in Ontario, Canada found that from 1987 to 1989, there were 100 or more allowed workers' compensation claims among nurses for injuries due to violence. The annual rates for such claims were higher among male nurses (13.9 per 1000) than among female nurses (1.4 per 1000). The rates for such claims were significantly higher among both male and female nurses compared to the general population. Nurses and other health care workers are at risk for violent injury in the workplace and workers' compensation data likely underestimate the extent of the problem, because no statistics are available for denied claims or claims without lost time, and many assaults are unreported.

Sexual assault in the workplace was not distinguished from physical assaults in the claims database used in this study. Sexual assaults in the workplace and related risk factors have not been well studied. Occupations of

rape victims are similar to occupations identified as high risk for other intentional injuries. Rape incidents are characterized by isolation from the public and from co-workers.

It is clear and unfortunate that horizontal violence exists in nursing. It affects nursing in all areas. When tension is elevated in patient care areas, nursing staff are not likely to perform at their best and the result is often poor patient care.

It is believed that horizontal violence arises as an expression of an oppressed group behavior evolving from feelings of low self-esteem and lack of respect from others. It is imperative that horizontal violence and bullying in the workplace be addressed for the health and welfare of nurses and patients. Development of programs that address horizontal violence and bullying, are essential to healthy work environments and a healthy future for nursing.

Body Part Injured

The descriptive analysis of workers' compensation claims based on body part injured, showed that lower back injuries were most prominent for both CNAs and nurses at 42.01% and 38.96% respectively. The frequency of lower back claims for servers was 26.79%. This means that CNAs and nurses are about 1.5 times as likely to claim a lower back injury compared to the baseline population.

Neck and shoulder pain is common among hospital nurses, and patient handling tasks that involve reaching and pulling are the most important target for risk reduction strategies.

CNAs and nurses were also more likely to claim an injury to multiple body parts at 14.87% and 12.34% respectively, as compared to servers at 9.52%. CNAs and nurses are about 1.5 times as likely to file a claim due to injury to multiple body parts as our baseline population.

Also of note, is that most of the injuries which occurred to multiple body parts occurred at night to older workers. This is probably due to older nurses taking a few shifts in the night in the hope that it will be quiet and easy, especially if the patients are on large doses of sedatives to ensure they will not awake and disturb the staff. The downside to this is that patients do awake and they are delirious from overdoses of sedatives and begin screaming and lashing out at workers who are there to help them. Healthcare workers then try to subdue the patients by holding their arms and legs which leaves black and blue marks on the skin.

The next day when the relatives come by to visit and see their loved ones covered in black and blue marks, they become very angry at the staff, and sometimes physical violence ensues. The author speaks from anecdotal evidence and personal experience.

An elderly graveyard shift nurse whom I interviewed said the following, “I feel like a waitress fetching and carrying things for patients all night long. I am so tired in the morning”. Needless to say, she only works two nights per week. Being tired during a work shift is a risk factor for injuries. Perhaps older healthcare workers should not be scheduled to work the graveyard shift as there are less staff to call for help, in case of an emergency on the ward.

Our baseline population of servers had the highest number of claims for knee injury at 14.88%. CNAs and nurses had a frequency of 6.32% and 11.69%, respectively. CNAs were more than 2 times as likely to claim a knee injury as servers. Nurses were slightly more likely to claim a knee injury than servers.

The population of servers are continuously walking and going up and down stairs during a work shift. CNAs and nurses are not constantly on their feet as they may sit to do charting, for example, and they are not constantly traversing floors with different levels as is customary in restaurants.

Healthcare workers, whenever possible, should sit and make themselves comfortable and ergonomically situated, to perform job tasks. Both patient and staff will be more relaxed. Supervisors must allow for this and it will take a paradigm shift to get management and staff to think about safety first, and apply it to practice. It would be wise for healthcare workers to remember to be the change they want to see in the world.

Limitations of the Study

In this study we have demonstrated the use of workers' compensation claims data as a tool for studying risk factors for health and safety in the healthcare sector. There are limitations and possible biases in using this approach, since the workers' compensation claims databases are designed to permit administrative tracking of claims for industrial insurance purposes, and were not designed for epidemiological surveillance studies.

Our findings should be replicated elsewhere before they can be confidently utilized. Consistency of results in further studies can be used as

a criterion for validity of our findings. Workers' compensation databases could be used for identification of cases of a particular disorder. These cases could be followed-up by collecting further medical and outcomes information.

. Claims data may not be representative of all injuries that occur in the healthcare industry. Any work-related injuries or illnesses not reported to the WCB would have been missed in this study, and therefore our results probably underestimate the true burden of injury and illness among CNAs and nurses. The magnitude of under-reporting is unknown.

Barriers to reporting injuries include fear of employer retribution, lack of recognition of occupational injuries and illnesses by physicians, workers and employers, undocumented worker status and fear of deportation, as well as administrative barriers, and alternate medical insurance providers.

The completeness and accuracy of the data were a concern for some variables of interest such as financial compensation for claims. Exclusion of self-insured employers limits our ability to generalize these results. Analyses of the reliability of workers' compensation data could be conducted to better understand its strengths and limitations.

Linking compensation and outcomes data, including hospital admissions and emergency presentations, will provide a more comprehensive picture of the nature of work-related injuries and the factors contributing to work-related injuries. Such data will inform policy and program development aimed at

reducing the burden of this type of injury in the community (Boufous & Williamson, 2003).

The Florida workers compensation claims database is missing data. The mechanism of injury is not documented, and this is very important to teach workers what they can correct in order to prevent such injuries. It also helps the attending physician to know what tissues are injured based on the movements that caused the injury. It will also help research studies.

Another very important, but missing demographic is BMI, which gives a measure of the fitness and condition of the worker's body, remembering that the body is the tool by which the individual gets the work accomplished. This "tool" must be in good working order, and must be repaired and serviced just like other machines in the workplace, to use an analogy. There are also missing dates and missing amount of monetary benefits.

Florida has many seasonal workers, yet only a minute number of such workers are in the claims database. Attention must be placed on seasonal workers so that they too are treated humanely as workers compensation laws mandate. In an Asian Immigrant Women Workers free clinic providing culturally focused occupational health consultation and treatment for painful musculoskeletal disorders in Oakland, California Chinatown, workers did not file workers' compensation claims because of a lack of knowledge and a fear of reprisal (Burgel, Lashuay, Israel, & Harrison, 2004).

The burden of work-related illnesses in the US is substantial, and the workers' compensation system is underutilized. Unions appear to improve filing

of work-related musculoskeletal disorders, particularly for less severe conditions. Higher filing rates is not to be seen as a moral hazard, but rather viewed as improved and earlier reporting, as is advocated by early intervention approaches to reducing musculoskeletal disorders.

Medical Management of Workers Compensation Injuries

Current thinking suggests that medical management in the first 3-4 weeks after the onset of pain should be generally conservative. Several studies of rather heterogeneous interventions focusing on return to work and implemented in the sub-acute stage (3-4 to 12 weeks after the onset of pain) have shown important reductions in time lost from work (by 30% to 50%).

There is substantial evidence indicating that employers who promptly offer appropriately modified duties can reduce time lost per episode of back pain by at least 30%, with frequent spin-off effects on the incidence of new back-pain claims as well.

Newer studies of guidelines-based approaches to back pain in the workplace suggest that a combination of all these approaches, in a coordinated workplace-linked care system, can achieve a reduction of 50% in time lost due to back pain, at no extra cost and, in some settings, with significant savings (Frank et al., 1998).

Use of intervertebral fusion devices rose rapidly after their introduction in 1996. This increased use was associated with an increased complication risk without improving disability or reoperation rates (Maghout Juratli, Franklin, Mirza, Wickizer, & Fulton-Kehoe, 2006).

There are times when allopathic medical management simply does not help claimants, and the attending physician has to think outside the box and look at alternative treatments to cure workers of disabling pain. Alternative regenerative cures for pain include prolotherapy, prolozone therapy and platelet rich plasma treatments. Another treatment for pain and general well-being is acupuncture and herbal remedies instead of opioids.

Studies have found that prescribing opioids for more than 7 days for workers with acute back injuries is a risk factor for long-term disability and that opioid therapy does not arrest the cycle of work loss and pain.

Given the negative association between receipt of early opioids for acute lower back pain and outcomes, the use of opioids for the management of acute lower back pain may be counter-productive to recovery and it is a risk factor for continued disability. Opiate prescription is significantly associated with daily tobacco use, pain radiating below the knee, and being in severe injury categories.

Somatization and Malingering

Healthcare workers treating workers compensation claimants are constantly concerned about worker complaints of pain which is incongruent with physical findings. In one study it was found that Hispanics were more likely to somatize as compared to Caucasian workers. This study also found minimal differences between Hispanic and Caucasian subjects on the malingering scale (DuAlba & Scott, 1993).

It is difficult to address pain issues as the definition of pain is that it is what the patient tells you it is. It is hoped that with advancing research in the field of pain, doctors will be able to differentiate between genuine cases of pain and malingering. Research is promising with tests that detect changes in hormonal levels when there is pain. Genetic approaches on differences in metabolism of medications are underway and there are now lab-tests to confirm the above.

Work Status after Workers Compensation Claims

It is often wondered what happens to workers after the claim is settled. One study looked at this and found that two years after the claim, 65% of the claimants had returned to work in the same company, often without any ergonomic improvement, 12% had retired or had left employment voluntarily, and 18% had been dismissed. The risk of dismissal was associated with being older than 45 years, having two or more musculoskeletal disorders at claim, and working in the cleaning services sector (Roquelaure et al., 2004).

Haddon's Matrix and Guidelines for Treatment of Lower Back Pain

Dr. William Haddon, Jr. is widely considered as the father of modern injury epidemiology. Dr. Haddon was a physician as well as an engineer who worked in the USA on the design of safer roads in the late 1950's. He combined his skills to develop a framework for analyzing injury based on the host (i.e. the person injured), the agent (i.e. what caused the injury e.g. electrical energy) and the environment (i.e. the physical and social context in which the injury occurred).

Management and workers would do well to consider his approaches as it is still relevant today. I have included in this discussion, Dr. Haddon's approaches for lower back pain in the nursing sector.

Table 39: A Haddon's Matrix Addressing Back Injuries in Nursing Staff

Phases	**Host**	**Vehicle**	**Physical Environment**	**Socio-economic Environment**
Pre-Injury	Age, Training, Physical condition	Patient shape, deformity, acuity, disability, weight, height above floor	Lift/Transfer equipment availability, accessibility, adjustability, restricted space, patient equipment, Slippery surfaces, uneven floor, uneven work surfaces	Staffing levels, staffing mix(CNAs, LPNs, RNs), teamwork, safety culture, safe patient handling committee and program
Injury	Age, Physical condition	Patient shape, deformity, acuity, disability, weight, height above floor, velocity, friction	Lift/Transfer equipment availability, accessibility, adjustability, restricted space, patient equipment	Resources for acute care
Post Injury	Age, Physical condition			Rehabilitative quality, light duty opportunities
Total Losses/Costs	Pain, potential long-term MSD, decreased income, decreased quality of life, possible career change required	Patient may experience fear or injury of his own if transfer is interrupted by acute back injury or pain		Loss of valued staff, increased staff turnover, contributes to nursing shortage

Table 39 summarizes a Haddon's Matrix for addressing back injuries in healthcare workers. Dr. Haddon also put forward ten strategies for injury control applied to back injuries among CNAs and nurses. His strategies are as follows:

I. To prevent the creation of the hazard in the first place.

- Health promotion and disease prevention to prevent patient hospitalization

II. To reduce the amount of hazard brought into being

- Reduce rates of obesity to reduce body mass needed to transfer/reposition

III. To prevent the release of the hazard that already exists

- Use of lift equipment to take burden off workers back

IV. To modify the rate or special distribution of release of the hazard from its source

- Adequate staffing to limit the number of patients a single nurse must transfer/reposition
- Distribute patients with high workload evenly among staff
- Use of a lift team distributes workload

V. To separate, in time or in space, the hazard & that which is to be protected?

- Use of lifts separates the caregiver from the client in space

VI. To separate the hazard & that which is to be protected by interposition of a material “barrier”

- Proper use of equipment to secure patients in lift protects both parties if the confused patient become agitated during transfer

VII. To modify relevant basic qualities of the hazard

- Use of a hover mat or similar equipment reduces friction and creates a safe way to handle patients

VIII. To make what is to be protected more resistant to damage from the hazard

- Promote excellent physical health of nursing staff (example: gym memberships and personal training)
- Provide training on body mechanics and proper technique
- Provide training on proper use of equipment

IX. To begin to counter the damage already done by the environmental hazard

- Provide rehabilitation and light duty for the staff member with back pain

X. To stabilize, repair, and rehabilitate the object of the damage

- Provide health care for the injured nurse

Research Summary

1. Needlestick injuries were not the main cause of healthcare morbidity. Musculoskeletal injuries were the cause of morbidity and this is where effort and funding should be placed.
2. CNAs were 7 times as likely to file a claim for a lifting injury as compared to a baseline population. Lifting is a significant risk factor for injury. Females were only half as likely to claim lifting injuries when compared to males and this is interesting as one may expect the opposite to be the case. Gender was a significant risk factor for lifting injuries. There is need for legislation in Florida to prevent manual lifting of patients.
3. Nurses were 10 times as likely to claim pushing/pulling injuries compared to a baseline population. Pushing and pulling are significant risk factors for nurses filing a claim. Further research should evaluate the need for nurses to be pushing and pulling, and new techniques in lieu of pushing and pulling should be developed.
4. CNAs were 4 times as likely to file a claim injury by being struck and nurses had increased injuries due to being struck. Being struck, or violence in the workplace, is a serious and significant reason for CNAs and nurses to file a claim. Future research is needed to investigate nursing factors leading to their being struck because when incidents

happen, it is seldom the result of a single factor, but the result of multiple factors coming together and culminating in violence.

5. Older workers, 45 years and over were more likely to report falls. Age is a significant risk factor for fall injuries and inquiry and research needs to be conducted as to why this is the case. Mechanism of injury (a missing piece of data in workers' compensation databases) would go a long way in isolating body mechanics and ergonomic factors which lead to fall injury.
6. Descriptive analysis showed a temporal relationship for injuries. There is a temporal pattern, in that most injuries occur during the morning shift between 8:00 am and 1:00pm. They occur more often during the earlier part of the week and decreases towards the end of the week. Most injuries occur during the first six months of the year. This finding is congruent with two other studies in the literature.
7. In terms of Geography, the Miami/Fort Lauderdale/Orlando/West Palm Beach areas tended to have the most injuries. Miami-Dade, Brevard and Broward counties tended to have the most injuries.

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Appendix 1

Workers Compensation Insurance Organizations Injury Description Codes - Cause Of Injury

I. Burn or Scald – Heat or Cold Exposures – Contact With

01. Chemicals: Includes hydrochloric acid, sulfuric acid, battery acid, methanol, antifreeze.

02. Hot Objects or Substances

03. Temperature Extremes: Non-impact injuries resulting in a burn due to hot or cold temperature extremes. Includes freezing or frostbite.

04. Fire or Flame

05. Steam or Hot Fluids

06. Dust, Gases, Fumes or Vapors: Includes inhalation of carbon dioxide, carbon monoxide, propane, methane, silica (quartz), asbestos dust and smoke.

07. Welding Operation: Includes welder's flash (burns to skin or eyes as a result of exposure to intense light from welding.)

08. Radiation: Includes effects of ionizing radiation found in Xrays, microwaves, nuclear reactor waste, and radiating substances and equipment. Includes non-ionizing radiation such as sunburn.

Appendix 1 (Continued)

09. Contact With, NOC: Not otherwise classified in any other code. Includes cleaning agents and fertilizers.

11. Cold Objects or Substances

14. Abnormal Air Pressure

84. Electrical Current: Includes electric shock, electrocution and lightning.

II. Caught In, Under or Between

10. Machine or Machinery: Running or meshing objects, a moving and a stationary object, two or more moving objects

12. Object Handled: Includes medical hospital bed & parts, wheelchair, clothespin vise.

13. Caught In, Under or Between, NOC Not otherwise classified in any other code.

20. Collapsing Materials (Slides of Earth): Either man made or natural.

III. Cut, Puncture, Scrape Injured By

15. Broken Glass

16. Hand Tool, Utensil; Not Powered: Includes needle, pencil, knife, hammer, saw, axe, screwdriver.

17. Object Being Lifted or Handled: Includes being cut, punctured or scraped by a person or object being lifted or handled.

18. Powered Hand Tool, Appliance: Includes drill, grinder, sander, iron, blender,

Appendix 1 (Continued)

welding tools, nail gun.

19. Cut, Puncture, Scrape, NOC: Not otherwise classified in any other code. Includes power actuated tools.

IV. Fall, Slip or Trip Injury

25. From Different Level (Elevation): Includes collapsing chairs, falling from piled materials, off wall, catwalk, bridge.

26. From Ladder or Scaffolding

27. From Liquid or Grease Spills

28. Into Openings: Includes mining shafts, excavations, floor openings, elevator shafts.

29. On Same Level

30. Slip, or Trip, Did Not Fall: Slip or trip and did not come in contact with the floor or ground.

31. Fall, Slip or Trip, NOC Not otherwise classified in any other code. Includes tripping over object, slipping on organic material, slip but fall not specified.

32. On Ice or Snow

33. On Stairs

V. Motor Vehicle

40. Crash of Water Vehicle

41. Crash of Rail Vehicle

Appendix 1 (Continued)

45. Collision or Sideswipe With Another Vehicle: Vehicle collision, both vehicles in motion.

46. Collision with a Fixed Object: Collision occurring with standing vehicle or stationary object.

47. Crash of Airplane

48. Vehicle Upset: Includes overturned or jackknifed.

50. Motor Vehicle, NOC: Not otherwise classified in any other code. Includes injuries due to sudden stop or start, being thrown against interior parts of the vehicle and vehicle contents being thrown against occupants.

VI. Strain or Injury By

52. Continual Noise: Injury to ears or hearing due to the cumulative effects of constant or repetitive noise.

53. Twisting: Free bodily motion that imposes stress or strain on some part of body. Includes assumption of unnatural position, involuntary motions induced by sudden noise, fright or loss of balance.

54. Jumping or Leaping

55. Holding or Carrying: Applies to objects or people. Includes restraining a person.

56. Lifting: Includes objects or people.

57. Pushing or Pulling: Includes objects or people.

58. Reaching

Appendix 1 (Continued)

59. Using Tool or Machinery

60. Strain or Injury By, NOC: Not otherwise classified in any other code.

61. Wielding or Throwing: Physical effort or overexertion from attempts to resist a force applied by an object being handled.

97. Repetitive Motion: Cumulative injury or condition caused by continual, repeated motions; strain by excessive use. Includes Carpal Tunnel Syndrome.

VII. Striking Against or Stepping On: NOTE: Applies to cases in which the injury was produced by the impact created by the person, rather than by the source.

65. Moving Part of Machine

66. Object Being Lifted or Handled

67. Sanding, Scraping, Cleaning Operation: Include scratches or abrasions caused by sanding, scraping, cleaning operations.

68. Stationary Object

69. Stepping on Sharp Object

70. Striking Against or Stepping On, NOC: Not otherwise classified in any other code.

VIII. Struck or Injured By: NOTE: Applies to cases in which the injury was produced by the impact created by the source of injury, rather than by the injured person.

Appendix 1 (Continued)

74. Fellow Worker, Patient or Other Person: Struck by co-worker, either on purpose or

accidentally. Includes being struck by a patient while lifting or moving them not in act of a crime.

75. Falling or Flying Object

76. Hand Tool or Machine in Use

77. Motor Vehicle: Applies when a person is struck by a motor vehicle, including rail vehicles, water vehicles, airplanes.

78. Moving Parts of Machine

79. Object Being Lifted or Handled: Includes dropping object on body part.

80. Object Handled By Others: Includes another person dropping object on injured person's body part.

81. Struck or Injured, NOC: Not otherwise classified in any other code. Includes kicked, stabbed, bitten.

85. Animal or Insect: Includes bite, sting or allergic reaction.

86. Explosion or Flare Back: Rapid expansion, outbreak, bursting, or upheaval. Includes explosion of cars, bottles, aerosol cans, or buildings. "Flare back" involves superheated air and combustible gases at temperatures just below the ignition temperature.

IX. Rubbed or Abraded By

Appendix 1 (Continued)

94. Repetitive Motion: Caused by repeated rubbing or abrading; applies to non-impact cases in which the injury was produced by pressure, vibration or friction between the person and the source of injury. Includes callous, blister.

95. Rubbed or Abraded, NOC: Not otherwise classified in any other code. Includes foreign body in ears.

X. Miscellaneous Causes

82. Absorption, Ingestion or Inhalation, NOC: Not otherwise classified in any other code. Applies only to non-impact cases in which the injury resulted from inhalation, absorption (skin contact), or ingestion of harmful substances.

87. Foreign Matter (Body) in Eye(s): Injury to eyes resulting from foreign matter that is

not otherwise classified in any other code.

88. Natural Disasters: Injury resulting from natural disaster. Includes hurricane, earthquake, tornado, flood, forest fire.

89. Person in Act of a Crime: Specific injury, other than gunshot, caused as a result of contact between injured person and another person in the act of committing a crime. Includes robbery or criminal assault.

90. Other Than Physical Cause of Injury: Stress, shock, or psychological trauma that develops in relation to a specific incident or cumulative exposure to conditions.

91. Mold; Includes mildew.

Appendix 1 (Continued)

93. Gunshot: Injury is caused by the discharge of a firearm. Includes instances where injury arises from being struck by the fired projectile, burned by muzzle blast or deafened by report of gunshot.

96. Terrorism: An act that causes injury to human life, committed by one or more individuals as part of an effort to coerce a population group(s) or to influence the policy or affect the conduct of any government(s) by coercion.

98. Cumulative, NOC: Cumulative, not otherwise classified in any other code. Involves cases in which the cause of injury occurred over a period of time, any condition

increasing in severity over time.

99. Other - Miscellaneous, NOC: Not otherwise classified in any other code.

Appendix 2

Workers Compensation Insurance Organizations Injury Description Codes - Nature of Injury

I. Specific Injury

01. No Physical Injury: i.e., Glasses, contact lenses, artificial appliance, replacement of artificial appliance

02. Amputation: Cut off extremity, digit, protruding part of body, usually by surgery, i.e. leg, arm

03. Angina Pectoris: Chest pain

04. Burn: (Heat) Burns or scald. The effect of contact with hot substances. (Chemical) burns. tissue damage resulting from the corrosive action chemicals, fume, etc., (acids,
alkalies)

07. Concussion: Brain, cerebral

10. Contusion: Bruise - intact skin surface hematoma

13. Crushing: To grind, pound or break into small bits

16. Dislocation: Pinched nerve, slipped/ruptured disc, herniated disc, sciatica, complete tear, HNP subluxation, MD dislocation

19. Electric Shock: Electrocution

Appendix 2 (Continued)

22. Enucleation: Removal of organ or tumor

25. Foreign Body

28. Fracture: Breaking of a bone or cartilage

30. Freezing: Frostbite and other effects of exposure to low temperature

31. Hearing Loss or Impairment: Traumatic only. A separate injury, not the sequelae of another injury

32. Heat Prostration: Heat stroke, sun stroke, heat exhaustion, heat cramps and other effects of environmental heat.does not include sunburn

34. Hernia: The abnormal protrusion of an organ or part through the containing wall of its cavity

36. Infection: The invasion of a host by organisms such as bacteria, fungi, viruses, mold, protozoa or insects, with or without manifest disease.

37. Inflammation: The reaction of tissue to injury characterized clinically by heat, swelling, redness and pain

40. Laceration: Cut, scratches, abrasions, superficial wounds, calluses. wound by tearing

41. Myocardial Infarction: Heart attack, heart conditions, hypertension. The inadequate blood flow to the muscular tissue of the heart.

42. Poisoning - General (Not OD or Cumulative Injury): A systemic morbid condition resulting from the inhalation, ingestion, or skin absorption of a toxic substance affecting the metabolic system, the nervous system, the circulatory system, the digestive system, the respiratory system, the excretory system, the

Appendix 2 (Continued)

musculoskeletal system, etc. includes chemical or drug poisoning, metal poisoning, organic diseases, and venomous reptile
and insect bites. does not include effects of radiation, pneumoconiosis, corrosive effects of chemicals; skin surface irritations, septicemia or infected wounds.

43. Puncture: A hole made by the piercing of a pointed instrument

46. Rupture

47. Severance: To separate, divide or take off

49. Sprain or Tear: Internal derangement, a trauma or wrenching of a joint, producing pain and disability depending upon degree of injury to ligaments.

52. Strain or Tear: Internal derangement, the trauma to the muscle or the musculotendinous unit from violent contraction or excessive forcible stretch.

53. Syncope: Swooning, fainting, passing out, no other injury

54. Asphyxiation: Strangulation, drowning

55. Vascular: Cerebrovascular and other conditions of circulatory systems, NOC, excludes heart and hemorrhoids. Includes: strokes, varicose veins - non toxic

58. Vision Loss

59. All Other Specific Injuries, NOC

II. Occupational Disease or Cumulative Injury

60. Dust Disease, NOC: All other pneumoconiosis

61. Asbestosis: Lung disease, a form of pneumoconiosis, resulting from protracted inhalation of asbestos particles.

Appendix 2 (Continued)

62. Black Lung: The chronic lung disease or pneumoconiosis found in coal miners

63. Byssinosis: Pneumoconiosis of cotton, flax and hemp workers

64. Silicosis: Pneumoconiosis resulting from inhalation of silica (quartz) dust.

65. Respiratory Disorders: Gases, fumes, chemicals, etc.

66. Poisoning - Chemical, (Other Than Metals): Man made or organic

67. Poisoning – Metal: Man made

68. Dermatitis: Rash, skin or tissue inflammation including boils, etc., generally resulting from direct contact with irritants or sensitizing chemicals such as drugs, oils, biologic agents, plants, woods or metals which may be in the form of solids, pastes, liquids or vapors and which may be contacted in the pure state or in compounds or in combination with other materials.do not include skin tissue damage resulting from corrosive action of chemicals, burns from contact with hot substances, effects of exposure to radiation, effects of exposure to low temperatures or inflammation or irritation resulting from friction or impact

69. Mental Disorder: A clinically significant behavioral or psychological syndrome or pattern typically associated with either a distressing symptom or impairment of function.

i.e., acute anxiety, neurosis, stress, non-toxic depression

70. Radiation: All forms of damage to tissue, bones or body fluids produced by exposure to radiation

71. All Other Occupational Disease Injury, NOC

Appendix 2 (Continued)

72. Loss of Hearing

73. Contagious Disease

74. Cancer

75. AIDS

76. VDT - Related Diseases: Video display terminal diseases other than carpal tunnel syndrome

77. Mental Stress

78. Carpal Tunnel Syndrome: Soreness, tenderness and weakness of the muscles
of the thumb caused by pressure on the median nerve at the point at which it goes through the carpal tunnel of the wrist

79. Hepatitis C

80. All Other Cumulative Injury, NOC

III. Multiple Injuries

90. Multiple Physical Injuries Only

91. Multiple Injuries Including Both Physical and Psychological

Appendix 3

Workers Compensation Insurance Organizations Injury Description Codes - Part of Body

I. Head

10. Multiple Head Injury: Any combination of below parts

11. Skull

12. Brain

13. Ear(s): Includes: hearing, inside eardrum

IAIABC Subsequent Report of Injury (SROI) Codes:

13A. Total deafness of both ears

13B. Total deafness of one ear

13C. Where worker prior to injury has suffered a total loss of hearing in one ear, and as a result of the accident loses total hearing in remaining ear

14. Eye(s): Includes: optic nerves, vision, eye lids

IAIABC Subsequent Report of Injury (SROI) Codes

Appendix 3 (Continued)

14A. The loss of eye by enucleation (including disfigurement resulting therefrom)

14B. Total blindness of one eye

14C. Blindness in both eyes

15. Nose: Includes: nasal passage, sinus, sense of smell

16. Teeth

17. Mouth: Includes: lips, tongue, throat, taste

18. Soft Tissue

19. Facial Bones Includes: jaw

II. Neck

20. Multiple Neck Injury: Any combination of below parts

21. Vertebrae: Includes: spinal column bone, “cervical segment”

22. Disc: Includes: spinal column cartilage, “cervical segment”

23. Spinal: Cord Includes: nerve tissue, “cervical segment”

24. Larynx: Includes: cartilage and vocal cords

25. Soft Tissue: Other than larynx or trachea

26. Trachea

II. Upper Extremities

30. Multiple Upper Extremities: Any combination of below parts, excluding hands and wrists combined

31. Upper Arm Humerus and corresponding muscles, excluding

Appendix 3 (Continued)

clavicle and scapula

32. Elbow: Radial head

33. Lower Arm: Fore Arm – radius, ulna and corresponding muscles

34. Wrist: Carpals and corresponding muscles

35. Hand: Metacarpals and corresponding muscles – excluding wrist or fingers

36. Finger(s): Other than thumb and corresponding muscles

IAIABC Subsequent Report of Injury (SROI) Codes:

36A. The loss of an index finger and metacarpal bone thereof

36B. The loss of an index finger at the proximal joint

36C. The loss of an index finger at the second joint

36D. The loss of an index finger at the distal joint

36E. The loss of a second finger and the metacarpal bone thereof

36F. The loss of a middle finger at the proximal joint

36G. The loss of a middle finger at the second joint

36H. The loss of a middle finger at the distal joint

36I. The loss of a third or ring finger and the metacarpal thereof

36J. The loss of a ring finger at the proximal joint

36K. The loss of a ring finger at the second joint

36L. The loss of a ring finger at the distal joint

36M. The loss of a little finger and the metacarpal bone thereof

Appendix 3 (Continued)

36N. The loss of a little finger at the proximal joint

36O. The loss of a little finger at the second joint

36P. The loss of a little finger at the distal joint

37. Thumb

IAIABC Subsequent Report of Injury (SROI) Codes

37A. The loss of a thumb and metacarpal bone thereof

37B. The loss of a thumb at the proximal joint

37C. The loss of a thumb at the second or distal joint

38. Shoulder(s): Armpit, rotator cuff, trapezius, clavicle, scapula

39. Wrist (s) & Hand(s)

IV. Trunk

40. Multiple Trunk: Any combination of below parts

41. Upper Back Area: (Thoracic Area) Upper back muscles, excluding, vertebrae, disc, spinal cord

42. Lower Back Area: (Lumbar Area and Lumbo Sacral) Lower back muscles, excluding sacrum, coccyx, pelvis, vertebrae, disc, spinal cord

43. Disc: Spinal column cartilage other than cervical segment

44. Chest: Including ribs, sternum, soft tissue

45. Sacrum and Coccyx: Final nine vertebrae-fused

Appendix 3 (Continued)

46. Pelvis

47. Spinal Cord: Nerve tissue other than cervical segment

48. Internal Organs: Other than heart and lungs

49. Heart

60. Lungs

61. Abdomen Including Groin: Excluding injury to internal organs

62. Buttocks: Soft tissue

63. Lumbar & or Sacral Vertebrae (Vertebra NOC Trunk): Bone portion of the spinal column

V. Lower Extremities

50. Multiple Lower Extremities: Any combination of below parts

51. Hip

52. Upper Leg: Femur and corresponding muscles

53. Knee: Patella

54. Lower Leg: Tibia, fibula and corresponding muscles

55. Ankle: Tarsals

56. Foot: Metatarsals, heel, Achilles tendon and corresponding muscles – excluding ankle or toes

57. Toes

IAIABC Subsequent Report of Injury (SROI) Codes:

Appendix 3 (Continued)

57A. Little toe metatarsal bone

57B. Little toe at distal joint

57C. The loss of any other toe with the metatarsal bone thereof

57D. The loss of any other toe at the proximal joint

57E. Other toe at middle joint

57F. The loss of any other toe at the second or distal joint

57G. Other toe at distal joint

58. Great Toe

IAIABC Subsequent Report of Injury (SROI) Codes:

58A. The loss of a great toe with the metatarsal bone thereof

58B. The loss of a great toe at the proximal joint

58C. The loss of a great toe at the second or distal joint

VI. Multiple Body Parts

64. Artificial Appliance: Braces, etc.

65. Insufficient Info to Properly Identify – Unclassified: Insufficient information to identify part affected

66. No Physical Injury: Mental disorder

Appendix 3 (Continued)

90. Multiple Body Parts (Including Body Systems & Body Parts): Applies when more than one major body part has been affected, such as an arm and a leg and multiple internal organs.

91. Body Systems and Multiple Body Systems: Applies to the functioning of an entire body system has been affected without specific injury to any other part, as in the case of poisoning, corrosive action, inflammation, affecting internal organs, damage to nerve centers, etc., does not apply when the systemic damage results from an external injury affecting an external part such as a back injury which includes damage to the nerves of the spinal cord.

99. Whole Body: A code referencing the anatomic classification of the injury.

IAIABC Note: Approved for IAIABC EDI jurisdictional reporting as a Permanent Impairment Body Part Code Only.

About the Author

Dr. Sheila Mohammed received her Bachelor's Degree in Biology at the City University of New York. In 1998, she was admitted into the American University of the Caribbean School of Medicine and obtained her Medical Doctor degree in 2001. Her residency training lasted five years and she graduated from the Occupational Medicine Residency Program at the University of South Florida (USF) in Tampa, in 2008 as an Occupational Medicine Specialist.

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