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Analysis of commercial lines insurance claims in the nursing home industry

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Analysis of commercial lines insurance claims in the nursing home industry

by

Jason Schaufenbuel

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Industrial and Agricultural Technology

Program of Study Committee:
Steven Freeman, Major Professor
Nir Keren
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The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this dissertation. The Graduate College will ensure this dissertation is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2017

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DEDICATION

To Kari, Amelia and Sabrina – may you pursue those endeavors that bring you joy in life, just as you have permitted me.

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ABSTRACT

These studies provide information to the owners and operators of nursing homes, so they can better understand the causes of commercial insurance (property, auto, general liability, and workers' compensation) claims in their industry. Insurance claim loss data are provided from a sample of nursing homes in the midwestern United States. The first article analyzes the commercial property, auto, and general liability claims from nursing homes from January 2007 and March 2017. Claim frequency is calculated based upon the number of bed years, with commercial property insurance having the greatest frequency of claims. Median incurred cost data are provided, permitting comparisons between lines of insurance coverage. Control measures are suggested to help nursing home operators reduce the potential for the most frequently occurring losses in their industry. The second article utilizes text mining to evaluate over 3,000 nursing home employee workers' compensation claim descriptions to identify the frequent activities that lead to injury. Incurred loss information allows a review of the relationships between injury categories, word terms, and claim cost. The median claim cost per claim category is provided. The simple analysis process identifies specific activities which lead to injury, allowing the industry to better focus their injury reduction efforts than permitted through traditional classification systems. The final study evaluates 1,922 workers' compensation claims related to resident handling. Definitions are established for the identified activities, with claim frequency and median cost data. The data indicate that all categories of resident handling claims have similar claim costs. Employers wanting to make the largest impact on their resident handling claim loss experience should simply focus interventions on those activities leading to the most injuries in their organization, or resident transfers, as they are the most frequent source of resident

handling related injury in the industry. The provided data and analysis identify the most frequent sources of claims and relationships between claims and their respective costs. Suggested control measures are provided. The combination of data and controls allow organizations to compare their commercial insurance loss performance and take steps to reduce losses to enhance their profitability and improve resident and employee safety.

CHAPTER 1. INTRODUCTION

The nursing home industry is responsible for providing residential care for individuals who are too healthy for a hospital, but have medical issues requiring nursing care or are unable to complete activities of daily living in their own homes. Nursing homes provide nursing supervision and assisting with activities of daily living such as eating, bathing, dressing, toileting, transferring/walking and continence. In addition, staff will prepare meals and may also provide physical, speech and occupational therapy, in addition to social and recreational activities.

In 2014 there were approximately 15,600 nursing homes, caring for 1,369,700 residents and employing over 1,000,000 individuals in nursing homes in the United States of America.¹ It is the third largest sector of the health care industry.² There are generally two types of individuals in a nursing home, those who require long-term care, they will never improve to the point they can go back home, and those who require short-term care such as temporary rehabilitation following a surgery.³ The Centers for Medicare and Medicaid Services estimated that in 2015 over \$156 billion was spent on nursing and continuing care community care through private or public payments.⁴ Therefore, this is a sizable industry that employs a large number of people and has a considerable economic impact.

Individuals and businesses generally buy insurance to protect against loss. Specifically a business purchases insurance at a relatively small fee, for the guarantee that the insurance company will in full or partially reimburse the business for a large, but uncertain loss in the future.⁵ While all types of insurance may not be a legal necessity, businesses often find that the safety net provided through the purchase of an insurance policy helps to offset the potential uncertainty of a covered loss.

There are multiple types of commercial insurance that are available to businesses, and each type of insurance covers specific losses. Some of the different types of insurance include:

- Property – covers the business’ property (building and equipment) and the personal property of others in the event of loss due to smoke, fire vandalism, wind, hail, and some other natural events (floods and earthquakes generally are not covered).
- General liability – covers injury to others or property damage resulting from dangerous conditions on the premises, your employees, or the use of the business’ goods or services.
- Professional liability (errors and omissions insurance) – covers damages for failure to or improperly rendering professional services.
- Crime – covers the loss of assets of the business due to robbery, larceny, forgery, burglary, and embezzlement.
- Commercial automobile – covers losses caused during the use of a business’ automobile.
- Workers’ compensation – covers injuries to employees resulting from a work-related activity.
- Directors’ and Officers’ liability – covers actions of the directors and officers of the company that affect the operations of the business.

Because the significant cost of insurance and the direct and indirect impact these losses have on this industry, the research is focused on what drives the commercial insurance claims in the nursing home industry, outside of professional liability, so that nursing home operators and insurance industry personnel can take steps to address such loss drivers. It is

recognized that insurance claim filing may not be an appropriate surrogate for the frequency of incidents occurring in an industry, however this research is solely focused on the claims that are driving insurance loss.⁶ Thus, if a claim is not reported, there is no financial impact on the insurance carrier and with no loss to the insurer, there is no impact on the cost to the purchaser of the insurance.

Professional liability claims are not addressed in these studies because:

1. State by state differences in litigation activity, and large changes in litigation frequency.⁷
2. No access to data because of small market size and proprietary nature.^{7(p 2), 8}

It is important to realize that insurance claims are the outcome of an event impacting the insured that results in financial loss or the need to defend against such claims. Insurance may only cover a portion of the loss, as many insurance policies have loss limits (caps) and many insureds retain some of the loss through a deductible. More importantly though, by understanding what drives these claims, nursing home managers can prevent or minimize loss to their organization, loss that goes beyond financial but also can have an impact on the facilities through their reputation, resident safety, regulatory, and finances beyond the losses covered by an insurance company.

Impact of Loss

The understanding and prevention these losses are important to nursing home professionals for multiple factors. Some of the key factors, which are detailed later, include:

- moral and legal obligation;
- economic impact;
- sustain the business by preventing disruption;

- reputation; and
- legal obligation.

Moral Obligation

Nursing home personnel have the moral obligation to protect those they employ and care for. Average nursing home residents are generally older than their peers living in the community, frailer, have more medical conditions, memory issues, and difficulty with activities of daily living.⁹ The residents rely upon the nursing home management and staff for their care and safety. While nursing home management has the moral obligation to protect residents, they are also bound by federal and state law to ensure residents are free from abuse and neglect, and receive proper medical care.¹⁰ Similarly, nursing home management should take actions to minimize harm to employees, as they are legally required to do so by the Occupational Safety and Health Administration (OSHA).

Economic Impact: Insurance

CliftonLarsonAllen (CLA) in 2014 reported that workers' compensation costs made up 1.0% to 1.4% of a nursing home's average cost per resident day; while other types of commercial insurance were an additional 0.5% and 0.8%.¹¹ Types of commercial insurance includes: property, general liability, professional liability, crime, commercial automobile, workers' compensation, and directors' and officers' liability. Combined the commercial insurance costs averaged between 1.8% to 2.2% of a nursing homes average cost per resident day. If CLA's \$229.87 average cost per resident day reflects the average nursing home expense in America, this would mean that insurance costs are a \$3 billion annual expense to the nursing home industry. CLA reported that nursing home operators made no profit in 2013, as the report indicates the average nursing home owner experienced expenses that were

1.2% greater than revenue. Operators should be interested in controlling their insurance costs to enhance profitability. Insurance costs are directly impacted by the losses occurring in their industry; losses which are generally controllable.

Beyond workers' compensation and professional liability claims there is virtually no published research about insurance claims in the nursing home industry. The few published reports that were identified are generally focused on the number of claims in the industry and their cost on a subset of the industry. Few reports provide information about the cause of the claims themselves to enable nursing home operators to take steps to address the sources of the losses. Below are some examples of the data available:

- OSHA and BLS injury/illness data, are typically focused on the rate of injuries (such as the number of injuries per 200,000 hours worked) and not on what caused the injuries. ¹²
- Insurance industry information about the frequency and severity of health care industry workers' compensation claims. ¹³
- General and professional liability claim frequency and severity data for the long-term care industry, with no indication of what caused the claims. ¹⁴
- Injuries to nurses and aides only, no consideration for other employee groups. ¹⁵⁻¹⁸
- General property losses across all industries, not specific to nursing homes. ¹⁹

Insurance is a unique product in that the rate charged for the insurance needs to be known before the ultimate cost of the service is delivered. It is a contract for the insurance carrier to pay for a potential future loss (such as injury, property damage, or medical treatment) during a given period (effective period of the policy), when it is not known if, when, or to what extent the loss will occur. Thus, "the costs associated with an insurance

product are not known at the point of sale and as a result need to be estimated.”²⁰ (p 18) As such, insurance companies must determine the likelihood of a loss and its severity to calculate a premium that is great enough to cover losses, ensure a profit, yet keep them competitive with other insurers so they remain in business. Insurance companies use their own data to determine appropriate pricing. However, some events that are covered through insurance occur at such low frequencies that an insurance company may not have enough loss data to determine appropriate pricing, so they will purchase data from data aggregators such as Verisk Analytics or American Association of Insurance Services. Because these loss data offer a competitive advantage in setting pricing, and increasing the likelihood of profitability, it is considered proprietary and sharing of such data are rare.

Because of the proprietary nature of claims information, nursing home industry personnel and safety professionals serving the industry learn about losses either through experience or by discussions with others in the industry. Neither method is a successful way to try to prevent loss. Without this information it is challenging to learn how to prevent loss to property and people, including staff and residents. Therefore, the information developed in these studies is of significant benefit to operators of nursing homes as well as individuals trying to reduce losses within the industry.

While the cost of many lines of commercial insurance is simply based on the typical losses for the industry and the value being insured, with no or limited consideration being given to an individual business' experience, this is not true with workers' compensation insurance. The cost a business pays for workers' compensation insurance is partially based upon the business' individual experience. Workers' compensation pricing is generally based

upon three factors: the rate for the specific class(es) the business operates in, the organization's payroll by class, and the organization's experience modification rate.

The workers' compensation industry has assigned one or more classes for all organizations. The individual classes generally reflect the type of work performed; this is done to ensure that the cost of insuring the inherent risk in one class (steel erection) is not impacting the rates of a less hazardous class (clerical work). Thus, the work an organization performs is generally placed into one or more classes, with each class having its own base rate per \$100 of payroll. Then the amount that each business pays for its insurance coverage is based upon the amount of payroll they have per class, that class' rate, and the organization's experience modification rate.

$$\text{Premium} = \text{Class payroll}/\$100 * \text{rate by class} * \text{EMR}$$

A typical nursing home will have employees and payroll in the following class codes with (2017 Iowa Rate in \$ per \$100 of payroll) ²¹:

- 8829 Convalescent or nursing home – all employees (\$3.84)
- 8810 Clerical office employees NOC (\$0.30)

An oversimplified explanation of a business' experience modification rate (EMR) calculation process simply compares the amount of workers' compensation loss (adjusted by class code) a business incurred divided by the average for the industry (adjusted by the same class codes) over the same time-period. The period over which the losses are reviewed are the oldest three of the last four years.

To stabilize EMRs from significant variation three controls are utilized in the calculation, these include the use of a ballast value, weighting value and loss caps. Each

state will have their own ballast values, primary loss cap, overall loss cap and excess claim weightings.

A ballast value is applied to both the business' and industry's expected losses. This ballast value is based upon the organization's total payroll, with larger organizations having a larger ballast value than smaller organizations. Because of the EMR calculation method the ballast value acts to somewhat dampen the year to year impact of loss change in the mod calculation.

Loss caps are in place so that an extremely large claim does not overly impact a business's mod. In 2017, for Iowa, losses going into the EMR are capped at \$270,000.^{21 (33)} Losses are broken into two components, primary and excess. Primary losses are capped in 2017 in Iowa at \$16,500 per individual claim and go into the EMR calculation at 100%. Excess losses are those losses over \$16,500 per claim, and are entered into the EMR calculation on a weighted basis, with the weighting dependent upon the organization's size. Weightings for 2017 in Iowa ranged from 4% to 80%.²¹⁽³³⁾ Weightings, just like ballast values, are dependent upon the organization's size, so larger employers are more directly impacted by their losses than smaller employers. The intent of the primary/excess split is give primary losses more weighting to encourage employers to reduce these frequent lower cost claims and still allow severe claims to have an impact, but not be the driver of the EMR.

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So, if an Iowa nursing home had a \$40,000 claim for an employee injury needing surgery with physical therapy, with a weighting value of 14% the claim would be calculated in the experience modification calculation as:

Primary losses: \$16,500

Excess losses: $(\$40,000 - \$16,500) * 14\% = \$3,290$

Total losses: $\$16,500 + \$3,290 = \$19,790$

A nursing home with losses that are identical to the industry average will have an EMR of 1.0. Whereas a nursing home with losses that are greater than average will have a mod greater than 1.0 and an organization with losses lower than the industry average will have a EMR less than 1.0. The EMR calculation methodology does have a minimum mod; however, it is dependent upon the organization's size which impacts the expected losses and ballast value; however, there is no theoretical maximum.

EMR Calculation

$$EMR = \frac{\text{Actual Losses} + \text{Ballast Value}}{\text{Expected Losses} + \text{Ballast Value}}$$

Workers' compensation premium calculation:

$$Premium = \text{Class payroll}/\$100 * \text{rate by class} * EMR$$

An organization with an EMR of 1.1, pays 10% more for their premium than an organization with an EMR of 1.0. While an organization with an EMR of 0.8, would pay 20% less than an organization with an EMR of 1.0. Nursing home operators that understand what is driving their losses, as well as the losses in the industry can then take measures to reduce the frequency and severity of the injuries in their workplace, having a direct impact on their workers' compensation insurance costs.

Prevent Business Disruption and Failure

Incidents can occur within or to a nursing home that can result in either significant disruption in operations or potential closure of the facility if the business is not able to recover from the incident. Such incidents can include: fire, water intrusion, earthquake, wind (tornado/hurricane), a motor vehicle crashing into the building taking out a section, etc. It is

imperative for any business to have a plan to respond to such incidents. However, to successfully prepare for such incidents the organization must understand what is likely to occur to them. Through this research, nursing home operators will have a better idea of what events have led to claims by their peers, so they can take steps to prevent the incidents and potentially disastrous results within their business.

Reputation

Statements such as the following can have a dramatic effect on the reputation of a nursing home.

- “Grime and mold smothered the windows, leaving residents barely able to see outside.”²³
- “Nursing home patients evacuated after fire”²⁴
- “...Care provided to nursing facility residents was so grossly substandard that the care was worthless and effectively without value.”²⁵
- “Former nursing home bookkeeper perpetrated highly complex embezzlement...”²⁶

Occasionally, events leading to insurance claims will make the headlines of the news, causing an impact on the organization’s reputation. Thus, understanding these events can help organizations address potential problems before they cause damage to a reputation. A reputation is critical for the organization to get new residents and retain those they have.

Nursing homes in the United States had an average occupancy rate of 84.7% at the end of 2015, which continues a 20-year trend.^{27,28} Occupancy rate is calculated as the sum of the number of inpatient days of care divided by the number of bed days available.²⁹

In addition to reputation, competition for care outside the nursing home industry is one factor that impacts occupancy rates, which directly affects revenue and operating costs.

^{30, 31} Nursing home operators do not want the added burden of an incident adversely affecting their reputation. An incident that could possibly be prevented through the knowledge gained through this research.

Legal Obligation - Resident Safety

As previously mentioned, nursing home residents have the right to be free from abuse and neglect, and receive proper medical care. However, even with those rights and protections, the Office of Inspector General in 2011 found, nationwide, that 22% of Medicare beneficiaries who had post-acute skilled nursing home stays that were 35 days or less experienced at least one adverse event during their stay.³² 79% of these events resulted in prolonged skill nursing facility (SNF) stay, transfer to a different SNF or other post-acute facility, and/or hospitalization (i.e., admission to inpatient care, hospital observation unit, or emergency department); 14% required intervention to sustain the resident's life and 6% contributed to or resulted in the resident's death.

While the intent of the research is not to focus on resident care, there are incidents impacting residents that may result in insurance claims, such as elopement and personal injury. Elopement is when a resident leaves a facility unsupervised and without notice. This puts the resident at risk for injury and opens the nursing facility up to potential liability should something occur to the resident. Should the event be serious, the nursing home owner may file a general liability claim to cover the damages. Rosenfeld Injury Lawyers lists on their website the valuation of six elopement cases in Illinois, ranging from \$988,850 to \$200,000,000.³³ While it is likely that the intent of their website is to show the largest potential payouts the victims of elopement may recover, these sizeable figures clearly would have an impact on either the nursing home owner suffering the economic loss, their insurance carrier (to the extent they are liable for the claim through the policy limitations) or both.

In 2015 the Centers for Medicare & Medicaid Services reported that ensuring “that a nursing area is free from accident hazards and provide adequate supervision to prevent avoidable accidents” was the second most frequently cited deficiency in nursing home inspections.^{34 (154)} These are hazards that could lead to resident injury and result in general liability insurance claims.

Fire is another resident safety concern. While the Centers for Medicare and Medicaid Services mandated that all nursing homes must be fully sprinklered as of August 13, 2013, about 2,700 fires occur each year in nursing homes.^{35, 36} Fire and resident accidents can both possibly be severe enough that a nursing home may file a property or general liability insurance claim. A fire could potentially cause a nursing home to close and force residents to move; thus, disrupting their lives. Serious resident injuries not only result in harm to the residents, but can adversely impact the reputation of the facility. Therefore, this research assists nursing home owners to understand what leads to these incidents, so they can take steps to prevent them in their facilities.

Legal Obligation - Employee Safety

The Bureau of Labor Statistics for 2015 indicated that the nursing and residential care facility industry had the fourth highest frequency of workplace injuries and illnesses of all major industry classifications and a rate of injury per 100 employees that is more than twice the average of all industries (6.8 cases vs 3.3 cases per 100 employees).³⁷ These injuries and illnesses take a significant toll on the employees of this industry.

The primary agency for creating and enforcing legal obligations for nursing home management to prevent staff injury is the Occupational Safety and Health Administration (OSHA). OSHA, as a Federal Agency and its approved state plans, establishes and enforces rules related to workplace safety. OSHA has implemented specific and generic standards

that create minimum expectations for the owners of nursing homes to meet to reduce employee injury. To enforce their regulations, OSHA will conduct inspections of a small percentage of workplaces each year.

OSHA, through their own data and the data of the BLS, noticed that the nursing and residential care industry had such a high rate of injuries and illnesses. In 2012 OSHA implemented a National Emphasis Program (NEP) focused on the nursing homes and residential care facilities.³⁸ OSHA implemented the program because these industries had a days away, restricted work activity and job transfer (DART) rate that was more than twice the average rate for all other industries. DART is calculated as the number of employee injuries/illnesses where the employees must miss work or be restricted from their regular work activities because the workplace injury they experienced is so severe. This number of days is then turned into a ratio by dividing the number of cases by 200,000 hours (OSHA's equivalent base number of hours for 100 full-time employees). OSHA in the NEP indicated that in 2010 the nursing home industry had a DART rate of 5.6, compared to the average rate for all private industry of 1.8. This alone shows the significant impact workplace injuries/illness are having upon employees in the nursing home industry. OSHA however, focused the NEP "primarily on the hazards that are prevalent in nursing...specifically, ergonomic stressors relating to resident handling; exposure to blood and other potentially infectious materials; exposure to tuberculosis; workplace violence; and slips, trips and falls."^{38 (10)} OSHA indicated that together, overexertion and slips, trips and falls accounted for 74.6% of all workplace injury cases with days away from work in 2010. OSHA provided no additional clarity of the specific causes of these slips, trips and falls or overexertion cases. Thus, creating a burden for employers, who may be in compliance with OSHA's regulations,

but are still experiencing workplace injuries and illnesses which put them at risk for an inspection.

Clearly these causes of the injuries to residents and staff that should be researched so that the industry can make improvements to further reduce the frequency and severity of such events.

Focus and Purpose of Research

The three studies summarized below were undertaken to provide nursing home management with information about the losses impacting their industry, so they may gain a better understanding of what is driving commercial lines insurance loss in their industry, compare their performance and take corrective action.

Analysis of Commercial Insurance Claims in the Nursing Home Industry, with Control Measures

Research question

What are the primary sources/causes of commercial insurance claims occurring in the nursing home industry, outside of workers' compensation and professional liability, and what controls can be implemented to reduce their frequency and severity?

Purpose

The purpose of this study is to provide information to nursing home operators on the losses occurring in their industry related to the common lines of commercial insurance, and the controls they can utilize to reduce the occurrence of these incidents. No published research could be located about the losses within nursing homes that are reported to insurance carriers beyond employee injuries and professional liability/malpractice. Such losses may include:

- Property damage claims due to fire, wind, and hail.

- Auto claims due to hitting a person, motor vehicle accident, or hit and run.
- Commercial boiler & machinery claims due to damage to equipment such as a freezer, hot water heater, or elevator.
- Crime claims from employees embezzling money.
- Employment practices claims from allegations of wrongful termination.
- General liability claims from harm to residents, or guests from circumstances such as slipping on the floor, falls from bed or wheelchair, or elopement.

Hartford in 2015 issued a report on the most common and costly property and liability claims impacting small businesses.¹⁹ This report, however, was from a broad spectrum of small businesses they insure and may not represent the experience of the nursing home industry. Without a clear understanding of what the risk factors are that drive loss within the nursing home industry, nursing home owners and managers may not be able to identify the areas where they should apply their resources to minimize loss. This study reviews the commercial line losses of a regional insurance carrier to determine the typical losses that occur within this industry.

Events that lead to insurance claims often have other adverse impacts on the business. Thus, if a nursing home owner understands what drives losses in the industry, they can take steps to prevent or reduce the occurrence of such losses in their organization, minimizing the adverse impact of those losses on their business and reputation; thereby making their facility a safer and more desirable place to live.

More importantly, it is understanding what controls can be utilized to eliminate the occurrence of these claims that is of the biggest benefit to nursing home managers to ensure the best return on their resources to control potential loss.

Text Analysis of Workers' Compensation Claim Descriptions in the Nursing Home Industry: Identification of Injury Causes

Research question

When a narrative analysis is applied to the employee description of injury, of workers' compensation claims, what information does the analysis provide to nursing home owners to allow them to prioritize their safety activities to eliminate injuries in the workplace?

Purpose

The purpose of the study is to apply machine learning techniques to nursing home employee injury descriptors, from an existing workers' compensation carrier's data set, to identify claim trends and relationships to claim costs. Those descriptors are further analyzed for underlying commonalities that would allow nursing home owners the ability to prioritize safety activities to eliminate those causes of injury producing events responsible for the most frequent and costly injuries.

In 2015 the nursing home and residential care facility industry (excluding state and government owned facilities) experienced 171,900 injuries and illness, giving it the highest rate (6.8 cases per 100 employees) of any industry with more than 100,000 cases of workplace injuries and illnesses.^{37 (19)} For all industries, regardless of the number of injuries, nursing home and residential care facilities had the 2nd highest rate of non-fatal occupational injuries and illness in 2015.^{12 (1)}

Limiting the analysis to just the more severe injuries and illnesses, those that result in lost time from work, the occupation of nursing assistant, which is the largest single occupation in the nursing home industry, had the fourth highest rate of incidents of all occupations.^{1 (30), 16 (32)} In 2015 nursing assistants had a rate of 348.5 lost workday incidents

per 100,000 full-time employees which was only lower than police/sheriff officers, correctional officers/jailers and firefighters.⁴⁰ Their rate of lost time injury/illness was higher than that of laborers and freight/stock movers, construction laborers, and plumbers/pipefitters. However, limited data beyond broad categories and analysis of safe resident handling injuries has been published, providing incomplete insight into the causes of injuries affecting staff of nursing homes.^{15(1), 17(3)}

Published research has often focused on just the injuries associated with nursing, nursing aides or direct care staff because they accounted for about 70% of the recorded injuries between 1980 and 1988, but only make up 37% to 42% of the industry's overall employment population.^{16(33), 41} However, this leaves the injury characteristics of about 60% of the employed population not studied. This population includes dietary, laundry, housekeeping, maintenance and administrative employees.¹¹

Frequency and Cost of Workers' Compensation Claims from Resident Handling Activities in the Nursing Home Industry

Research question

What are the frequency and cost characteristics of nursing home employee workers' compensation claims related to resident handling activities?

Purpose

The purpose of this study is to identify the types of activities that are leading to employee injury from patient handling tasks in the nursing home industry and determine if claims costs significantly differ by the type of activity.

The research about patient handling tasks in nursing homes has identified potential high-risk tasks. Owen and Garg in 1989 identified via a survey of employee perceptions 16 stressful patient-handling tasks.³⁹ The top three tasks identified, based upon identification

and raking of the tasks by the employees themselves, include the transferring the patients from toilet to chair, chair to toilet and chair to bed.

Based upon a literature review, no follow-up studies have been completed to evaluate if the tasks employees perceived to be most stressful were those that are producing injury. The research would allow comparisons to be made between the claims filed with a workers' compensation carrier and the published research. In addition, the research may identify relations in the claims data that may not have been identified previously.

The analysis looks at the reported claims using supplied categories of loss, demographic information and brief narrative descriptions of the incident.

CHAPTER 2. ANALYSIS OF COMMERCIAL INSURANCE CLAIMS IN THE NURSING HOME INDUSTRY, WITH CONTROL MEASURES

Accepted for publication: *The Director: Journal of the National Association of Directors of Nursing Administration/LTC*, Author: Jason Schaufenbuel

Abstract

Background: Commercial insurance, including auto, property, general liability, boiler and machinery, inland marine, and employee practices liability insurance coverages is an expense most nursing homes simply accept. The claims that drive this expense are typically controllable. However, little research has been published about the causes of commercial insurance claims, how to control those specific to nursing homes, their costs, or a measure of claim frequency that organizations can use as a comparison.

Methods: This study analyzed the commercial lines insurance claims filed with a midwestern insurance carrier by nursing home owners. A claim frequency measure is established by evaluating the number of claims against the number of licensed beds. Additionally, claims from commercial auto, property and general liability are further analyzed with potential controls to minimize the most frequently occurring claims.

Results: Analysis shows that general liability claims occurred at a frequency significantly greater than auto claims but not at a greater frequency than property claims. The mean rank cost of liability claims was second highest of all claims costs, significantly greater than the costs of property claims.

Conclusions: To impact the frequency and severity of commercial insurance claims, nursing home management should focus their efforts on the causes of general liability and property claims. While many property claims are outside the control of nursing home

personnel, the most frequent property claims and virtually all liability claims are within the control of the nursing homes operators that experience them.

Keywords: nursing home, commercial insurance, claims

Introduction

Commercial insurance coverage (excluding workers' compensation insurance) for the nursing home industry is reported to equal between 0.5% and 0.8% of the average cost per resident day.¹ Beyond the direct cost of the claims filed against these insurance policies, the claims can also harm a business's reputation, and disrupt the business to the point that the enterprise may no longer be viable. Since insurance costs are driven by the loss experience of the industry, it is important for nursing home management to understand the losses it is reporting so steps can be taken to reduce claim frequency and severity. However, no published research could be located to help identify the claims that drive insurance costs so that the industry can focus its limited resources to eliminate or reduce these incidents.

This study utilizes data from commercial lines insurance claims from which nursing home management can compare themselves and assess their practices to prevent the claims which are identified. Importantly, it assists the industry in understanding the risks that are driving the insurance costs they are paying.

Methods

This study looked at the commercial lines claims filed by nursing home owners with a regional insurance carrier in the upper mid-west to identify the frequency and severity of the claims reported. The primary lines of insurance evaluated were commercial auto, property and general liability.

The claims studied occurred between January 1, 2007 and March 15, 2017, within nursing home organizations and their affiliated assisted and independent living facilities if

applicable. Organizations that only provided assisted or independent living were not included in this study. Claims were included if they incurred any losses, such as payments to the insured organization, its residents or third-parties, or expenses paid to defend against claims even when no other losses were incurred. All losses are exclusive of any deductible. 92% of the claims were closed at the time of the study; the incurred losses, which include the paid and reserved amount expected to cover the cost of the claim, were used for open claims. Due to data access limitations, deductible amounts could not be determined specific to any insured, line of coverage or individual location. In addition, claims may not be reported consistently by organizations because of their individual reporting processes, deductibles, and insurance philosophies.

A measure of claims frequency was established by determining the number of bed years a facility was insured by line of coverage. Due to limitations in state licensing data, only claims from organizations in Wisconsin are used in calculating the rate of claims by bed years. The number of licensed skilled care beds and number of assisted living apartments each organization has was determined from state licensing data.²⁻⁴ The number of calculated beds ranged from 9 to 1,343 ($n=62$, median beds=100 (IQR=109)). The bed counts were based upon the most recent policy in force, against licensed bed counts as of April 2017. It was assumed that each assisted living apartment equated to one bed for the purposes of calculating an exposure basis. It was possible that the organizations had additional properties, such as independent living facilities listed on the insurance policy for which bed counts were not available. However, it was not possible to separate the claims by property type, so any claims associated with these potential properties are included in the study. A bed year was calculated as shown in the following examples. An organization with 100 beds is insured for

3 years, they were considered to have 300 bed years of exposure. When an organization was insured for less than a full year, the percentage of days of the year insured was multiplied against the number of beds. Therefore, an organization insured for 84 days (23% of a year) with 100 beds had 23 bed years of exposure. The total number of bed years by insured ranged from 25 to 11,040 ($n=62$, median bed years=659 (1,110)).

Kruskal-Wallis H tests were conducted to determine if there were differences between identified groups as reported in the results section. The values reported are mean ranks. Distributions of the groups were not similar for all groups, as assessed by visual inspection of a boxplot. Subsequent post hoc pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. All calculations reported in this paper were made using *SPSS Statistics for Windows*, Version 23.0. Armonk, NY: IBM Corp.; 2015.

Results

Between 2007 and March 15, 2017 there were 590 claims reported in WI which had incurred loss or expense by 62 insureds (not all insureds had purchased the same lines of insurance coverage). Of these, there were 195 commercial auto (CA) claims, 22 boiler and machinery claims, 3 inland marine claims, 173 commercial property (CP) claims, 1 garage liability claim, and 196 general liability (GL) claims. Due to the low number of boiler and machinery, inland marine, and garage liability claims, these were excluded from further analysis for the WI claims frequency. Applying the number of bed years to establish an exposure basis, it was estimated that the median rate of claims for CA was 0.383 (IQR = 2.18) claims per 1,000 bed years, CP was 1.49 (3.81) claims per 1,000 bed years and GL was 1.90 (3.19) claims per 1,000 bed years.

A Kendall's tau-b correlation was run to determine the relationship between the rate of claims filed on one line of coverage toward claims filed on another line amongst the 59 insureds who had coverage on all three lines. There was a weak, positive association between the rate of CA claims and CP claims, which was statistically significant, $\tau_b = .263, p = .008$. There was also a weak, positive association between the rate of CP and GL claims, which was statistically significant, $\tau_b = .198, p = .041$. The association between the rate of CA and GL claims was a weak positive correlation, which was not statistically significant, $\tau_b = .121, p = .218$.

A Kruskal-Wallis H test was conducted to determine if there were differences in the frequency of claims by bed year between the three lines of coverage groups: "CA" ($n=60$), "CP" ($n=60$) and "GL" ($n=61$). The mean ranks of claim frequency were statistically significantly different between groups, $\chi^2(2) = 6.58, p = .037$. Statistical significance of the post hoc pairwise comparisons was accepted at the $p < .017$ level. This analysis revealed statistically significant differences in claim frequency between the CA (77.64) and GL (100.4) ($p = .014$) groups, but not between the CP (94.79) or any other group combinations.

An analysis of claim costs, of claims which had incurred loss or expense, was completed using 1,022 claims reported from 156 insureds between 2007 and March 15, 2017. Table 1 shows number of claims and the median and interquartile range of the total incurred costs, losses and expenses for the claims in each line of business. The total incurred costs are the sum of the losses incurred (expenses paid directly to the insured or the harmed parties) and expenses. Expenses are the cost of using third-parties to defend the claim. These expenses include third-party legal fees, experts, records requests, etc. This expense category does not include the insurance carrier's internal costs of wages, salaries, benefits, utilities,

etc. for using their own staff and equipment for managing the claim, investigation, or legal services.

Table 1. Summary of Claim Measures by Line of Insurance Coverage

Line of Insurance Coverage	Number of Claims	Median Total Incurred (IQR)	Median Losses Incurred (IQR)	Median Expenses Incurred (IQR)
Commercial Auto (CA)	363	1,480 (3,030)	1,470 (2,990)	0 (0)
Commercial Boiler and Machinery	30	6,440 (20,200)	6,440 (20,200)	*
Commercial Inland Marine	10	2,680 (9,800)	2,690 (8,330)	0 (0)
Commercial Property (CP)	324	2,720 (12,700)	2,500 (11,900)	0 (619)
Employment Practices Liability	13	27,200 (76,400)	15,000 (48,900)	6,470 (11,200)
Garage Liability	1	2,060	2,060	*
General Liability (GL)	281	3,990 (37,400)	2,500 (19,100)	5 (5,770)
Total	1,022	2,500 (9,410)	2,090 (8,450)	0 (380)

* No expenses were incurred on any claims

A Kruskal-Wallis H test was conducted to determine if there were differences in the incurred cost of the claims between the six lines of coverage groups: “CA,” “boiler and machinery,” “inland marine,” “CP,” “employment practices” and “GL.” The claim costs were statistically significantly different between groups, $\chi^2(5) = 130, p < .001$. Statistical significance of the post hoc pairwise comparisons was accepted at the $p < .003$ level. This analysis revealed statistically significant differences in claim costs between the boiler and machinery (335) and CP (544) ($p < .001$) groups, the boiler and machinery and GL (607) ($p < .001$) groups, the boiler and machinery and employment practices (790) ($p < .001$) groups, inland marine (391) and employment practices ($p < .001$) groups, CA (417) and CP ($p < .001$) groups, CA and GL ($p < .001$) groups, CA and employment practices ($p < .001$)

groups, CP and GL ($p = .002$) groups, CP and employment practices ($p = .001$) groups, but not between any other group combinations.

A Kendall's tau-b correlation was run to determine the relationship between the loss incurred on a claim toward the expense incurred. Across all claims there was a weak, positive association between the loss incurred and the expense incurred, which was statistically significant, $\tau_b = .204, p < .001$. When analyzed by the line of business, employment practices liability had a strong, positive association between loss incurred and expenses, which was statistically significant, $\tau_b = .773, p < .001$. Whereas all other lines had a weak positive correlation of .280 or less, with only inland marine and commercial boiler and machinery having correlations that were not statistically significant. This association is not surprising given that questionable and complex claims are likely to have more costs associated with the investigation, legal defense and third-party experts than unambiguous claims.

Further analysis was conducted of the CA, CP, and GL claims as these were the most frequent claims. Commercial auto insurance can provide various coverages for each separate vehicle. The typical coverage includes property damage and medical expenses for others when caused by an organization's vehicle or an individual driving for the organization.⁵ Additional coverage is available to cover repairs or loss of the organization's vehicles. The sources of CA claims were motor vehicle crashes (MVCs) ($n=256$, median total incurred \$2,010 (\$3,330)), glass claims ($n=57$, \$120 (\$118)), personal injury claims, not the result of MVCs ($n=10$, \$9,210 (\$192,000)) and others ($n=40$, \$1,330 (\$1,710)). The personal injury claims all involved residents falling out of wheelchairs ($n=10$) during transport or while loading into/out of the transport vehicle. The "other" category of claims included hail ($n=10$), theft ($n=5$), and fire ($n=2$), as well as others and unknown.

A Kruskal-Wallis H test of incurred losses between the top three identified sources of auto claims: “MVC,” “glass,” and “personal injury” show statistically significant differences in losses between groups, $\chi^2(2) = 119, p < .001$. Statistical significance of the post hoc pairwise comparisons was established at the $p < .017$ level. This analysis revealed statistically significant differences in claim losses between the MVC (186) and glass (42) ($p < .001$) groups, and the glass and personal injury (246) ($p < .001$) groups, but not between personal injury and MVC groups.

Motor vehicle crash claims were further analyzed using ANSI D16.1-2007 Accident Classification by First Harmful Event.⁶ Of the 239 claims that could be classified, collisions involving parked motor vehicles ($n=71$, median total incurred \$1,500 (\$1,490)) were most common, followed by collisions involving a motor vehicle in-transport (on a roadway) ($n=62$, \$4,140 (\$10,900)), collisions involving a fixed object ($n=52$, \$1,680 (\$3,620)) and collisions involving an animal ($n=51$, \$3,050 (\$3,180)). A Kruskal-Wallis H test of the incurred claim costs of these four events showed statistically significant differences between groups, $\chi^2(3) = 20.6, p < .001$. Statistical significance of the post hoc pairwise comparisons was accepted at the $p < .008$ level. This analysis revealed statistically significant differences in claim costs between the parked (91) and animal (134) ($p = .001$) groups and the parked and in-transport (140) ($p < .001$) groups, but not between the fixed object (115) group or any other combinations.

Typically, CP insurance covers the loss of, or damage to an organization’s structure and installed fixtures; it can also include building contents and the property of others that is in the organization’s care.⁷ The loss may occur due to fire, wind/hail, lightning and other perils depending upon the policy. The top five types of CP claims reported were loss/theft of

property ($n=94$, median total incurred \$1,500 (\$1,650), of which 82 were the loss of hearing aids ($n=59$) and dentures ($n=23$). Second were water leak/intrusion claims ($n=85$, \$6,310 (\$13,600)), followed by wind/hail damage ($n=62$, \$13,800 (\$55,300)), lightning ($n=42$, \$7,360 (\$12,900)) and fire ($n=15$, \$19,800 (\$68,100)).

A Kruskal-Wallis H test was conducted to determine if there were differences in incurred cost of the claims between the five types of CP loss groups: “loss/theft,” “water leak/intrusion,” “wind/hail,” “lightning,” and “fire.” The mean ranks of claim costs were statistically significantly different between groups, $\chi^2(4) = 87.5$, $p < .001$. Statistical significance of the post hoc pairwise comparisons was accepted at the $p < .005$ level. This analysis revealed statistically significant differences in claim costs between loss/theft (83.8) and all other groups: water leak/instruction (164), lightning (175), wind/hail (196), and fire (216), all $p < .001$, but not between any other combinations.

General commercial liability insurance typically protects an organization’s assets if someone is hurt on their property or when there are property damages or injuries caused by their employees.⁸ The top types of GL claims were injury ($n=228$, median total incurred \$7,520 (\$67,300)), property damage ($n=44$, \$894 (\$1,140)) and others/unknown ($n=9$). The injury claims involved residents ($n=131$, \$32,600 (\$161,000)), third-parties ($n=58$, \$3,340 (\$8,690)), employees ($n=4$), and undetermined ($n=35$).

Due to no consistent method to identify the cause of resident injury claims and the complexity of some claims, they were categorized as those where a fall or falling was the precipitating event of the injury, alleged negligent care, or other event led to the claim. The author recognizes that falls may be due to alleged negligent care, but the data rarely allowed for classification of claims where the fall may have had no bearing on the organization’s

care, such as when a resident falls to the floor while self-ambulating to the restroom and the organization's insurance covers the medical treatment. Or an incident, such as a staff member dropping a resident to the floor while assisting with ambulation, and negligence is assigned by the court. Resident injuries were from alleged negligent care ($n=72$, \$36,600 (\$186,000)), falls ($n=40$, \$59,700 (\$151,000)) and others ($n=11$).

Injuries to third-parties were coded and analyzed by their event or exposure using the Occupational Injury and Illness Classification Manual.⁹ While these individuals did not have an occupational exposure, the manual provides a means to classify the events that lead to the injuries experienced. The two primary events/exposures related to third-party claims were: falls, slips, trips ($n=50$, median total incurred \$5,250 (\$9,720)) and contact with object or equipment ($n=6$, \$1,350 (\$2,160)). The most frequent sub-events/exposures leading to falls, slips, trips were: slipping ($n=14$, \$12,200 (\$33,300)), tripping over an object ($n=12$, \$1,370, (\$3,150)), unspecified ($n=10$, \$6,830 (\$7,160)), and uneven surface ($n=9$, \$5,460 (\$21,700)). Of the slipping claims, 11 were attributed to snow/ice. While the median total incurred values had a wide range, a Kruskal-Wallis H test was conducted to determine if there were differences in the incurred cost of the claims between the four types of sub-events: "slipping," "tripping," "uneven," and "unspecified." The mean ranks of claim costs were not statistically significantly different between groups, $\chi^2(3) = 7.73$, $p = .052$.

Discussion and Recommendations for Practice

Overall, the frequency of claims occurring in the WI insureds, along with the costs of the claims, provide some assistance to nursing home personnel when deciding which loss control efforts may have the best return on investment in eliminating or reducing the occurrence of claims. By multiplying the frequency of the WI claims with the median claim

cost of claims by line of coverage, GL claims were \$7.58 per bed year, while CA claims were \$5.67 and CP claims were \$4.05.

As described in the results, there was no significant difference between frequency of CP and GL claims or CP and CA claims for the WI insureds. The only statistically significant difference was between the frequency of CA and GL claims. The nature of the services nursing home staff provide, the health condition of the residents, and the frequency of third-party guests being onsite, would lead the author to believe that GL claims would occur at a significantly higher rate than CP claims. This supports the idea that while the care of residents and guest is important to nursing home management, the causes of CP claims should not be ignored.

Looking at the cost of claims, there was no significant difference between the cost of Employment practices and GL claims (both are statistically more expensive than CA, Boiler, and CP claims). Thus, efforts to prevent these claims should be a primary focus. Given the low frequency of EM claims these are not discussed further, but organizations are encouraged to talk to their legal representative to ensure their employment practices comply with the law, so these expensive claims can be avoided.

In addressing GL claims, injuries to residents and third parties related to falls should be addressed. Other researchers indicate that resident falls are a major focus for quality improvement, as 50% - 75% of nursing home residents fall annually.¹⁰ Multiple factors are associated with falls in nursing homes and research is showing that standardized risk assessment with multiple individually-tailored interventions appear to be most effective in reducing the number of falls.¹¹⁻¹³ Generally this includes a comprehensive fall risk

assessment, staff education of risk factors and prevention strategies, environmental changes, mobility aids, medication reviews, and post-fall reviews.

Most third-party slip/fall claims in the study were caused primarily by snow and ice, which is anticipated given the region in which the study's claims occurred. Due to jurisdictional differences, it is important for every business owner to understand their obligations related to snow/ice control. In many jurisdictions organizations with this exposure have a duty to exercise reasonable care to ensure safe conditions for guests and others. There is no specific rule related to how much snow/ice must be present or how much time you have to remove it before you are liable. Reasonableness is based upon what a reasonable person would do in the same situation; thus, making specific requirements impossible. Nursing homes, being commercial entities welcoming the public in to visit residents, would generally be held to the same reasonableness standard as most retailers in the same geographic area. Typically, business owners have a legal duty to investigate and discover whether hazardous conditions exist. This includes making routine inspections of walkways and parking lots to ensure they are safe for visitors and taking corrective actions when they are not. Shoveling snow while snow continues to fall is generally not considered reasonable, but once the snow stops the snow/ice must be addressed in a reasonable time and in a reasonable manner. A comprehensive snow/ice control process includes: a snow/ice removal plan with clear responsibilities, use of inspection and snow removal logs, appropriate snow/ice control, as well as consideration for where snow is piled and the hazards it creates, such as where melt water may refreeze.¹⁴

CA motor vehicle claims would be another area of focus to mitigate loss in nursing home operations. Specifically, organizations should focus loss prevention efforts on MVCs

and personal injury incidents as they are the costliest. To prevent MVCs experts and an industry consensus standard indicate that employers should implement a motor vehicle safety program.¹⁵⁻¹⁸ Common elements of these programs include:

- driver's license background checks;
- compliance with all established traffic regulations, including use of seat belts and speed limits;
- preventing distracted driving;
- preventing drowsy driving;
- providing drivers with training in safety driving practices, with refresher training every two to three years;
- procedures for reporting and investigating work-related crashes;
- process for re-evaluating drivers at least once per year;
- on-the-road evaluations of the driver;
- providing safe and well-maintained vehicles; and
- disciplinary action system for moving violations and/or preventable crashes.

Organizations may also want to consider the use of in-vehicle data recorders. These devices show promise as a method to monitor employee driving behavior as recent research shows that driving behavior is correlated with having a MVC.¹⁹ When this data are combined with feedback and coaching it shows promise in reducing the frequency of at-risk behaviors; however, further research is necessary to show their long-term value.^{20, 21}

Commercial auto personal injury claims arising from residents falling out of wheelchairs or from wheelchairs tipping over during transit or while loading, while infrequent in nature, tended to have a high cost similar to that of MVCs, which would likely

indicate severe injury to residents. Of wheelchair riders in busses, these injuries are more common than injuries related to collisions. Only 6% of wheelchair incidents in busses were reported to have involved the vehicle being in a collision.²²

Researchers have found that the “‘disuse’ and ‘misuse’” of wheelchair tiedown and occupant restraint systems (WTORs) “... place wheelchair-seated passengers at greater risk of injury.”²³ In large transit vehicles not securing wheelchairs using four-point tiedowns and misuse of lap belts were the most common issues.²⁴ Based upon the literature and the author’s 20 years of professional experience, to reduce the frequency of these incidents organizations must:

- Purchase user-friendly WTORs and require their use.
- Ensure lift platforms have an integrated barrier to prevent wheelchairs from going off the lift when elevated.
- Ensure employees are trained about the proper use of lifts and WTORs (following the manufacturers’ guidelines), with hands-on training loading and securing a variety of wheelchairs.
- Encourage residents to purchase wheelchairs that are compliant with ANSI/RESNA WC-4:2012 – American National Standard for Wheelchairs, Section 19: Wheelchairs used as Seats in Motor Vehicles, as only those wheelchairs have been tested as to their performance when used as seats in moving vehicles. Compliant chairs will have four easily accessible tiedown points and provide for the anchorage of a pelvic safety belt.
- When chairs are not WC-4 section 19 compliant, implement a “chair-marking” program to identify optimal securement locations to assist vehicle operators.²⁵

- Ensure residents are trained about the need for the devices.
- Conduct routine observations to ensure proper usage of securement devices.
- Consider encouraging residents with wheelchairs that are difficult to secure transfer to a standard seat.

Commercial property claims could be another focus area of nursing home management's loss prevention efforts. To provide some comparison to other businesses, Table 2 shows a comparison of the CP data in this study to data published in 2015 by The Hartford about the frequency and severity of small business CP and GL claims.²⁶ Due to the regionalized nature of the nursing homes in this study, it is expected to see a higher percentage of water/freezing related claims compared to the national data of The Hartford.

Table 2. Comparison of Study Data Against Insurance Industry Data

Common Claims	Study Data % of claims, median loss (interquartile range)	The Hartford % of claims, average loss
Loss/Theft of personal property	29%, \$1,500 (\$1,650)	20%, \$8,000
Water/Freezing	26%, \$6,310 (\$13,600)	15%, \$17,000
Wind/Hail	19%, \$13,800 (\$55,300)	15%, \$26,000
Fire	5%, \$19,800 (\$68,100)	10%, \$35,000

While the losses associated with loss/theft of personal property were significantly less than the losses of the other CP claims, the frequency of the lost dentures and hearing aids, and the difficulty it creates for residents, combined with the responsibility of nursing home personnel to “exercise reasonable care for the protection of the resident’s property from loss or theft” creates a unique obligation in terms of the loss of personal property.²⁷ Organizations should have a clear process for staff to follow when assisting residents with dentures and hearing aids. This may include providing a designated storage container and area for hearing

aid and dentures to be placed when they are not in use. Management must ensure staff and residents utilize the container/area when items are not being worn and routinely have. Training should be provided to have cleaning staff check the location of each resident's dentures and hearing aids before removing linens and waste from the room. If the dentures/hearing aids are not on the resident, or in their designated storage location, then re-check the linens and waste can before removal. Routinely throughout the day, staff should check to verify that residents are using their hearing aids and dentures.

Specific to behind-the-ear hearing aids, there are covers in bright colors to aid in visual detection, or straps and clips to keep them on the person should they fall out of the ears. In addition, some hearing aid manufacturers may warrant hearing aid loss or damage for a limited time after initial purchase, lessening the organization's liability. Recent technological advances allow selected hearing aids that are adjusted via smartphone apps to have a "find my hearing aid" function to aid in locating lost aids. For dentures, to aid in identifying to whom misplaced dentures belong, have the dentures marked with the resident's name, as required under law of multiple states.

As shown in the results, the other types of CP claims, all of which were significantly more expensive than the loss/theft claims, come from a variety of causes, including weather, mechanical failure, and human events. While organizations are at the mercy of the weather, there are steps they can take to mitigate insurance claims from exposures. To prevent water/freezing associated claims organizations need to:

- Ensure adequate indoor temperatures during periods of extremely cold weather.
- Protect pipes that are in areas known to be subject to extreme cold, such as uninsulated spaces.

- Ensure appropriate personnel know how to shut off water and fire sprinkler systems.
- Ensure sink and tub drains are properly functioning, i.e., not “slow,” so they drain faster than faucets can fill them.
- Ensure roofs are properly maintained and inspected.
- Have accumulations of snow/ice removed from roofs that prevent drainage.

To minimize the impact of wind/hail organizations should:

- Secure loose items outside that can become projectiles in high winds (chairs, benches).
- Keep trees trimmed to prevent them from falling onto/into buildings.
- Have roof inspected for structural, insulation, or drainage issues.

As noted in the results section, there was a statistically significant, but weak correlation between the rate of CP and CL claims. Further studies with a larger sample of nursing homes are warranted to show if this pattern is consistent, as this study suggests that organization’s that have a high frequency of claims on one line of coverage also have more claims on other lines. One explanation is that an organization that does not exercise control in one area of the organization’s performance likely doesn’t exercise control in another. Taking this further, additional study looking at the relationship between commercial insurance claim frequency and quality of care, is reasonable, to see if there is a correlation. Quality of care in the nursing home industry has been found to be correlated with other factors, including: staffing levels/measures, and profit status as examples.²⁸⁻³¹

Conclusion

This is believed to be the first published study of commercial insurance claims in the nursing home industry. While the results should not be surprising to those in the industry,

they should serve as a reminder that these claims should not be viewed as inevitable, but as incidents that can be mitigated through appropriate controls. The controls identified for the selected claims provide a foundation on which organizations can assess their current practices and determine if alternative approaches to reduce loss should be implemented. As with any change, the success of reducing claim frequency and severity is dependent upon the organization's commitment, follow-through, and ability to sustain the control measures.

Limitations

There are several limitations in this study that should be noted. First, the geographic range and number of claims analyzed is limited due to the business operations of the insurance carrier providing the claims data. Thus, the type of claims, their frequency, and cost may not represent the exposure of the entire industry. It is hoped that other insurance companies or industry associations would share their claim data, so a more comprehensive analysis of the industry's claims could be undertaken to aid in identifying areas where the industry should focus their loss prevention efforts. Second, because of data limitations it was not possible to limit the filed claims to just nursing home facilities. The claims reported reflect the incidents across all the properties on the insured's insurance policy. Efforts were taken to limit policies to only those where the insured did operate a nursing home facility and not just assisted living. Third, the rate of claims per 1,000 bed years is an estimation based upon available data of the number of licensed beds at the time of the analysis. The bed count does not take into consideration the actual occupancy of the organizations during the study period or variations in the bed count during the time the organizations were insured. At best, the frequency of claims is an approximation. Because of this, comparisons to the experience of other organizations may differ. The intent was simply to demonstrate a method by which organizations within the industry could compare their experience against each other. Last, the

controls identified for the selected claims are based upon practices in the literature and the primary author's 20 years of experience. As limited research has been completed about exposures specific to the nursing home industry, and given the constant changes in technology, organizations should take steps to remain aware of the controls that are best suited for their circumstances.

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CHAPTER 3. TEXT ANALYSIS OF WORKERS' COMPENSATION CLAIM DESCRIPTIONS IN THE NURSING HOME INDUSTRY: IDENTIFICATION OF INJURY CAUSES

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Abstract

Introduction: The nursing home industry experiences a high rate of workplace injuries and illnesses. Traditional injury classification systems provide limited information to assist employers in identifying specific causes of injury.

Method: A semi-automated analysis process using the free software *R: a language and environment for statistical computing* and the *tm* package was utilized to determine term frequency and identify hierarchical clustering within claims descriptions of workers' compensation claims reported in the nursing home industry. Combined with the total incurred cost for each claim, an analysis of terms and their relationship to claims cost is possible.

Results: Claims from slip/trips/falls and resident handling had the greatest incurred cost. High-frequency terms for the six most frequent causes of injury are presented. Hierarchical clustering revealed affiliation between terms to further guide injury prevention efforts. Statistically significant correlations between term occurrence and claim cost were identified. Claim descriptions containing the terms *resident* and *lift* had a significantly greater median incurred cost (\$1,209) than other resident handling tasks (\$1,043).

Conclusion: Text analysis of workers' compensation claim descriptions identified specific activities/events that employers can address to prevent employee injury.

Practical Applications: The straightforward analysis process can identify high-frequency terms in claim descriptions, that may be related to the specific causes of workplace injuries;

information that is not available through traditional classification systems. With appropriate customization, the analysis could work for any industry with an adequate number of claims.

Keywords: term analysis; term frequency; total incurred cost; injury activities

Introduction

According to the Bureau of Labor Statistics (BLS, 2016, Table 1), private sector nursing care facilities (skilled nursing facilities) experienced an OSHA recordable rate of 6.8 cases per 100 employees in 2015. This is more than twice the rate for all private industry employers of 3.0, and 94% greater than the rate for the construction industry (3.5). Injuries from overexertion and bodily reaction accounted for more than 40% of OSHA recordable incidents involving days away from work, followed by slips/trips/falls (26%) and violence or other injuries by persons (11%) (BLS, 2017).

Identification of the specific activities that are leading to employee injuries is very challenging given the current literature. Within the nursing home industry, published research has often focused on just the injuries associated with nursing, nursing aides or direct care staff (those providing care to residents) because they account for about 70% of the recorded injuries between 1980 and 1988, but only make up between 37% to 42% of the nursing home employment population (Personick, 1990, p. 32; BLS, 2015). This leaves the injury characteristics of about 60% of the nursing home employee population not studied. This population includes dietary, laundry, housekeeping, maintenance and admin employees (CliftonLarsonAllen, 2014, p. 26).

In a study of nursing aides, Hoskins (2006, p. 2) reported that from 1995 – 2004 that 53% of nursing aide injuries were related to overexertion, with most of the injuries resulting from lifting patients. This is much lower than an earlier report indicating that overexertion while caring for residents accounted for 50% of the total OSHA recordable cases in nursing homes

(Personick, 1990, p. 33). Neither study provides details about the specific causes of the overexertion and lifting injuries, hampering the implementation of corrective measures.

Due to the high rate of injuries involving days away from work and restricted work activity (DART), from April 5, 2012 to April 5, 2015 OSHA implemented a National Emphasis Program (NEP) focused on increasing compliance inspections in nursing homes and residential care facilities (OSHA, 2015). OSHA in the NEP indicated that in 2010 the nursing home industry had a DART rate of 5.6, compared to the average rate for all private industry of 1.8. OSHA focused the NEP “primarily on the hazards that are prevalent in nursing ... specifically, ergonomic stressors relating to resident handling; exposure to blood and other potentially infectious materials; exposure to tuberculosis; workplace violence; and slips, trips and falls” (OSHA, 2015, p. 10). OSHA indicated that together, overexertion and slips, trips and falls accounted for 74.6% of all workplace injury cases with days away from work in 2010. OSHA provided no additional clarity of the specific causes of these slips, trips and falls or overexertion cases. This lack of clarity of the activities leading to injury in the industry make it challenging for employers who want to take corrective actions to prevent employee injury, but are unsure of what specific activities are leading to injury.

Using existing occupational injury and illness datasets to determine the cause of injuries is also challenging. A commonly used source of occupational injury data are from the Bureau of Labor Statistics (BLS). BLS injury/illness data are classified in accordance with the Bureau of Labor Statistics Occupational Injury and Illness Classification Manual (BLS, 2012). This manual establishes specific labels for the nature, part of body, source, and event/exposure that lead to the injury. When proper coding is used in the nursing industry the leading nature of injury is *sprain/strain*, with *back* being the most frequent body part affected, with the major

source of injury being *patient*, and *overexertion* being the leading type of *event or exposure* (Personick, 1990). Similarly, in the workers' compensation industry, claims data are traditionally coded in accordance with Part 6 – Coding Values of the *Statistical Plan for Workers Compensation* (NCCI, 2013). A back strain from manually transferring a resident from a bed to wheelchair would be coded as upper/lower back, strain, lifting. Both classification systems make it impractical for nursing home personnel to identify what exposures in the workplace should be the focus of their efforts, as there is no specific event or activity identified to which prevention efforts should be directed.

Narrative text analysis has been utilized in research to augment traditional injury classification data by providing additional detail about the circumstances surrounding the injury (Bondy, Lipscomb, Guarini, & Glazner, 2005; Lincoln et al., 2004; Lombardi et al., 2005; Williamson, Feyer, Stout, Driscoll, & Usher, 2001). Narrative text can provide information about contributing factors that are leading to injury (Lincoln et al., 2004), factors that employers can use to implement changes designed to prevent injury.

Employers trying to control workers' compensation insurance costs need to address the injuries and illnesses that are leading to losses, not just those leading to days away from work, rendering traditional sources of injury data of limited value. Workers' compensation premiums are a function of the employer's size (payroll dollars), the premium rate for the class(es) of business performed by the employer, and the employer's experience modification (MOD) rate. The MOD calculation is a function of the employer's workers' compensation losses compared to the average losses for their industry, with certain constraints (NCCI, 2016). Losses are the payments made to cover medical or indemnity (lost wages and any permanent or partial disability resulting from the injury) expenses. Essentially, the employer can only control their

workers' compensation insurance premiums by reducing the costs associated with their injuries, either through reduction in the frequency of claims occurring or reducing the average costs of their claims.

The objective of this research is to utilize text mining of workers' compensation claim descriptions to identify the frequent activities/events that lead to workers' compensation claims in nursing homes. Comparisons will also be made of the claims' costs to determine if specific activities are associated with higher cost injuries. Nursing home operators can utilize this information to prioritize their limited resources to focus on the specific tasks that are causing the most frequent and expensive workers' compensation claims, instead of just knowing the broad causes, sources, and events/exposures identified in BLS or workers' compensation industry data.

Methodology

This study looked 3,357 workers' compensation claims filed by 113 nursing home providers with more than 200 facilities located primarily in IL, IA and WI. These organizations ranged in size from 22 to 209 licensed beds per facility (Mean = 84). This is slightly smaller than the 108 average licensed beds per facility in the United States as reported for 2015 (National Center, 2015, Table 92). The claims in this study occurred between July 7, 2010 and August 8, 2017, valued as of August 12, 2017, within the convalescent or nursing home industry, as identified as class code 8829 in the *Scopes Manual* (NCCI, 2014). Limiting claims to this class code eliminates claims that may have occurred to employees working in hospitals, assisted living, or home health organizations that also had nursing homes. Claims were included if they incurred medical or indemnity losses above \$1.00. Incurred costs include the total of the paid and reserved amounts that have been spent or are anticipated being needed to cover the overall cost of the claim including medical treatment, lost wages and impairment. 91.0% of the claims were closed at the time of the study, indicating the claim was resolved and no additional money

would be necessary to cover losses. For the open claims, money believed to be necessary to close the claim is designated as reserves. This reserve amount is part of the total incurred cost; however, it is subject to change until the point the claim is closed.

The *cause of injury*, *claim description*, and *total incurred* fields from the workers' compensation claims record were used for the analysis in this study. The cause of injury field categorizes claims on the event or activity that lead to the injury. This includes categories such as fall (from liquid, grease, spills), foreign body in eye, and manual material handling. The carrier who provided the data is unique in that they have cause of injury fields specific to resident handling-related tasks. Either the claims entry staff or the insured select the cause of injury category based upon their knowledge of the injury at the time of claim submission. The claim description field contains a short narrative description of the claim as provided by the insured at the time of reporting.

A multi-step text analysis process was used. First, the claim descriptions for each claim were manually reviewed to verify that the identified cause of injury was suitably classified. When the description clearly indicated that another cause of injury category was appropriate, the category was changed. When the description of injury was unclear, the cause of injury was not changed, giving deference to the individuals who initially coded the claims. Of the original claims, 303 were re-classified, with no category having more than 12% of their ultimate claims re-categorized. Of the initial 24 categories (Mdn = 48.5 claims per category), only two, *thermal burns* and *cut/punctures/scrapes* had more than 20% of their ultimate claims re-categorized. Any individual category with less than 100 claims was placed into an *other* category due to the unlikely nature of these events occurring. The remaining categories with more than 100 claims were:

- *Struck by/against object (SBAO)*: claims from employees striking against or being struck by an object, such as “elevator door closed hitting on the side” or “rock hit employee in eye while mowing.”
- *Body fluid/needle stick (BFN)*: claims related to being stuck by needle or being exposed to body fluids, such as “taking needle off insulin pen and needle poked through cap” or “urine exposure to mouth changing catheter bag.”
- *Manual material handling (MMH)*: claims due to the manual handling of goods or materials, but not residents. Examples include: moving a chair to clean under it, moving furniture, or putting linen in a cart.
- *Struck/bitten by human (SBH)*: claims from being struck or bitten by a human, such as: “bitten by agitated resident” or “punched in jaw while bathing resident.”
- *Slips/trips/falls (STF)*: claims related to an employee slipping, falling or tripping in the workplace. Examples include: “slipped on ice” or “slipped on stairs to basement.” Injuries due to residents falling and causing injury to staff are included in resident handling.
- *Resident handling (RH)*: claims from activities from performing personal care, repositioning, assisting, or transferring residents. Examples include: “repositioning resident in bed,” “lifting resident from bed to chair,” “pulling up resident’s pants,” and “walking resident to bed, residents legs gave out and had to lower to floor.”

The next step was to pre-process the claim descriptions for frequency analysis using the freely available software *R: A language and environment for statistical computing* (R Core Team), with the *tm* package (Feinerer & Hornik, 2015). Pre-processing consisted of converting all claim descriptions to lower case, removing any punctuation marks and numbers, removing English language stop words, and replacing certain occurrences of words. Spelling errors were

not corrected. English stop words such as *as*, *the*, *is*, and *on* are generally removed, as they “... provide very little information about the actual content of the document” (Aggarwal, 2015, p. 431). The replacement of certain words was necessary to ensure that words describing the same concept, such as *toilet* and *commode*, are expressed by a single term. *Patient* and *client* were changed to *resident*. Word patterns such as *wheel chair* were combined to *wheelchair*, so it would be viewed as a single term instead of two separate terms. Additional stop words were then removed such as body parts or directions, and specific words such as *employee* as they add little value to the analysis since all injuries were to employees. The final step of pre-processing was to stem the remaining terms. Stemming consolidates variations of the same word to their root. For example, *transferring*, *transferred*, and *transfers* become *transfer*. While stemming can worsen precision slightly, it assists in producing high-quality results in text mining. (Aggarwal, p. 431).

The final aspect of pre-processing is to create a document term matrix. The document term matrix can be visualized as a spreadsheet with multiple columns. The first column is an identifier for the claim and additional columns represent each of the stem words (terms) in the document. Each row then represents an individual claim, with a “1” in the column(s) where the claim description contained the applicable stem word(s). Before pre-processing there were a mean of 17.6 words (SD = 6.92, Mdn = 17.0) per claim description. After pre-processing the mean number of terms per claim description was 6.92 (SD = 3.10, Mdn = 7.0). There were 2,447 stem words, of which 1,141 occurred only once and 214 words appeared in 10 or more claim descriptions.

Given that little is known about the causes of injuries in the nursing home industry, beyond the broad groupings of traditional classification systems, unsupervised analysis methods

were chosen to cluster the claims based upon relationships between the terms in the claim descriptions. With unsupervised methods, no preconceived concepts regarding the data and their relationships are imposed upon the data, allowing natural relationships to become evident. Supervised analysis processes require the use of training data, and a training model that relies upon existing categorization of the data being analyzed. Such a supervision process "...directs the data mining...in a specific way" (Aggarwal, p. 15), leading to potential bias, as the data are fit to the model, potentially obscuring unique relationships in the data that are not inherent in the model.

The *tm* package (Feinerer) was utilized to conduct *k*-Means and Ward's Hierarchical clustering of the document term matrix. The *k*-Means clustering process works by seeking clusters where "...the between-cluster variation is large compared to the within-cluster variation" (Larose & Larose, 2015, p. 530). It places each claim description in one of the desired number of clusters, forming clusters with the smallest possible variation. Ward's method takes each claim description and attempts to merge the most similar ones into clusters that produce the smallest sum of squares (Shalizi, 2009). Traditionally, hierarchical clustering is illustrated in a dendrogram, which is illustrated in this paper as an inverted tree shaped figure, working from the trunk, to branches and to the leaves. Where the branches represent clusters of related terms, and ultimately if expanded far enough, the leaves are the individual claims. Dendrograms are provided only where they added value in clarifying the results.

Topic modeling using latent Dirichlet allocation (LDA) with Gibbs sampling was completed using the *topicmodels* package (Grün & Hornik, 2011). The intent of an LDA model is to identify the topics within the claim descriptions "... that best describe/explain the words observed in documents" (Buckley, 2016, p. 243). The number of clusters and topics is selected

by the end-user as part of the analysis process. Numerous values for the number of clusters/topics were utilized in the *k*-Means clustering and topic modeling. After more than a dozen attempts with each process, no discernable relationships were identified. Therefore, simple term frequency is the primary method of analysis in this research, with Ward's clustering provided for illustrative purposes. All statistical calculations reported in this paper were made using *SPSS Statistics for Windows*, Version 23.0. Armonk, NY: IBM Corp.; 2015.

Results

Table 1 shows the number of claims and median incurred, with interquartile range for each of the cause of injury categories. Resident handling claims are the most frequent accounting for 39.7% of the total claims, followed by slips/trips/falls (18.1%) and struck/bitten by human (8.1%) claims.

Table 1 *Number of claims and median incurred, with interquartile range by cause of injury category*

Category	<i>n</i>	Median Incurred	Interquartile Range
Struck/by against object	138	\$796	\$1,585
Body fluid/needle stick	184	\$655	\$678
Manual material handling	191	\$875	\$2,557
Struck/bitten by human	273	\$796	\$1,953
Slips/trips/falls	607	\$1,233	\$3,812
Other	632	\$611	\$1,062
Resident handling	1,332	\$1,070	\$2,861
Total	3,357	\$878	\$2,112

A Kruskal-Wallis test was conducted to determine if there were differences in total incurred costs between the cause of injury categories of: struck/by against object ($n = 138$), body fluid/needlestick ($n = 184$), manual material handling ($n = 191$), struck/bitten by human ($n = 273$), slip/trip/fall ($n = 607$), other ($n = 632$), and resident handling ($n = 1,332$). Distributions of

total incurred were similar for all groups, as assessed by visual inspection of boxplots. Median total incurred costs were statistically significantly different between the different claims categories, $\chi^2(6) = 119.225, p < .001$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Table 2 shows the results of the pairwise post hoc analysis for only those categories with statistically significant (adjusted $p < .05$) differences in median total incurred costs. The other pairwise combinations of categories showed no statistically significant differences in median total incurred costs.

Table 2 *Kruskal-Wallis pairwise comparisons of median incurred claims costs by claim category for those category combinations with statistically significant differences (adjusted $p < .05$) in median total incurred costs*

Category 1 - Category 2	Test statistic	Standard error	Standard test statistic	Adjusted significance
Body fluid/needle stick - Resident handling	-411.778	76.228	-5.402	< .001
Body fluid/needle stick - Slip/trip/fall	-532.85	81.566	-6.533	< .001
Other - Struck/bitten by human	-231.93	70.196	-3.304	.020
Other - Manual material handling	266.848	80.029	3.334	.018
Other - Resident Handling	-376.97	46.815	-8.052	< .001
Other - Slip/trip/fall	-498.042	55.082	-9.042	< .001
Struck by/against object - Slip/trip/fall	343.743	91.405	3.761	.004
Struck/bitten by human - Slip/trip/fall	266.112	70.63	3.768	.003

Given the unique nature of the other category, because of the variety of infrequent events, and the significantly lower median claim costs as compared to struck/bitten by human, manual material handling, resident handling, and slip/trip/fall claims, the other category of claims were dropped from further analysis. For reporting simplicity, Table 3 shows the verbs and nouns appearing in at least 10% of the claim descriptions in each category.

The following subsections provide details about the concurrently occurring terms and incurred cost relationship by the six primary cause of injury categories, and hierarchical clustering results as applicable.

Table 3 Verbs and nouns occurring in at least 10% of claim descriptions in each category

Struck by/against Object				Struck/bitten by human			
Verb		Noun		Verb		Noun	
Term	<i>n</i>	Term	<i>n</i>	Term	<i>n</i>	Term	<i>n</i>
hit	68	resident	46	grab	66	resident	265
fall	21	door	33	assist	56	bed	27
		wheelchair	18	combative	36		
		cart	15	hit	35		
		bed	14	twist	32		
		room	14	kick	32		
				bit	31		
Body fluid/needlestick				Slips, trips and falls			
needlestick	60	needle	101	fall	404	floor	146
poke	52	resident	84	slip	247	ice	122
give	35	insulin	67	walk	153	resident	114
stuck	33	blood	30	trip	101	water/wet	91
inject	25	syringe	21	hit	75	room	79
						parking lot	63
Manual material handling				Resident handling			
lift	57	cart	25	assist	413	bed	350
pull	35	bed	21	transfer	356	wheelchair	193
move	32	laundry	21	pull	234		
push	22	bag	19	position	159		
				fall	132		
				turn	132		

Struck by/Against Object (SBAO)

Assisting resident were the most common words occurring concurrently ($n = 8$) in the claim description. No other words appeared concurrently in more than 5% of the claims. A Spearman's rank-order correlation was run to assess the relationship between the common nouns, verbs, concurrently occurring words identified and the total incurred claim cost. There were no statistically significant correlations between the identified terms and the total incurred cost.

The hierarchical clustering dendrogram in Figure 1 shows the clustering of the five most common words in the claim descriptions using Ward's method. The height of the branches in the dendrogram pertains to how similar the branches are to each other. The greater the difference in height, the more dissimilar. *Door/hit* are more unrelated to *resident/wheelchair*, than *fall*, in their occurrence in the SBAO claim descriptions.

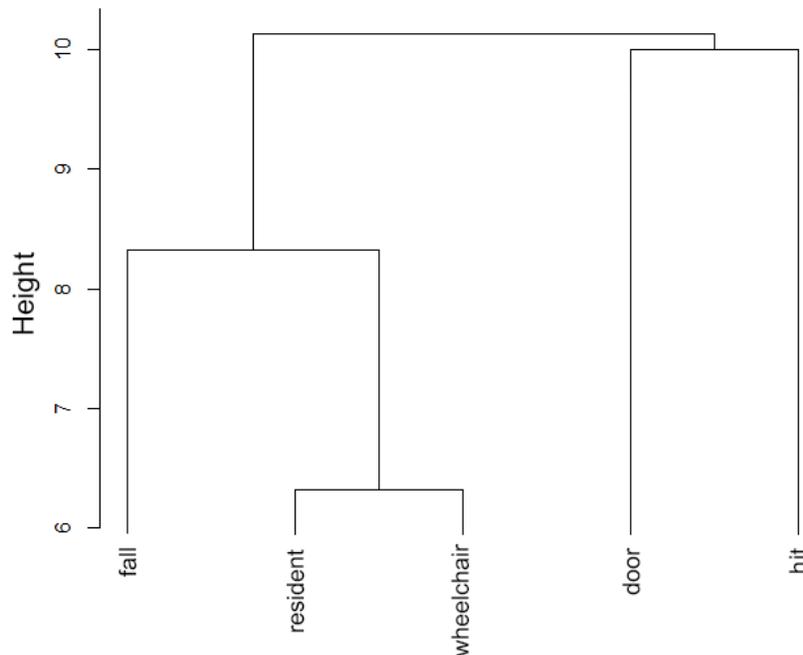


Figure 1 Dendrogram of five most common words in the struck by against object claim descriptions

Body Fluid/Needle Stick (BFN)

The most frequent two-term concurrences were: *give/insulin* ($n = 17$), *inject/insulin* (15), *needle/poke* (15), *recap/needle* (12), *insulin/resident* (11), *insulin/needle* (10), and *blood/sugar* (9). The Spearman's rank-order correlation showed no statistically significant relationships between the occurrence of the frequent terms identified and the total incurred costs.

Manual Material Handling (MMH)

The only two-term concurrence to appear in more than 5% of the claim descriptions was *move/bed* ($n = 11$). A Spearman's rank-order correlation showed no statistically significant correlations between the identified terms and total incurred cost. Figure 2 shows the Ward's Hierarchical clustering of the eight most common terms in the MMH claim descriptions. *Bed/move* are unrelated to *lift* and *pull* based upon their height.

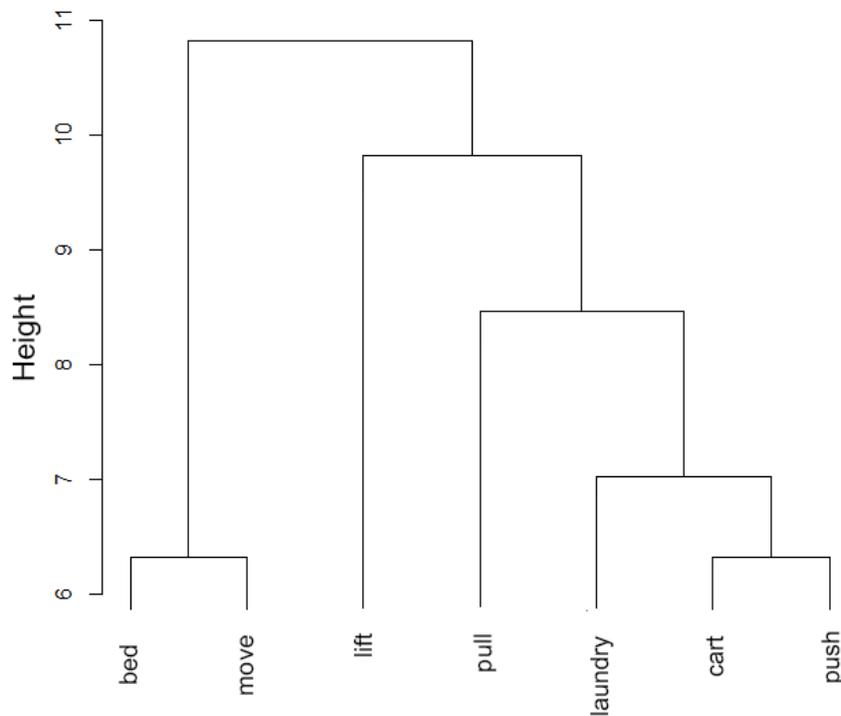


Figure 2 Dendrogram of eight most common words in the manual material handling claim descriptions

Pearson's product-moment correlations were run to assess the relationship between the words identified and other terms in the claim description. *Move* was found to have a positive, moderately strong statistically significant correlation with *bed* $r = .380, p < .001$. Moving of beds accounts for 12 claims. Similarly, *med* correlated with *cart* $r = .442, p < .001$ (4 claims);

bag correlated with *laundry* $r = .442, p < .001$ and *salt* $r = .310, p < .001$ for 10 and 2 claims respectively.

Struck/Bitten by Human (SBH)

The terms appearing concurrently in at least 5% of the claim descriptions were: *assist/resident* ($n = 43$), *resident/grab* (41), *combat/resident* (19), *twist/grab* (16), *resident/combat* (16), and *resident/agitated* (15). The Spearman's rank-order correlation showed a weak to moderate negative correlation between the occurrence of the term *bit* and the total incurred cost $r_s = -.280, p < .001$, while the correlation between *kick* and total incurred cost was weakly positive $r_s = .160, p = .008$. A Mann-Whitney U test showed that the median total incurred costs for claims containing bit (Mdn = \$337) and kick (\$2,200) are statistically significantly different, $U = 829.00, z = 4.578, p < .001$.

Slips/Trips/Falls (STF)

Terms appearing concurrently were: *slip/fall* ($n = 68$), *slip/ice* (42), *wet/floor* (38), *fall/ice* (36), and *slip/wet* (31). Figure 3 shows the Ward's Hierarchical clustering of the eight most common terms in the STF claim descriptions. The occurrence of fall was generally unrelated to *resident/room* and *ice/walk* based upon branch height. A Spearman's rank-order correlation showed no statistically significant relationships between the occurrence of the individual or concurrent terms and the total incurred costs.

Resident Handling (RH)

Frequent concurrent terms in at least 5% of the claim descriptions were: *assist/resident* ($n = 282$), *transfer/resident* (239), *resident/bed* (235), *lift/resident* (135), *position/resident* (107), *turn/resident* (82), *resident/transfer* (79), *resident/fall* (70), and *resident/wheelchair* (70). Spearman's rank-order correlation showed a very weak, statistically significant positive correlation between the occurrence of *pull* and total incurred costs $r_s = .006, p = .017$; and a

weak, statistically significant positive correlation between lift/resident and total incurred costs, $r_s = .055$, $p = .045$.

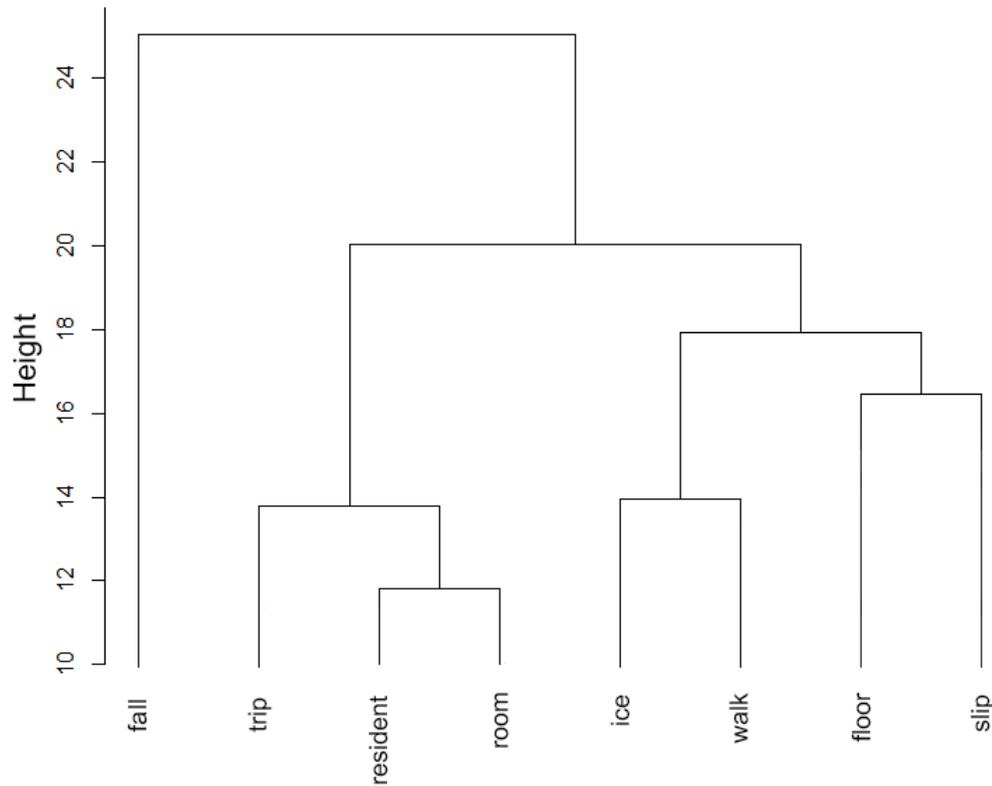
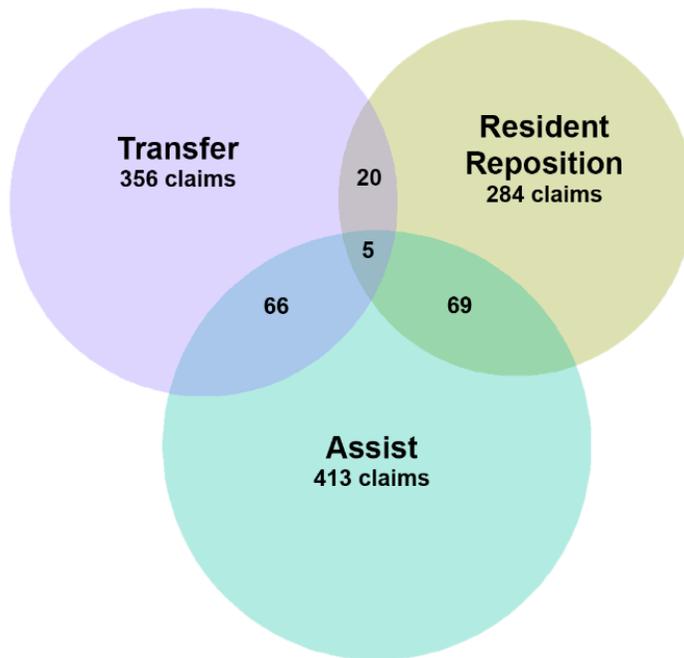


Figure 3 Dendrogram of eight most common words in the slip/trip/fall claim descriptions

The terms *turning*, *boosting*, *position*, and *reposition* in claim descriptions are typically associated with moving a resident within the bed for comfort and to maintain skin integrity (Fragala & Fragala, 2014). For analysis purposes, these terms were combined into a *resident repositioning* term group. The terms assist, transfer and resident reposition occurred in 79.1% of all RH claims. Figure 4 shows a Venn diagram of the occurrence of assist, transfer and resident repositioning in the claim descriptions.



Venn Diagram created in part through use of *venneuler* (Wilkinson, 2011).

Figure 4 Venn Diagram of claim descriptions containing assist, transfer and resident reposition

Table 4 shows the Jaccard Coefficient (Niwattanakul, Singthongchai, Naenudorn, & Wanapu, 2013) for the occurrence of the transfer, resident reposition, and assist terms in the RH claim descriptions. From the values, the largest Jaccard Coefficient is .110, corresponding to only 11% similarity between any two of the terms, with assist and resident repositioning having the most similarity. A Kruskal-Wallis test showed no significant differences in the total incurred costs between the occurrence of resident repositioning, assist and transfer or their various combinations, $\chi^2(7) = 1.430, p = .964$.

Using Pearson's product-moment correlation to look for relationships between the term fall and other terms, some unique correlations arise. Here are the terms correlating with fall, all having a $p < .001$: prevent $r = .371$, caught = .134, reach = .130, and grab = .118.

Table 4 Jaccard Coefficients for the presence of assist, transfer and resident repositioning in claim descriptions

Jaccard Similarity Measure			
	Assist	Transfer	Resident repositioning
Assist	1.000	0.102	0.110
Transfer	0.102	1.000	0.041
Resident repositioning	0.110	0.041	1.000

When evaluating term correlations in the RH claim descriptions, it is not surprising to find the most frequent term, resident, being associated with the other common terms. Assist and resident occurred alongside each other in 394 claims, transfer/resident ($n = 335$), lift/resident (218), and wheelchair/resident (180). A Mann-Whitney U test showed that the median total incurred costs for claims containing resident and lift (\$1,209) compared to claim descriptions without the terms (\$1,043) were statistically significantly different, $U = 131,812.00$, $z = 2.000$, $p = .046$. There was no statistically significant difference in the median costs of claims with the occurrence of the term lift by itself, against claims without the term lift, $U = 120,544.00$, $z = -1.869$, $p = .062$.

Discussion

Nursing Home Industry Impact

Based upon categorical analysis, activities/events that lead to resident handling (RH), slip/trip/fall (STF), and manual material handling (MMH) claims represent 63% of the total reported claims, and are the most expensive claims occurring to nursing home employees, with no significant differences in median incurred cost. The 39.7% of total claims resulting from resident handling in this study is consistent with the 25% to 50% patient/resident overexertion claims anticipated from calculations based on the research of Hoskins, Personick, and BLS

(2015). Given the high frequency and relatively high incurred cost, RH claims should be an emphasis of injury reduction measures by nursing home industry personnel.

Resident Handling

Term frequency analysis of the RH claims, with the small Jaccard Coefficient between the terms: assist, transfer, and resident repositioning, in the RH claims, should be the focus of additional study. These terms either represent discrete tasks that are each leading to a sizable and similar number of workers' compensation claims, or it is possible that the use of the terms in claim descriptions does not represent distinct activities, but simply semantic nuances in the claim descriptions. Being distinct activities would support research about high-risk patient handling tasks that indicate transfer tasks, while common, are not the only cause of staff injury (Nelson, Lloyd, Menzel, & Gross, 2003; Owen & Garg, 1989). Those identified tasks beyond transfers include repositioning residents in bed/chairs, bathing residents in bed, dressing residents, and applying anti-embolism stockings.

Assist, being the most frequent term, occurring in 31.0% of RH claim descriptions, and having no significant difference in total incurred costs compared to transfer or resident repositioning claims should be a focus of prevention efforts. Based on the claim descriptions, claims containing the term assist typically involve assisting a resident from sitting to standing, or assisting with dressing and personal cares, again supporting the research of Nelson et al. (2003) and Owen and Garg. These activities can be aided using mechanical lifts, but often require alternative controls to reduce the potential for injury. Hignett (2003) offers suggestions such as slide sheets/friction reducing devices, turning discs, grab handles, and standing-aids to reduce the occurrence of these injuries.

Special emphasis regarding the occurrence of lift and resident in claims descriptions is necessary given their higher incurred cost compared to other resident handling claims. For too

long employers have relied upon body mechanics training, expecting employees to be able to safely lift and transfer residents through body positioning, as the first approach to reduce resident handling injuries. There is simply no safe means for an employee to safely and routinely lift/hold the forces required for most transfer, assist or positioning tasks, as the forces exerted on the body "... are beyond reasonable limits and capabilities..." (Nelson, Fragala & Menzel, 2006, p. 20). Waters (2007), in a modification of the Revised NIOSH Lifting Equation (Waters, Putz-Anderson, & Garg, 1994), recommends that staff should lift no more than 35 pounds when performing patient handling tasks. Employers should work to eliminate the manual lifting of all residents by using mechanical lifts, and ensure that if employees are lifting during resident handling tasks, that they are not lifting more than 35 pounds. Often overlooked are the forces required to lift and hold a resident's leg when performing personal cares. Tözeren (2000, p. 302) indicates the thigh, shank, and feet of a person accounts for 15.0% of a person's body weight. If the resident is a 60-year-old male, and his weight is at the 90th percentile, his weight is approximately 255 lbs. (CDC, August 2016, p. 10), with a calculated leg weight of 38 lbs. Caregivers holding just half the weight of both legs during personal care are exceeding the 35 lbs. recommendation and should be provided with mechanical assistance.

Additional analysis of the impact of residents falling during RH tasks should be conducted, as fall was the fourth most frequent verb and resident/fall was the eighth most frequent concurrent term combination. Given the relationship between the terms fall, prevent, caught, reach, and grab, there may be a large number of staff injured when trying to prevent, catch, or grab residents who are falling or are beginning to fall. An understanding of when these events are occurring is necessary to ensure appropriate corrective measures are implemented. If residents are falling during ambulation, organizations can evaluate the use of mechanical

ambulation aides. Residents falling during transfers may indicate that the resident's physical ability to participate in the transfer process is not adequate for the transfer method selected, such as a gait-belt transfer, and a mechanical transfer aid such as a sit-to-stand or total body lift is necessary. To aid in determining the appropriate transfer method, the Banner Mobility Assessment Tool has been validated for assessing a resident's mobility bedside, before the risk of falling during transfer or ambulation occurs (Boynton, Kelly, Perez, Miller, An, & Trudgen, 2014).

Slips/Trips/Falls

Claims related to STFs were the second most frequent (18.1% of all claims), with the highest, although not statistically different median costs, when compared to RH and MMH claims. The text analysis, including the dendrogram in Figure 3, show that falls are multifaceted, with uncategorized falls occurring most frequently. For those specific categories identified, employers need to focus their attention on controlling ice, such as on parking lots and sidewalks during winter months and ensuring that spills of liquids are prevented and cleaned-up promptly. In addition, trips occurring in resident rooms, from call, electrical bed power, and light cords, as based upon claim descriptions, can be identified through routine inspections and corrected. The CDC (Bell, Collins, Dalsey, & Sublet, 2010) published *Slip, Trip and Fall Prevention for Healthcare Workers*. That document provides additional guidance about the causes of slips, trips and falls and their prevention strategies; going beyond the causes identified in this text analysis.

Struck/Bitten by Human

Term frequency data would indicate that residents are involved in more than 97% of the struck/bitten by human claims. While the mean incurred costs are different between claims involving bites compared to kicks, the analysis delivers no assistance in determining the cause of these incidents to assist nursing home personnel in addressing these claims. Due to the nature of

the care provided in nursing homes, residents and their personal factors, and the environment, this is a challenging issue to address and conclusions about combative behavior intervention effectiveness have generally been inadequate (Jutkowitz et al., 2016). While there is a significant difference in the median claim costs between claims with the terms bit and kick, this is likely not useful in identifying corrective measures. Whether a resident kicks or bites a staff member is more likely related to convenience and proximity, instead of a difference in the reason for the aggression requiring separate interventions.

Manual Material Handling

Traditionally, using the BLS classification manual, incidents involving the handling of residents are counted as manual material handling (MMH) claims, leading it to commonly be the largest category of claims occurring in nursing home employees (Personick, 1990). However, by separating the RH claims into their own category, MMH drops to the fourth most frequent source of claims, accounting for 5.7% of the reported claims. Using the dendrogram in Figure 2 you can identify multiple clusters of common words in the claim descriptions. An employer wanting to work on the four primary causes of MMH claims, as determined by terms occurring in claims descriptions, could identify those causes by horizontally cutting the dendrogram at height eight on the y-axis, producing categories of claims including: bed/move, lift, pull, and laundry/cart/push. Nursing home employers would then want to address lifting, pulling, and bed moving tasks, as well as tasks involving laundry and pushing carts. With any lifting and lowering task, employers should evaluate the forces required for the task and determine if they are acceptable to be performed without the use of mechanical aids. The Revised NIOSH Lifting Equation (Waters et al., 1994) recommends that no more than 51 pounds be lifted under ideal conditions. This ideal condition is typically not present, lowering the recommended weight limit. Maximum acceptable weights for pushing, pulling and carrying can be compared to Snook

and Ciriello's (1991) tables. One limitation with these studies is that they were based upon populations of industrial employees which may differ from the staff in nursing homes.

Body Fluid/Needlestick

Body fluid/needlestick (BFN) related injuries accounted for 5.4% of the total claims occurring in the nursing home population studied. Kiss, De Meester and Braeckman (2008) observed that insulin pens were involved in 40.4% of needlestick injuries in the nursing home employees studied. While it is impossible from the term analysis in this study to determine the relationship between insulin pens and exposure, the term insulin occurred in 36.4% of the claims, possibly indicating a similar relationship. In a meta-analysis, Tarigan, Cifuentes, Quinn, and Kriebel (2015) found that a combination of safety-engineered devices and training can substantially reduce the risk of needle stick injuries. "Training is crucial for all practitioners before using insulin pens" (Grissinger, 2011, p. 616). Grissinger also describes problems associated with the use of insulin pens and possible corrective measures. The concurrence of recap/needle (occurring in 6.5% of BNF claims) is concerning as the practice of recapping needles is typically prohibited by OSHA (1991). Nursing home personnel should evaluate their needle use practices to ensure recapping of needles is not necessary, so these incidents can be prevented.

Struck by/Against Object

The terms identified in the struck by/against object (SBAO) claims are generally the result of employees striking against objects when working, such as bumping a hand against a doorknob or backing up a resident in a wheelchair and running the wheelchair into themselves or rolling it over their foot. An employer wanting to address the three primary causes of SBAO claims, as determined by terms occurring in claims descriptions, could identify those causes by horizontally cutting the dendrogram in Figure 1 at height eight on the y-axis, producing

categories of claims that include: fall, resident/wheelchair, and door/hit. To address SBAO claims related to the term fall, based upon claim descriptions, nursing home management should focus efforts on ensuring items cannot fall onto staff from shelves, or be dislodged such as curtains/blinds or materials in storage. In addition, when employees are working below a cover such as an automobile trunk lid, or while reaching into an ice machine, that the cover is secured to prevent it from falling onto an employee's head. Likewise, to address incidents involving the terms door/hit, employers should focus on aiding employees in preventing them from striking their hands against doors/door knobs, getting parts of their bodies caught in closing doors, or being struck by doors opening unexpectedly.

Correlations with Total Incurred Cost

The limited number of statistically significant correlations and differences between claim categories, frequent terms, and total incurred cost is noteworthy. Further research is necessary, but this might indicate that total costs associated with injuries in the workplace are impacted by factors beyond the cause of the injury.

Limitations

One limitation of the study is the narrative claim description. These descriptions are provided by the employer or injured employee and lack consistency in structure or content. Should organizations determine that analysis of claim descriptions is useful for their injury prevention purposes, efforts should be made to develop standardized criteria for what should be included in the claim description. "Prompting the people who fill out injury reports to be more complete in their reporting would seem to be an indisputable improvement" (Bondy et al., p. 379). Such criteria may simply include a clear description of what the employee was doing and the object/substance that caused injury. In addition, the limited number of words in the claim descriptions after pre-processing, combined with the distribution of terms, specifically the high

frequency of common terms and low frequency of unique terms, pose challenges for traditional text mining.

Other limitations of the study include the regionalized nature of the employers reporting the workers' compensation claims. Because these employers were all in the upper mid-west United States, they may not reflect the exposures experienced in other locations. Specifically, STFs and MMH claims related to snow and ice may be over-represented in this population. In addition, the sample size of the study was relatively small. For example, in the study there were 681 claims occurring in 2015, compared to the BLS (2016, Table 2) estimate of 171,900 OSHA recordable claims in the industry. Thus, the study population equated to less than 0.4% of the total number of claims in the industry for 2015. Given a larger sample size, existing and additional terms may become more prevalent, providing further insight into the causes of nursing home injuries.

Conclusion/Practical Applications

Compared to the broad categories of causation present in traditional classification systems, the methodology used in this study identified specific activities/events leading to injury that can benefit the nursing home industry in allowing them to focus their injury reduction efforts. Using *R* and the *tm* package allowed for an automated, straightforward term analysis process, identifying the terms most frequently occurring in claim descriptions. While this study initially classified claims on their cause of injury category, this step may not be necessary when simply seeking the activities that are associated with the greatest number of claims, further simplifying the analysis process.

The analysis process is likely applicable to different industries, with refinement of the pre-processing phase, to ensure word patterns and synonyms specific to the industry are appropriately coded. It would also be useful in identifying the impact of specific

exposures/activities within an industry. For example, in the transportation industry specific terms such as *dollies*, *fifth-wheel*, *tandems*, and *pin-pulling* can be evaluated to determine the relative frequency of injuries associated with these terms and their financial impact.

Narrative analysis of claim descriptions alone does not provide the information necessary to identify all the specific exposures needing to be addressed in the workplace to achieve zero injuries. It does provide detail that is not available in the cause/source of injury, and body part categories that are part of traditional injury classification systems. If additional text were included in the analysis, such as text from incident reports/investigations, witness reports, and near-miss reports, further clarity may be gained about the exposures/activities leading to workplace injury, creating a valuable analysis tool for employers so they may focus their injury prevention efforts.

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CHAPTER 4. FREQUENCY AND COST OF WORKERS' COMPENSATION CLAIMS FROM RESIDENT HANDLING ACTIVITIES IN THE NURSING HOME INDUSTRY

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Abstract

This study provides data about workers' compensation claims resulting from resident handling activities in more than 200 nursing homes in the United States. The data include the number of claims, median claim cost, and claims per 100 full-time employees. Rates of claims and claim costs are analyzed to determine if statistically significant relationships exist. Results of the study show shoulder and knee injuries had significantly higher costs than injuries to the lower back and most other body parts. When mechanical aids are present in transfer related claim descriptions, claim costs are significantly higher. Additionally, knee injuries occur more frequently than anticipated in pushing/pulling mechanical aids tasks, than during other resident handling activities. The results indicate that from a cost perspective, organizations should address the resident handling activities that are leading to the most injuries in their facility, because no specific activity experienced a significantly higher claim cost than other activities. Researchers can also utilize the established categories of resident handling tasks to initiate formal agreement of definitions for tasks to ensure consistency in research and understanding.

Keywords: patient handling, skilled care facility, long-term care, injury rate, employee injury, work-related injury

Introduction

The studies about resident-handling-related employee injuries have provided limited data against which organizations can compare their workers' compensation claims experience.

Collins et al,¹ Garg and Kapellusch,² and Myers et al³ were the only studies located to provide

information about the rates of injuries in nursing home staff based upon full-time equivalent employees. However, these studies combined evaluated only 13 nursing homes, providing a very limited sample size.

Further complicating research into resident handling is that no consistent definitions of resident handling activities (RHA) could be located in the research. Without having clear definitions of the activities that are leading to injury, it is challenging to compare the risk and rate of injury from RHA and identify where corrective measures should be focused.

The intent of this study is to evaluate workers' compensation claims data from a modest sample of nursing homes, against which other organizations can compare their experience. This includes analysis of injury frequency as well as the cost of the claims. Injury frequency allows organizations to compare their claims experience to the study population, while the claim costs permit identification of specific resident handling claims that have the largest financial impact on organizations. With the knowledge of the industry's experience, compared with their own data, organizations can better focus their injury prevention efforts. To accomplish this claim categories and definitions will be established for the common workers' compensation claim descriptions related to RHA. This allows others to understand the activities associated with the categories of injuries analyzed.

Methods

This study originated with 6,911 workers' compensation claims, filed with a regional workers' compensation insurance carrier, by 123 nursing home providers located primarily in IL, IA, NE, and WI. Providers having only standalone nursing homes (NH) represented 56% of the organizations, with the other providers having locations consisting of nursing homes and assisted living (NHAL) facilities. Because of limitations in the data set, claims from the NHAL facilities are included as they could not be separated from their associated NH based upon the data

provided. Validation of this approach is provided in the Results section of this study. The providers represented more than 200 licensed NH, ranging in size from 20 to 202 beds (mean = 75.9). This is smaller than the 99 mean licensed beds per facility in the same states as reported for 2014.⁴ The claims in this study occurred between June 11, 2010 and August 8, 2017, valued as of October 8, 2017. Claims were included if they incurred medical or indemnity losses above \$1.00.

Total incurred costs, hereby known as incurred costs, represent the paid medical, indemnity, and other expenses, such as legal fees, and any reserved amount believed necessary to cover the claim to closure. Medical costs, those costs for medical treatment of the claim, were adjusted to 2017 dollars using the Bureau of Labor Statistics consumer price index for medical care.⁵ Indemnity costs are those costs related to reimbursing the employee for loss of wages and associated disability. Claims with indemnity benefits tend to be more expensive, but this is not entirely related to the severity of the injury. While indemnity benefits are regulated by state statute, employer action plays a role in controlling some of the factors related to an employee receiving indemnity benefits. For example, if an employee receives restrictions of their ability to perform work duties due to a work-related injury, and the employer does not accommodate the employee through light or restricted duty activities, indemnity benefits may be due if the employee is off work long-enough, as determined by individual state statute. Closed claims, indicating the claim was resolved and no additional money is necessary to cover losses, represented 95.5% of the claims.

Data cleaning consisted of reading the narrative claim description of each claim and determining if the claim was related to providing care to residents. When a claim was not related to resident care it was excluded from this study. Also excluded were needle stick claims and

claims where the injury was related to combative behavior, even when the combative behavior may have occurred during a resident care activity. 1,922 claims remained that were associated with handling or assisting residents.

In addition to the compensation claims, the insurance carrier also provided the earned payroll for each provider during the time they were insured. Where an insured's operations also included assisted living facilities, payroll amounts for employees other than direct resident care staff were excluded from calculations. For example, while a driver for an assisted living facility may have injured himself or herself pushing a resident in a wheelchair into a van, the driver's payroll is excluded from calculations as a conservative method to not purposely lower rates of injury per full-time equivalent employee (FTE). The payroll data were converted to full-time equivalents by using the average wage and salary information from the BLS⁶ for private industry nursing and residential care facilities, estimating that a full-time employee works 2,000 hours per year. All statistical calculations reported in this paper were made using *SPSS Statistics for Windows*, Version 23.0. Armonk, NY: IBM Corp.; 2015.

Results

Resident Handling Injury Activity Category Definitions

Because no consistent methodology for classifying resident handling claims could be located in the literature, a multi-step process was undertaken to identify the types of activities indicated in the claim descriptions. Based upon a review of the 1,922 claims, similarities were identified within the activities leading to injury. Box 1 shows the final categories and definitions developed to maximize the specificity of activities within each category. Each claim was then reviewed again and assigned to one of the categories.

Box 1. Resident Handling Claim Category Definitions

Ambulate – act of walking with a resident to provide assistance and/or support.

ADL/Personal Care – act of assisting a resident with activities of daily living, including dressing, applying compression stockings, bathing, or perform other personal care tasks such as shaving, mouth care, hygiene, or grooming. If injury is a result of holding a limb or body positioning during personal care, this should be classified under “limb/body position.”

Limb/Body Position – act of holding or lifting a limb into bed, onto wheelchair, or sit-to-stand footrests, or during personal or wound care.

Push/Pull Aid – act of pushing or pulling a wheelchair, mechanical aid, chair, shower chair, Broda chair, or another device with a resident in it.

Reposition – the act of turning, rolling, boosting, moving, or sitting a resident up in bed or wheelchair for comfort, perform personal care, maintain skin integrity or to perform other duties.

Transfer – the act of moving or assisting a resident in moving from one surface/object to another, such as assisting a resident from their bed to wheelchair, wheelchair to recliner, or lifting a resident from the toilet. These acts may be completed manually or with mechanical assistance.

Lift resident (NOC) – act of lifting a resident when it is not possible to determine if another category is more applicable.

Res Fall (NOC) – the act of a resident falling that is not occurring as part of another category of activity such as ambulation or transfer.

Multi Tasks – when two or more categories of resident related activities are identified.

Other/Unknown – when the act does not fit into another category or it is poorly described, but it is apparent it involved assisting or caring for a resident.

Due to the limited detail in the claim descriptions and the interrelatedness of the activities, classification of claim descriptions can be challenging. To ensure consistent application of the definitions across the claim descriptions, two independent coders were each provided with a different set of 75 randomly selected claims. These individuals then coded the

claims and the results of their coding were compared to that of the researcher using percent of claim categories matching and Cohen's kappa (κ) to measure interrater agreement. Percent agreement between the research and two coders was 90.7% and 93.3%. Cohen's kappa showed moderate to good agreement, as detailed by Landis and Koch,⁷ between the researcher and independent coders, $\kappa = .547$ and $\kappa = .811$, both with $P < .001$. Due to the robust nature of the Cohen's kappa, as it specifically considers the possibility of raters correctly guessing the right category, $\kappa > .500$ and percent agreement $> 85\%$ were considered acceptable for this study.

Comparison Between NH And NHAL Resident Handling Claim Rates

The initial analysis was to determine if the nursing homes with assisted living facilities (NHAL) had the same rate of resident handling claims as standalone nursing homes (NH), as this would impact the rate of claims per 100 FTE reported in the study. A Mann-Whitney U test was conducted to determine if there are differences in the rate of resident handling claims per 100 FTE between NH ($n = 69$) and NHAL ($n = 54$). No statistically significant difference was found in the rate of claims per 100 FTE between NH (median rate = 2.985) and NHAL (3.075), $U = 1,986.000$, $z = .627$, $P = .531$. With no statistically significant difference in the rate of injury, the injuries from NH and NHAL facilities were utilized in this study, as the mix of facilities likely represent the make-up of many long-term care organizations.

Characteristics of Resident Handling Claims

Female employees represent 95.5% of the injured employees, and the mean age of the claimant at time of injury was 35.1 (SD = 13.0); both results are comparable to previous research.^{1, 8} Table 1 shows distribution of resident handling claims by age group of employee at time of injury, with median incurred cost, interquartile range, and the percent of claims which were medical only (meaning the claim had no indemnity benefit payments). A Kruskal-Wallis test showed distributions of incurred costs were statistically significantly different between age

groups, $\chi^2(5) = 43.252$, $P < .001$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Table 2 shows the median incurred cost for each age group and the adjusted P -value for the pairwise comparisons.

Table 1. *Number of Resident Handling Claims by Age Group with Median Incurred Cost, Interquartile Range and Percent of Claims being Medical Only*

Age Group	<i>n</i>	Median Incurred Cost	IRQ	Percent Claims Medical Only
< 20	92	\$1,015	\$1,637	85.9%
20 - 29	731	\$965	\$2,033	85.6%
30 - 37	427	\$1,048	\$2,627	82.7%
40 - 49	286	\$1,608	\$3,673	71.7%
50 - 59	257	\$1,316	\$3,749	74.3%
60 +	95	\$2,031	\$4,142	74.7%
Total	1,888	\$1,117	\$2,577	80.8%

Table 3 shows the distribution of claims by RHA, with median incurred cost, interquartile range (IQR), the percent of claims that were medical only, and the number of claims per 100 FTE. A Kruskal-Wallis test showed distributions of incurred costs were not statistically significantly different between RHA groups, $\chi^2(9) = 12.556$, $P = .184$. A chi-square test of independence was conducted between medical only/indemnity status and RHA. All expected cell frequencies were greater than five. There was no statistically significant association between medical only/indemnity status and activity, $\chi^2(9) = 13.841$, $P = .128$.

Table 2. *Median Incurred Cost by Age Group with Pairwise Comparisons*

Age Group	Age Group for Pairwise Comparison	Median Incurred Cost	Adjusted P value
< 20		\$1,015	
	20 - 29	\$965	1.000
	30 - 39	\$1,048	1.000
	40 - 49	\$1,608	0.186
	50 - 59	\$1,316	0.913
	60 +	\$2,031	0.193
20 - 29		\$965	
	30 - 39	\$1,048	1.000
	40 - 49	\$1,608	< .001
	50 - 59	\$1,316	0.001
	60 +	\$2,031	0.002
30 - 39		\$1,048	
	40 - 49	\$1,608	0.002
	50 - 59	\$1,316	0.073
	60 +	\$2,031	0.024
40 - 49		\$1,608	
	50 - 59	\$1,316	1.000
	60 +	\$2,031	1.000
50 - 59		\$1,316	
	60 +	\$2,031	1.000

Table 3. *Number of Resident Handling Claims by Activity with Median Incurred Cost, Interquartile Range, Percent of Claims being Medical Only, and Claims per 100 Full Time Employees*

Category	<i>n</i>	Median Incurred Cost	IRQ	Percent Claims Medical Only	Claims per 100 FTE
Ambulate	38	\$1,109	\$2,478	86.8%	0.07
Dress/Personal Care	127	\$1,110	\$1,943	81.1%	0.24
Lift Resident (NOC)	54	\$819	\$884	85.2%	0.10
Limb/Body Position	61	\$1,463	\$3,067	78.7%	0.11
Multi Tasks	34	\$1,609	\$5,849	61.8%	0.06
Push/Pull Aid	71	\$1,602	\$5,496	74.6%	0.13
Reposition	388	\$1,213	\$2,729	82.0%	0.72
Res Fall (NOC)	124	\$1,158	\$2,897	77.4%	0.23
Transfer	846	\$1,138	\$2,358	81.2%	1.57
Other	179	\$958	\$2,423	83.8%	0.33
Total	1,922	\$1,152	\$2,873	80.9%	3.57

Table 4 shows the distribution of resident handling claims by body part affected, with the same measures as Table 3. Median incurred costs were statistically significantly different between the body part categories as assessed by a Kruskal-Wallis test, $\chi^2(4) = 29.717, P < .001$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Adjusted *P*-values are presented. The post hoc analysis revealed statistically significant differences in the median incurred costs between shoulder and back (other) ($P = .001$), shoulder and low back ($P = .001$), shoulder and other ($P = .008$), knee(s) and back (other) ($P = .004$), knee(s) and low back ($P = .019$), but not between any other group combinations. A chi-square test of independence was conducted between body part and handling activity. There was a statistically significant association between body part and activity, $\chi^2(36) = 73.590, P < .001$. The association was small,⁹ with Cramer's $V = .098$. The test had nine cells (18%) with a count less than 5, with a minimum expected count of 1.5. Only

two activity/body part combinations had adjusted standardized residuals (ASR) above 3, indicating the number of claims is greater than expected.¹⁰ Those were: Push/Pull Aid and Knees (ASR = 4.0), and Res Fall (NOC) and Other (ASR = 3.7).

Table 4. *Number of Resident Handling Claims by Body Part Injured with Median Incurred Cost, Interquartile Range, Percent of Claims being Medical Only, and Claims per 100 Full Time Employees*

Body Part	<i>n</i>	Median Incurred Cost	IRQ	Percent Claims Medical Only	Claims per 100 FTE
Back (Other)	153	\$915	\$1,543	85.0%	0.28
Knee(s)	85	\$1,764	\$6,950	67.1%	0.16
Low Back	814	\$1,063	\$2,527	81.2%	1.51
Other	543	\$1,008	\$2,391	82.5%	1.01
Shoulder	327	\$1,589	\$5,122	79.2%	0.61

Transfer-related injuries have been well studied. Garg et al.⁸ identified 16 high-risk tasks, of which six were transfer-related. From the claim descriptions in this study, the origin and/or destination could only be determined for 58.3% of the claims. In only 20.7% of the claims were both the origination and destination known. Table 5 shows the distribution of transfer claims based upon origination and destination occurring more than 25 times, including those where the origination and/or destination are unknown. A Kruskal-Wallis test showed no significant difference between the listed transfer types and incurred cost, $\chi^2(8) = 6.980$, $P = .539$.

In 10.9% ($n = 92$) of the transfer claims, the claim description indicated the presence of a mechanical aid (sit-to-stand, ($n = 33$) or total body lift (56)). A Mann-Whitney U test was run to determine if there were differences in incurred costs between transfer claims with and without the mention of the use of a mechanical aid (total body lift or sit-to-stand) as indicated in the claim description. Median incurred costs for claims without mechanical aid (\$1,132) and with aid (\$1,584) were statistically significantly different, $U = 39,483$, $z = 2.169$, $P = .030$. A

subsequent Mann-Whitney U test of just the mechanical aid claims showed no statistically significant difference between the median incurred cost of claims mentioning total body lift (\$1,584) or sit-to-stand (\$1,605), $U = 949.000$, $z = -.472$, $P = .637$.

Table 5. *Number of Transfer Claims by Origination and Destination of Transfer with Median Incurred Cost, Interquartile Range, and Percent of Claims being Medical Only*

Transfer (Origination to Destination)	<i>n</i>	Median Incurred Cost	IRQ	Percent Claims Medical Only
Unknown to Unknown	353	\$1,088	\$2,269	85%
Floor to Unknown	57	\$1,300	\$2,414	79%
Unknown to Bed	48	\$1,419	\$4,389	75%
Bed to Unknown	40	\$1,463	\$3,063	70%
Bed to Wheelchair	39	\$1,272	\$2,157	69%
Unknown to Toilet	29	\$1,003	\$3,492	79%
Unknown to Wheelchair	29	\$1,241	\$2,057	79%
Toilet to Unknown	27	\$691	\$1,519	81%
Chair/Recliner to Unknown	26	\$1,623	\$5,893	81%

Table 6 shows the repositioning activities identified from the claim descriptions, with median incurred cost. A Kruskal-Wallis test showed no significant difference between the repositioning activity and incurred cost, $\chi^2(3) = 0.070$, $P = .995$. In 60.6% ($n = 235$) of the repositioning claim descriptions the location of the repositioning activity could be determined. In “bed” represented 83.4% of the identified repositioning locations, while “chairs” (wheelchairs, chairs/recliners, and shower chairs) accounted for the balance. A Mann-Whitney U test of bed (median incurred = \$1,289) and chairs (\$1,592) as the location of the repositioning activity showed no significant difference in the median incurred cost, $U = 3,880.000$, $z = .150$, $P = .881$.

Table 6. *Number of Repositioning Claims by Type of Activity with Median Incurred Cost, Interquartile Range, and Percent of Claims being Medical Only*

Reposition Activity	<i>n</i>	Median Incurred Cost	IQR	Percent Claims Medical Only
Boost	83	\$1,392	\$2,261	84.3%
Roll/turn	127	\$1,253	\$3,338	84.3%
Sit up	44	\$890	\$3,802	76.1%
Undefined	134	\$1,213	\$2,830	80.6%

Discussion

The inclusion of NHAL-related claims and payroll had no significant impact on the rate of resident handling claims per FTE. This is unexpected as residents in assisted living facilities have a higher level of physical ability; thus, there should be fewer resident handling claims. However, the fewer claims may be negated by lower staffing levels. Additional study should be completed regarding this topic, as a literature review identified no studies regarding the rates of resident handling injuries in the assisted living industry.

It is understood that RHA place employees at risk of injury. Interestingly there was no significant difference in the incurred cost of claims by type of RHA. One may conclude that given the variety of the tasks, there should be some difference in the severity, as determined by claim cost. Since injuries to the low back dominate all RHA injury claims, this likely stabilizes the distribution of incurred costs. Employers wanting to make the largest impact on injury frequency and costs should simply focus prevention efforts on the injuries that are occurring most frequently in their facility, as there is no difference in the incurred costs of injuries from RHA. Small organizations, who do not experience an adequate number of injuries to determine a trend, should ensure resident transfers are performed in a manner that exposes employees to the lowest amount of musculoskeletal stress, as transfer related injuries are the largest source of

injuries across the sample of nursing homes. Traditionally the physical demands of transfers are reduced using mechanical aids. When selecting a mechanical aid to assist in transferring, repositioning, dressing, providing personal care, or preventing resident falls, management must ensure the aid does not require excessively high forces from the shoulders and knees, otherwise injuries to the back may simply shift to become injuries to other body parts.

Historically the focus of research about resident handling has been "... on the low-back region,"^{11 (p. 768)} and this study supports the conclusion that the low back is the body part with the highest frequency of injury. From a cost perspective, claims involving the shoulder and knee are significantly more expensive than claims involving the low back and other body parts and should receive additional attention. It is troubling that the data indicates that claims with the presence of mechanical aids were significantly more expensive than claims without mentioning an aid. While research has shown that mechanical aids reduce the risk of injury^{1, 12} the fewer resulting injuries may be more expensive. Davis and Kotowski^{11 (p. 768)} state that injuries to "... the shoulders and upper extremity may actually increase as the physical demands change from lifting patients to pushing lifting-assist devices and other medical equipment." This study suggests that knee injuries are disproportionately higher in claims involving the use of mechanical aids.

Limitations

The results of the study are subject to a several limitations. The workers' compensation carrier who provided the data for this study activity works with organizations to implement safe resident handling programs. Those interventions may have impacted the frequency and severity of the claims occurring. In addition, claim descriptions reviewed were brief in length and limited in detail, occasionally making it a challenge to determine the category of activity that was engaged in at time of injury. The limited descriptions also made it impossible to identify the

specifics of all incidents, such as transfer originations/destinations and locations of repositioning activities.

Conclusion and Practical Application

This study allows nursing home personnel to compare their resident handling injury performance against a modest sample of NH and NHAL facilities, both from a frequency and cost perspective, using defined classifications of work activity. Beyond permitting comparisons, the research shows no difference in the median cost of injuries from RHA. Employers wanting to make the largest impact on their resident handling claims loss experience should simply focus interventions on those activities leading to the most injuries in their organization, or resident transfers, as they are the most frequent source of resident handling related injury in the industry. Additionally, organizations should evaluate the forces required to move wheelchairs, total-body lifts, sit-to-stands, and other aids with residents in them, as they contribute to more knee injuries than anticipated. These injuries are costlier than the traditional low-back injuries associated with RHA. Researchers may choose to use the RHA defined in this study to initiate dialog throughout the profession regarding the establishment of common definitions for resident handling tasks. The establishment of definitions for RHA ensures consistency in understanding, study, and permits easier comparison across studies and organizations as “the... study of any concept or event requires that the item under investigation be defined...”¹³ (p. 126)

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CHAPTER 5. CONCLUSION

This collection of studies permits nursing home operators to better understand the commercial lines insurance claims that are occurring in their industry, allowing comparisons, and providing direction regarding where they should focus prevention efforts to reduce the frequency and severity of the claims, and subsequently lower their insurance costs.

The first research question was to identify the primary causes of loss in the nursing home industry, outside of workers' compensation and professional liability, and suggest control measures. The study accomplished this by showing that commercial auto claims, commercial property and general liability claims were the most frequently occurring claims in the industry. General liability claims have median claim costs significantly greater than most other types of claims and should be a focus of claim prevention measures. The general liability claims typically arose from resident injuries within the nursing home or the damage of property owned by others. Falls were the leading source of resident injury claims. Control measures were suggested for resident and employee falls, as well as the other sources of claims. This study adds to the knowledge of the industry, as it appears to be the first published research about commercial lines insurance claims in the nursing home industry.

The second study utilized text analysis to identify the events leading to employee injury based upon filed workers' compensation claims. The study successfully demonstrated that the use of a free, semi-automated text mining software package could identify the common activities leading to injury in a moderate sample of nursing home claims. By calculating the term frequency of words in the claim descriptions and using Ward's Hierarchical clustering for visual reference, specific activities related to the claims were identified. These results provide more information than through traditional injury cause categories, allowing for better focus in

implementing injury prevention measures. For example, slips and falls, the second-leading cause of injury, were primarily triggered by employees working on snow/ice or wet surfaces. Manual material handling claims, excluding activities associated with resident transfer, typically resulted from moving beds, handling laundry and pushing carts – all activities which can be assessed for their force requirements to determine if control measures should be implemented to prevent injury. Employee injuries from resident handling were the most common claims filled, accounting for 39.7% of claims. The text analysis of these claims identified three separate terms responsible for more than 79% of the claims. The terms “transfer,” “assist,” and “reposition” all occurred at a high rate, with limited concurrence, and had no significant difference in claim cost. Further research should be conducted to determine if these terms represent truly unique activities. Should they be discrete tasks, then suitable controls should be established to minimize these injuries, compared to the historical emphasis placed on transfer injuries alone.

Employee injuries resulting from resident handling activities are the focus of the third study. The research question was to identify the frequency and cost characteristics of workers' compensation claims related to resident handling. Since no common definitions of resident handling activities could be located in the published research, the initial step of this study focused on establishing definitions for the common resident handling tasks identified in the claims. The use of these definitions as classification categories was then tested with independent coders. The high inter-rater agreement suggests these definitions could be utilized by other researchers as a consistent means to study and communicate about resident handling tasks.

Once definitions of resident handling activities were established the claims were categorized and analyses were completed. The results show when compared to injury activity, there were no significant differences in median cost incurred, or distribution by gender or age of

employee at time of injury. Unexpectedly this indicates that all resident handling related injuries are consistent in severity, as measured by claim cost. Alarming claim descriptions that mention the presence of a mechanical transfer aid (total-body lift or sit-to-stand) are significantly more expensive than claims with no mention of a mechanical aid. While the higher costs of claims involving mechanical aids should not dissuade nursing home operators from purchasing lifts, they should understand that the type of aid and the physical demands the aid places on the care-giver can have unintended consequences. For example, knee injuries from pushing aids were observed at a higher frequency than would be anticipated. Further study should be undertaken to evaluate the relationship between the presence of a mechanical aid and claim cost to determine what leads to these injuries being more expensive.

Ultimately, these studies show that most of the insurance claims occurring within the nursing home industry are preventable. Nursing home operators simply need to take steps to implement prevention measures focused on the activities identified. By implementing successful control measures, nursing home operators will not only reduce the financial impact these claims pose, but also improve their reputation, enhance resident safety and reduce business disruption. All characteristics of a desirable nursing home.

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APPENDIX A. SKEWNESS OF INCURRED CLAIM COST DATA

In the three studies it was determined that non-parametric tests should be utilized when comparing claim costs on a categorical basis. This was primarily due to the number of outliers (values greater than 1.5 x the interquartile range) and the skewness of the data as evaluated by visual analysis and Shapiro-Wilk's test. The tables and figures below demonstrate the lack of normality in the claim cost data in the three studies, validating the use of non-parametric tests.

Analysis of Commercial Insurance Claims in the Nursing Home Industry, with Control Measures

Table 1. Mean Total Incurred Claim Cost by Line of Insurance Coverage, with Standard Deviation, Skewness, Kurtosis and Shapiro-Wilk Measures

Line of Insurance Coverage	Number of Claims	Mean	S _p	Skewness	Skewness standard error	Kurtosis	Kurtosis standard error	Shapiro-Wilk <i>p</i>
Commercial Auto (CA)	363	\$11,773	\$74,734	11.855	0.128	160.581	0.255	< .001
Commercial Boiler and Machinery	30	\$15,913	\$17,588	1.166	0.427	-0.095	0.833	< .001
Commercial Inland Marine	10	\$6,313	\$7,899	1.775	0.687	2.905	1.334	0.005
Commercial Property (CP)	324	\$19,467	\$78,113	13.759	0.135	220.876	0.270	< .001
Employment Practices Liability	13	\$55,668	\$76,963	2.000	0.616	4.106	1.191	0.002
General Liability (GL)	281	\$56,678	\$134,346	4.239	0.145	22.603	0.290	< .001

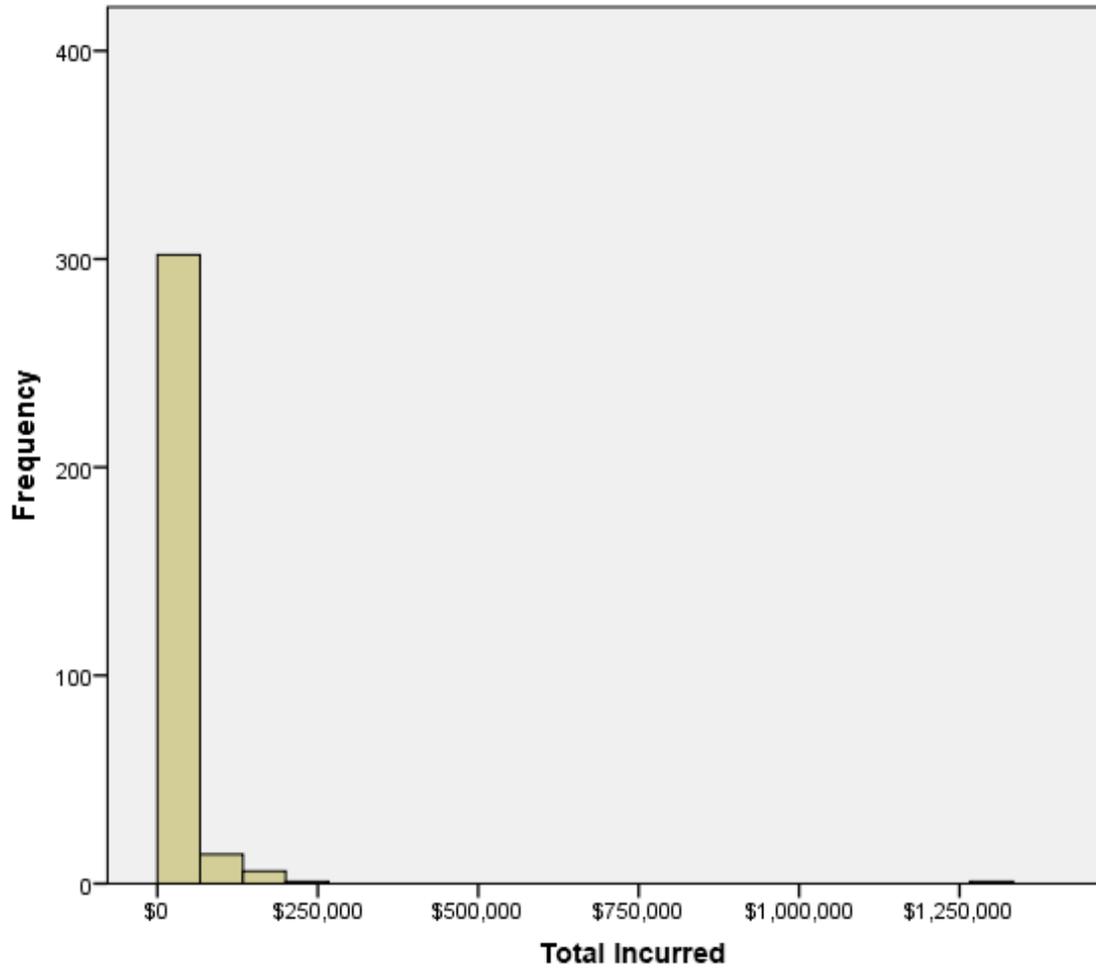


Figure 1. *Histogram of Total Incurred Claim Cost for Commercial Property Claims*

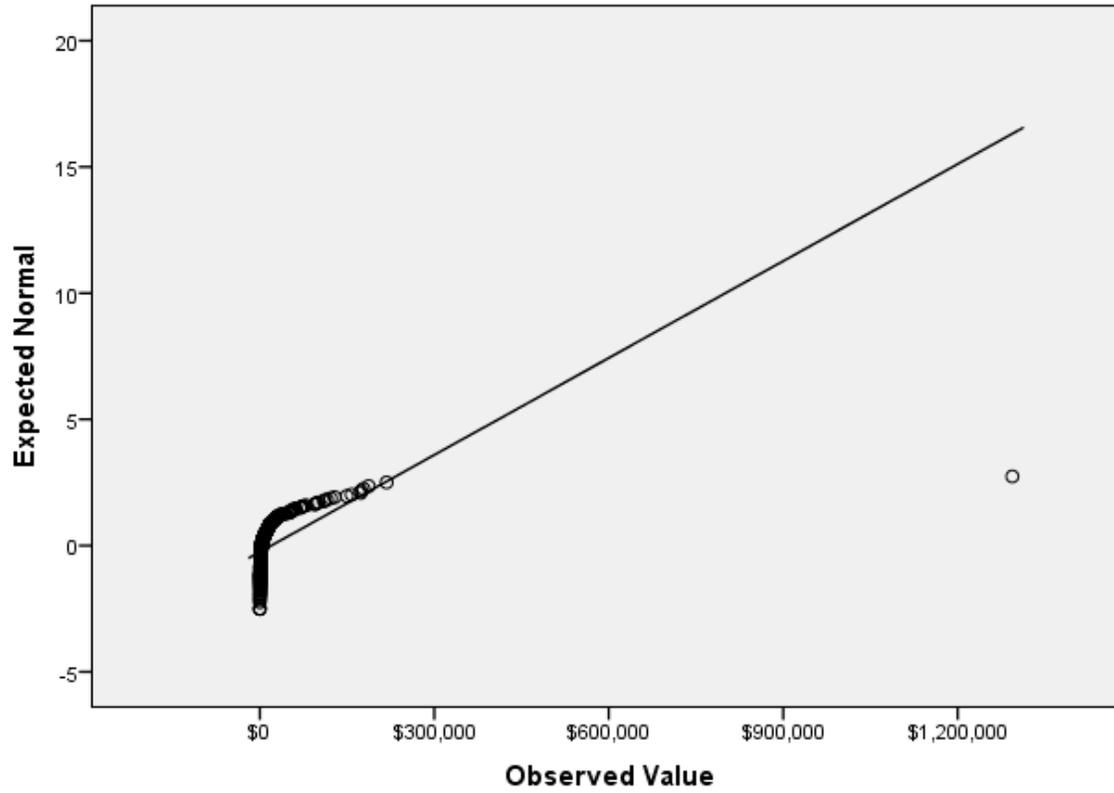


Figure 2. Normal Q-Q plot of Total Incurred Claim Cost of Commercial Property Claims

**Text Analysis of Workers' Compensation Claim Descriptions in the Nursing Home
Industry: Identification of Injury Causes**

Table 2. *Mean Total Incurred Claim Cost by Cause of Injury Category, with Standard Deviation, Skewness, Kurtosis and Shapiro-Wilk Measures*

Category	n	Mean	S_D	Skewness	Skewness standard error	Kurtosis	Kurtosis standard error	Shapiro- Wilk p
Struck/by against object	138	\$1,978	\$4,338	5.734	0.206	39.350	0.410	< .001
Body fluid/needle stick	184	\$900	\$1,560	10.779	0.179	133.685	0.356	< .001
Manual material handling	191	\$4,946	\$12,378	5.177	0.176	34.496	0.350	< .001
Struck/bitten by human	273	\$3,953	\$12,589	6.543	0.147	51.296	0.294	< .001
Slips/trips/falls	607	\$9,106	\$35,089	13.733	0.099	253.519	0.198	< .001
Other	632	\$2,650	\$8,887	7.345	0.097	63.777	0.194	< .001
Resident handling	1,332	\$6,993	\$23,618	7.411	0.067	76.214	0.134	< .001

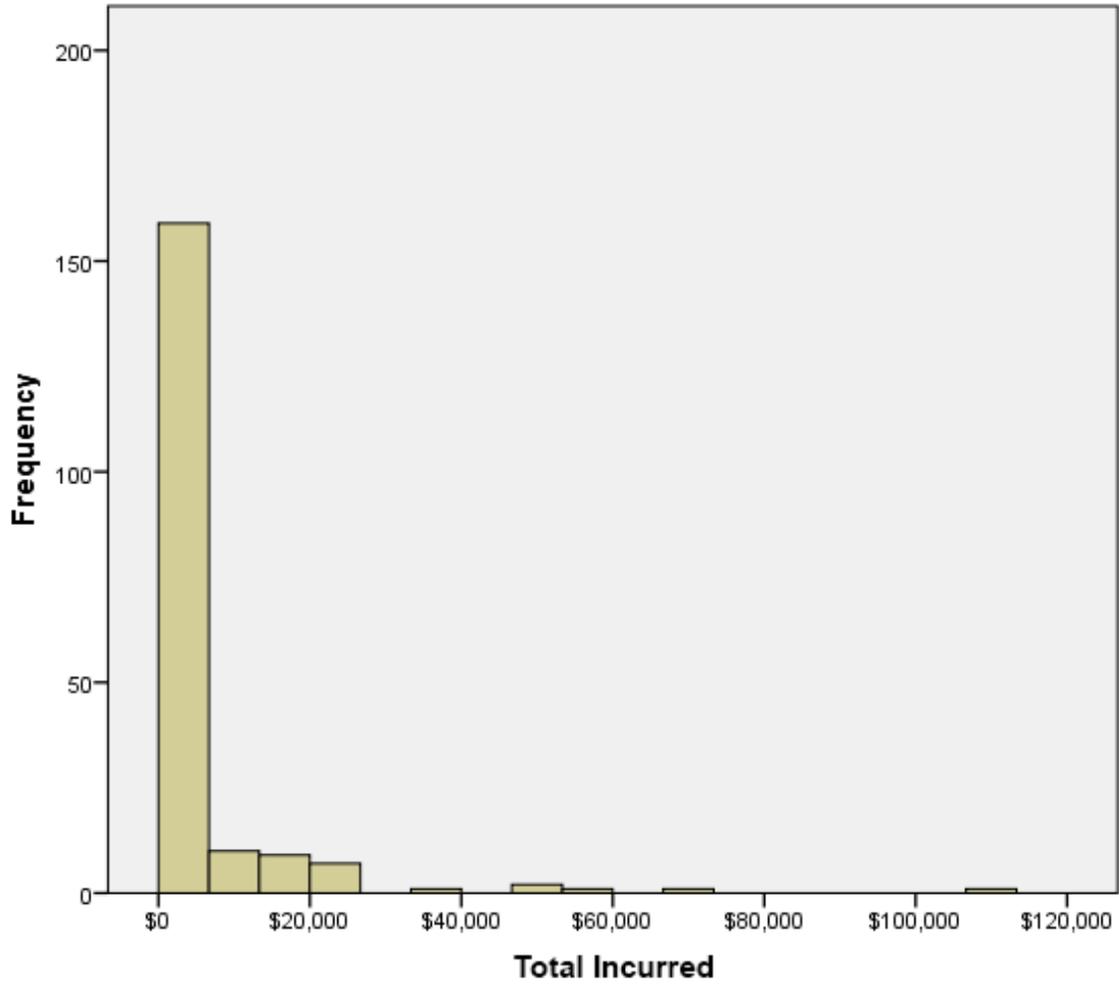


Figure 3. *Histogram of Total Incurred Claim Cost for Manual Material Handling Claims*

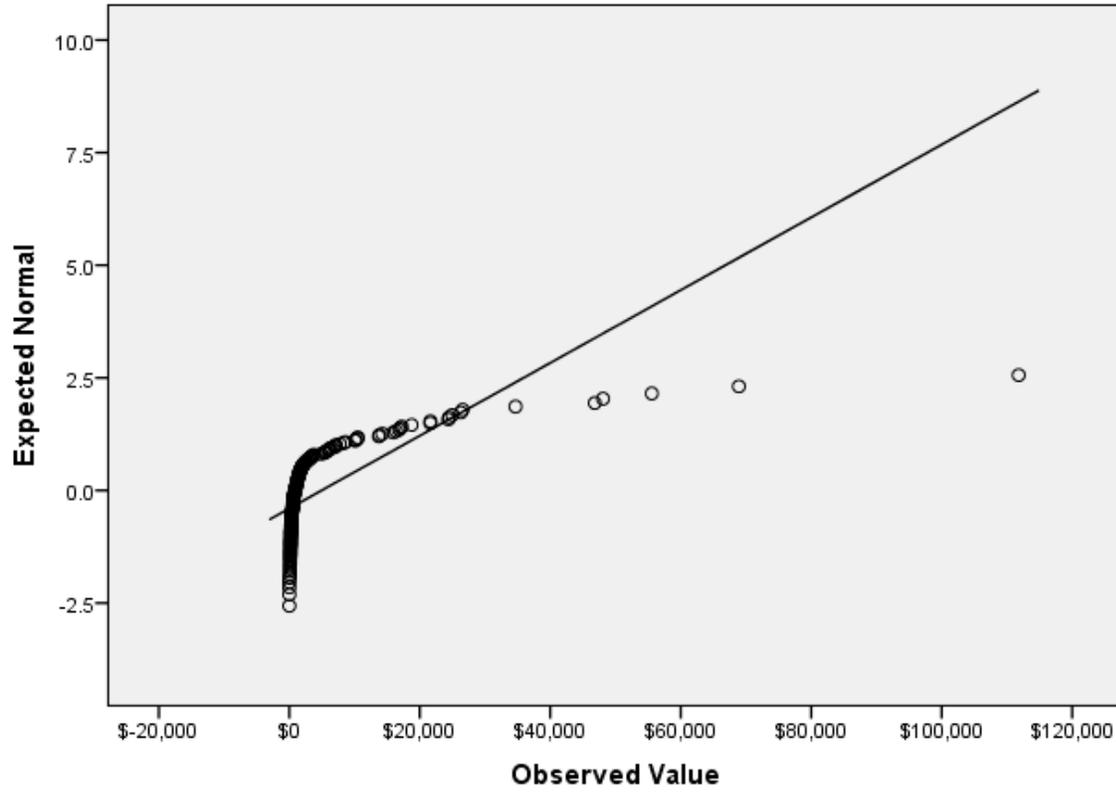


Figure 4. Normal Q-Q plot of Total Incurred Claim Cost of Manual Material Handling Claims

**Frequency and Cost of Workers' Compensation Claims from Resident Handling Activities
in the Nursing Home Industry**

Table 3. *Mean Total Incurred Claim Cost by Resident Handling Activity Category, with Standard Deviation, Skewness, Kurtosis and Shapiro-Wilk Measures*

Category	Number of Claims	Mean	S _D	Skewness	Skewness	Kurtosis	Kurtosis	Shapiro- Wilk <i>p</i>
					standard error		standard error	
Ambulate	38	\$6,969	\$21,654	5.110	0.383	28.096	0.750	< .001
Dress/Personal Care	127	\$3,887	\$9,482	4.749	0.215	25.072	0.427	< .001
Lift Resident (NOC)	54	\$3,660	\$8,946	3.937	0.325	15.821	0.639	< .001
Limb/Body Position	61	\$4,511	\$9,740	4.771	0.306	27.296	0.604	< .001
Multi Tasks	34	\$17,992	\$42,456	3.407	0.403	12.997	0.788	< .001
Push/Pull Aid	71	\$9,239	\$26,028	5.422	0.285	32.740	0.563	< .001
Reposition	388	\$7,662	\$23,722	5.628	0.124	36.692	0.247	< .001
Res Fall (NOC)	124	\$8,065	\$25,930	6.890	0.217	57.016	0.431	< .001
Transfer	846	\$8,337	\$26,879	6.010	0.084	45.479	0.168	< .001
Other	179	\$5,573	\$20,645	9.630	0.182	109.341	0.361	< .001

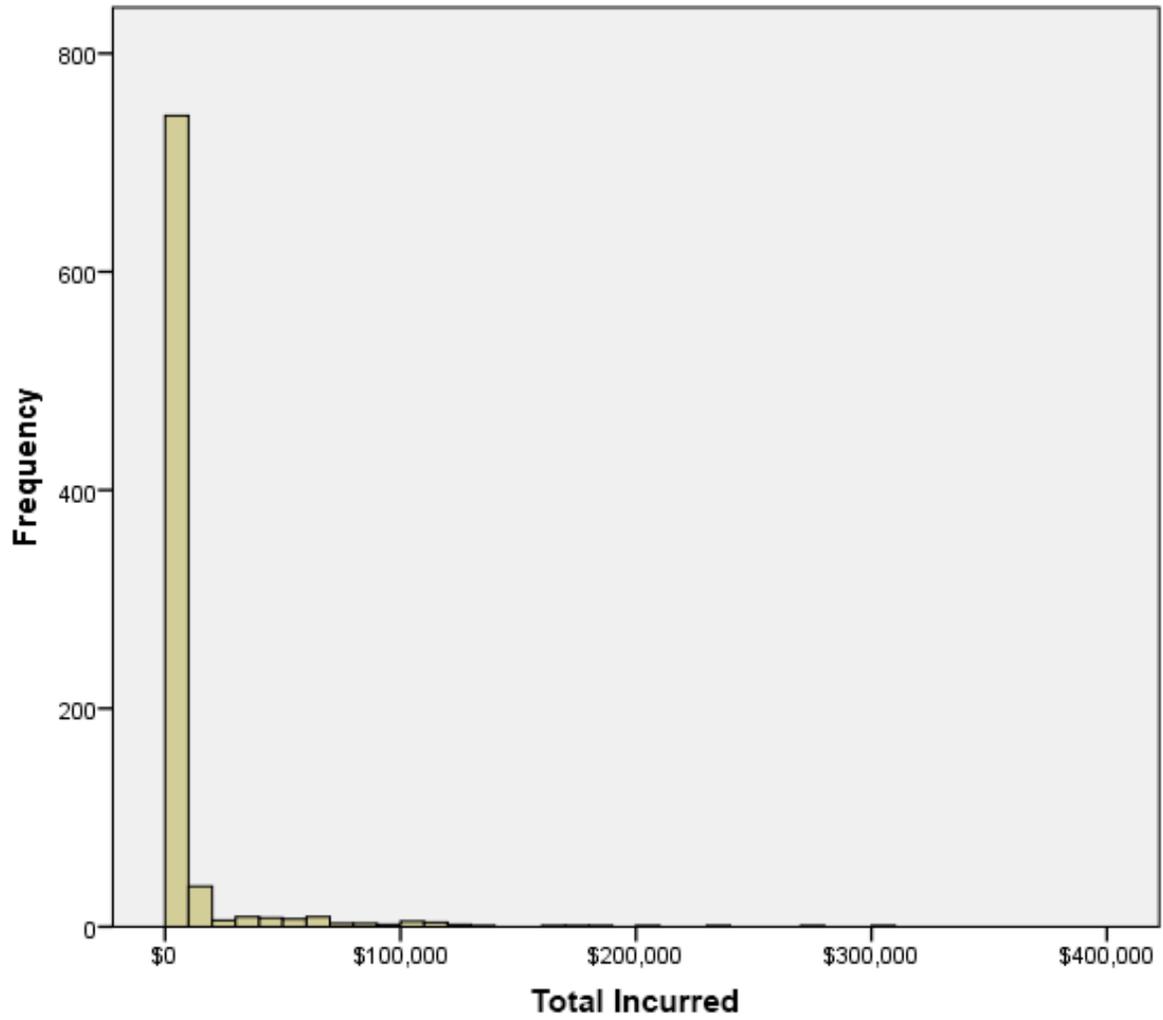


Figure 5. *Histogram of Total Incurred Claim Cost for Transfer Claims*

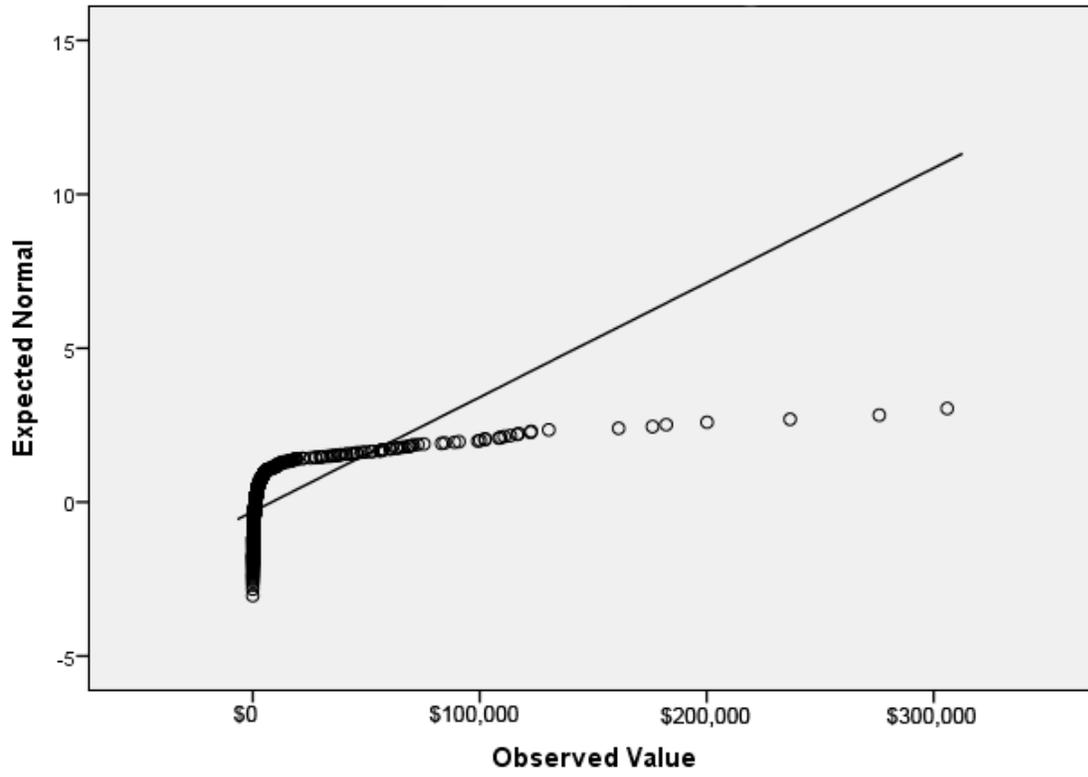


Figure 6. Normal Q-Q plot of Total Incurred Claim Cost of Transfer Claims

APPENDIX B. BACKGROUND INFORMATION: FREQUENCY AND COST OF WORKERS' COMPENSATION CLAIMS FROM RESIDENT HANDLING ACTIVITIES IN THE NURSING HOME INDUSTRY

The rate of employee injuries in nursing care facilities is known to be higher than for many other industries. In 2015 nursing care facilities experienced an OSHA recordable rate of 6.8 cases per 100 employees.⁴² This is more than twice the rate for all private industry employers of 3.0, and 94% greater than the rate for the construction industry of 3.5. It is commonly held that resident handling activities are the primary cause of injuries to employees in the nursing home industry. Aslam et al^{43 (267)} simply states “the majority of health care workers’ musculoskeletal injuries result from repositioning, moving and assisting patients...” Overall, multiple research studies support this position.^{16, 17, 44} Additionally, Jensen et al⁴⁵ looked at 90 studies on back injuries in nursing personnel and found that lifting and transferring tasks were associated with overexertion injuries.

As indicated in this study, there are no consistent definitions of resident handling activities described in research. Consider the task of “repositioning,” typically associated with moving a resident within the bed for comfort and to maintain skin integrity.⁴⁶ The studies below provide a simple overview of the problem:

- Collins et al⁴⁷ – “Repositioning in bed” and “rolling/turning resident” are presented as distinct, undefined categories.
- Garg et al⁴⁸ – Study discusses “repositioning in bed” in terms of patient comfort and perceived exertion by nursing aids, but provides no explanation of what the activity entails.
- Hodder et al⁴⁹ – Study identified “patient adjustment” category, which includes “sling under” and “up in bed,” but no indication if rolling/turning residents is included.

- Marras et al⁴⁴ – Study measures low back spine loading forces while repositioning a patient in bed, but no description of the task beyond the method used “...one-person hook method, manual two-person hook method, manual two-person using draw sheet and manual two-person lifting under thigh and shoulders.”
- Bing Yip⁵⁰ – Study lists “positioning patient on bed” as work activity with no definition.
- Skotte et al⁵¹ – This study differs from others, identifying six separate patient repositioning tasks that occur in bed.

Given the lack of consistency in the use of terms related to resident handling, and no established definitions in the literature, it was determined that it was necessary to identify the types of resident handling activities resulting in employee injuries before any analysis could be undertaken. The study explains the process used to establish and test the definitions for categorization purposes.