May 2014

Trends and Costs of Industry-Related Injuries in the United States [1998 - 2009]

Delphine Fontcha
University of South Florida, dsfontcha@gmail.com

Trends and Costs of Industry-Related Injuries in the United States [1998 – 2009]

by

Delphine Solange Fontcha

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Public Health
Department of Environmental and Occupational Health
College of Public Health
University of South Florida

Major Professor: Hamisu Salihu, MD, PhD
Muktar Aliyu, MD, MPH, DrPH
Eknath Naik, MD, PhD, MSPH

Date of Approval:
March 26, 2014

Keywords: HCUP occupational injuries data, fracture, contusion, burns, poisoning, dislocation

DEDICATION

To Kayla and Rene, my beloved daughter and husband for their extraordinary patience, love, and support throughout my professional development and beyond.

To my parents, Prisca and Paul for being the best parents I could dream for.

ACKNOWLEDGMENTS

This research was conducted within the framework of the University of South Florida's Occupational Medicine Residency program. It was funded and supported by the Sunshine Educational Research Center (SERC) which is largely supported by a training grant from the National Institute for Occupational Safety and Health (NIOSH).

I would like to express my heartfelt gratitude to my research committee members for their support, guidance, and encouragement during this project. A special thank you to Dr. Hamisu Salihu without whom this research might not have happened. Dr. Salihu, thank you for your constant guidance, mentorship and remarkable patience while working on my thesis. My profound gratitude also goes to Jason Salemi and Dr. Mulubrhan Mogos for their support in analyzing research data, and Dr Muktar Aliyu and Dr. Naik Eknath for their valuable inputs regarding this research.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

In order to describe the trend, characteristics, and cost of occupational injuries that occurred in industrial settings across the United States between 1998 and 2009, a cross sectional analysis based on hospital discharge data was conducted. The *National Inpatient Sample* (NIS) data from the *Healthcare and Cost Utilization Project (HCUP)*[1] was used. Identification of relevant injuries from the sample was performed using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9 CM) code E849.3 (industrial place and premises)[8].

A total of 307,586 (weighted) patients with industrial related injuries were discharged from hospitals in the United States during the period 1998-2009. They were largely male (81.8% vs. 16.6% female) and made up of 48.6% Non-Hispanic Whites, 18.2% Hispanic, and 6.2% Non-Hispanic Black. Two-thirds of patients were within the [25-54] years age group, broken down as 20.4%, 24.8% and 22.1% in the 25-34, 35-44, and 45-54 years age group respectively. Persons in the ≥65 age group also represented a sizable proportion at 7.3%.

The patients were mostly admitted from an Emergency Department (61.2%), followed by routine/standard admissions (22.2%). While they were for the most part discharged home (81.7%), 7.2% were released to a home care facility, 7.9% to another type of facility, and 0.7% died during their stay in the hospital. As for the geographical distribution, 38.9% were admitted in the West, 24.6% in the South, 19.5% in the Midwest, and 17% in the Northeast United States. Furthermore, 88.6% were admitted in a hospital in urban settings vs. 11.2% in rural settings.

The common injury sites were lower and upper extremities (52.6%), multiple locations (14.2%), trunk (9.3%), and head (8.9%). Of all admissions, 48.4% involved fractures, followed by open wounds (25.7%), internal crush injuries (19.4%), and superficial contusions (10.1%). "Foreign Body Entering through Orifice" (0.5%) and poisoning (2.3%) scored the lowest, while burns (5.8%), dislocations (3.9%), and crushing (5%) were noted as well.

The mean length of stay was 4.09 days (95% CI 3.92 - 4.22), while the 95th percentile was ≤13 days. When analyzed by injury site, persons with multiple injuries stayed the longest, averaging 6.21 days (95% CI 5.85 - 6.57) while those with injuries at extremities stayed the shortest, 3.53 days (95% CI 3.42 - 3.65). Patients admitted for burns stayed 7.21 days on average (95% CI 6.52 - 7.9) while those with sprain/strain injuries (2.87 days, 95% CI 2.71 - 3.02) and poisoning (2.92 days, 95% CI 2.69 - 3.16) stayed the shortest.

Overall, the mean cost of care (crude 2001-2009) was $10,153 per admission. Viewed from the injury site angle, the "multiple" category was the most costly at $17,518 and "extremity" the lowest ($8,269). Diagnostics of "Foreign Body Entering through Orifice" were the most expensive, costing on average ($17,036), closely followed by "burns" ($16,495), while "poisoning" was the least costly, with a mean cost of $6,077.

Using Joinpoint regression modeling, we found an overall annual percentage rate change (APC) decrease (-1.73%) over the course of the study. While this improvement was noted in most study sub-segments, it was reversed for women (1.53%), government insurance (Medicare/Medicaid) recipients (7.72%), and older workers (9.16%). The results also revealed a high annual percentage rate (APC) decrease for Hispanics (-9.65%) for the period 1998-2004, jumping to (-18.65%) from 2007 to 2009. A similar pattern with two models was noted for the

younger [18-24] age group where the annual percentage rate decreased constantly by (-2.08%) during the period 1998-2007 and drastically jumped to (-18.34%) from 2007 to 2009.

In conclusion, a comprehensive trend analysis of industry-related occupational injuries recorded nationwide within the United States as presented in this study is useful to policy makers in formulating targeted strategies and allocation of resources as needed to address disparities found at various levels. Disparities found in trends observed from a gender angle calls for action to reverse the positive rate recorded for females (1.53%) when compared to males (-2.74%).

Similarly, there is a call for action to address the age demographic disparity for older worker, the "≥65" age group exhibiting an alarming rate of occupational injuries (9.16%), bucking an across-the-board general negative trend.

INTRODUCTION

Occupational injuries and illnesses have been steadily declining over the past decades but remain a major public health and economic concern in the United States and around the world. On average, 3 million occupational injuries and illnesses were reported yearly between 2009 and 2012 in the United States according to the latest U.S. Bureau of Labor Statistics (BLS)[40] data. As illustrated in Figure 1 below, this represents about 50% of all occupational injuries and illness recorded in 1998 (5.9 million), the earliest BLS data available. While these figures and the trends are encouraging, BLS data does suffer from underreporting. It is estimated that the BLS misses between 33% and 69% of all injuries [*Leigh, Marcin, et al. (2004)*].

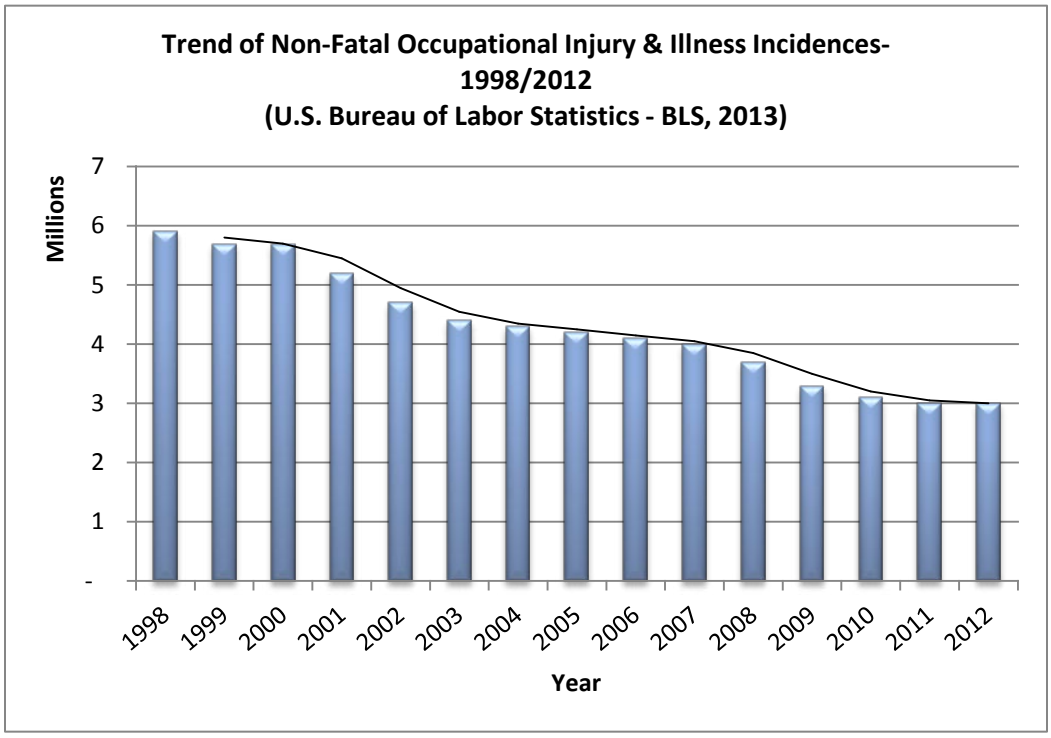

Figure 1 – Trends in U.S. Occupational Injuries and Illnesses

Occupational injuries and illnesses constitute a considerable proportion of the growing medical care cost in the U.S. Yet, and unlike well publicized diseases such as cancer, they remain mostly overlooked. Occupational injuries and illnesses are estimated to cost over $250 billion yearly in both direct and indirect costs [*Leigh (2011)*]. The economic impact of occupational injuries is easily quantifiable in terms of associated healthcare and productivity costs, estimated at over $67 billion and $183 billion yearly, respectively. Meanwhile, non-economic factors such as psychological and physical impairments and suffering caused by many of these injuries and illnesses are much harder to assess financially.

Most studies in the area have been limited to either specific industries, occupations, or geographical locations within the United States [(*Gardner, Landsittel, et al. (1999) ; Kelsh and Sahl (1996) ; McGwin, Enochs, et al. (2000) ; Olorunnishola, Kidd-Taylor, et al. (2010) ; Zwerling, Sprince, et al. (1993)*)], entirely focused on the various cost aspects [*Leigh (2011)*], or constrained to either a single year [*Lander, Shah, et al. (2013)*] or a much shorter trend.

In this paper, we seek to fill in the void left by these studies by providing a descriptive analysis of the trend, characteristics, and cost of occupational injuries that occurred in industrial settings across the United States from 1998 to 2009. Using a cross sectional analysis based on nation-wide hospital discharge data, we studied the trend from various angles, including four distinct U.S. census regions (Northeast, South, Midwest, and West), age, gender, ethnicity, patient admission location (rural vs. urban), income level, and payer. We also analyzed trends based on various injury types such as fractures, dislocations, poisoning, and burns, etc, or by injury site (anatomical position), namely extremities, head, trunk, or multiple body parts.

While prevalence of occupational injuries and illnesses has been on an overall downward trend over the past decade, we do not expect the trend to be homogenous across all studied sub-segments. In today's era of budget cuts and resource scarcity, a comprehensive trend analysis as presented in this study may be useful to policy makers in formulating targeted strategies and allocation of resources as needed and where warranted.

LITERATURE REVIEW

Several authors over the past decades have studied various aspects of occupational injury and illness, addressing subjects such as the cost or economic burden, specific demographics, industries, occupations, or geographical locations. *Lander, Shah, et al. (2013)* conducted a retrospective analysis of U.S. hospital admissions during 2006 using the National Inpatient Sample data. They found the mean total charge per admission was $32,254 (median $18,364, 90th percentile $66,607). Common diagnoses included orthopedic injuries (including amputations) to: finger/hand (20.9%), foot/ankle (8.2%), leg (10.2%) and spine (8.4%); infections (10.8%), pulmonary conditions (6.6%), soft tissue injuries (3.6%) and burns to <10% of the body (3.6%).Comorbidities included hypertension (17.0%) and diabetes mellitus (6.3%). Most common procedures performed included fracture reduction (17.6%), blood transfusions (3.1%) and spinal surgery (3%).

Paul J. Leigh of University of California at Davis has conducted extensive research in the field, authoring numerous noteworthy studies [19-25]. In *Leigh (2011)* , he studied the economic burden of occupational injury and illness in the United States using year 2007 injury, disease, employment, and inflation data from the U.S. Bureau of Labor Statistics (BLS) and the Centers for Disease Control and Prevention (CDC) as well as cost data from the National Council on Compensation Insurance and the Healthcare Cost and Utilization Project (HCUP). He estimated the number of fatal and nonfatal injuries in 2007 at over 5,600 and 8,559,000, respectively, at a cost of $6 billion and $186 billion. Using U.S. nationwide workers' compensation records from

1993, *Leigh, Waehrer, et al. (2006)* conducted an incidence study, analyzing cost differences for demographic groups and across occupational injuries and illnesses. According to this study, the youngest (age ≤17) and oldest (age ≥65) workers had exceptionally high fatality costs, costs for men of non-fatal and fatal incidents were nearly double and 10 times respectively those for women. *Leigh, McCurdy, et al. (2001)* in a study addressing the costs of occupational injuries in agriculture estimated a cost of $4.57 billion (range $3.14 billion to $13.99 billion) in 1992. *Leigh and Marcin (2012)* examined the relationship between Workers' compensation benefits and the shifting cost of occupational injuries. Total benefits in 2007 were estimated to be $51.7 billion, with $29.8 billion for medical benefits and $21.9 billion for indemnity benefits. For medical costs not covered by workers' compensation, other (non-workers' compensation) insurance covered $14.22 billion, Medicare covered $7.16 billion, and Medicaid covered $5.47 billion.

Several studies have focused on gender disparities and came to the general consensus that women are at a higher risk of workplace injuries than men [15; 38; 44]. In analyzing a cohort of 2,337 new postal workers in Boston, MA, hired between 1986 and 1989, *Zwerling, Sprince, et al. (1993)* found that, compared with men, women had an increased relative risk for occupational injuries in each of the three largest job classifications: letter carrier, letter-sorting machine clerk, and mail handler. They did not find the relative risks to be constant over time. Women in letter carrier and letter-sorting machine occupations had increased risks only during the first year of employment [relative risk (RR) = 1.93, 95% confidence interval (CI) 1.40–2.67 and RR = 2.60, 95% CI 1.31–5.15, respectively], while those in mail handler occupations had increased risks only after the first year of employment (RR = 2.13,95% CI 1.09–4.15). In *Kelsh and Sahl (1996)* the authors studied injury trends by injury type, severity, and how the injury occurred among a cohort of 9,582 female and 26,898 male electric utility workers employed during 1980–1992 by

the Southern California Edison Company. They found that gender-specific unadjusted injury rates were higher throughout the period for men. However, when adjusted for occupation, job experience, and age, elevated rate ratios indicated that female workers had higher injury rates. Furthermore, Mantel-Haenszel summary rate ratios and 95% confidence intervals were 1.49 (1.43–1.54) for all types of injuries, 1.27 (1.16–1.39) for head and neck injuries, 1.48 (1.38–1.58) for upper extremity injuries, 1.11 (1.01–1.21) for back injuries, and 2.11 (1.97–2.25) for lower extremity injuries. Similar findings showing elevated risk for women came out of a study by *Taiwo, Cantley, et al. (2009)* where they analyzed human resources and incident surveillance data from six U.S. aluminum smelters for injuries that occurred during the period 1996-2005. They concluded that women in heavy manufacturing industries such as aluminum smelters had a greater risk for sustaining all forms of injury after adjustment for age, tenure, and standardized job category [OR = 1.365, 95% CI (1.290, 1.445)]. This excess risk for female workers persisted when injuries were dichotomized into acute injuries (OR = 1.2) and musculoskeletal disorder-related injuries (OR = 1.1).

Focused racial and ethnic disparities in workplace injury and illness have been widely studied [28; 33; 42]. In a cohort study evaluating and comparing risk factors for agriculture-related injuries between African-American and Caucasian farmers, and African-American farm workers from Alabama and Mississippi during 1994-1996, *McGwin, Enochs, et al. (2000)* found that injury rates were 2.9 times (95% confidence interval (CI): 2.0, 4.3) higher for African-American farm workers compared with Caucasian and African-American owners. Furthermore, part-time farming (relative risk (RR) =2.0, 95% CI: 1.3, 2.5), prior agricultural injury (RR=1.5, 95% CI: 1.0, 2.1), and farm machinery in fair/poor condition (RR=1.8, 95% CI: 1.2, 2.7) were also independently associated with injury rates. In a study focused on occupational health of urban

Latino immigrant workers, *Pransky, Moshenberg, et al. (2002)* found that this population group had an increased risk of occupational injuries with adverse outcomes. A more recent study by *Xiang, Shi, et al. (2012)* looked at disparities between U.S.-born workers and their immigrant counterparts from the perspective of medical expenditures related to occupational injuries. While they found that immigrant workers had a statistically significant lower incidence rate of non-fatal occupational injuries than U.S.-born workers, no significant difference in seeking medical treatment and in the mean expenditures per injured worker between the two groups was found. Furthermore, the proportion of total expenditures paid by workers' compensation was smaller (marginally significant) for immigrant workers than for U.S.-born workers.

Numerous studies of occupational injuries and illness focusing on specific industries have been published [3; 11; 12; 16; 32]. *Hassi, Gardner, et al. (2000)* conducted a study of workplace injuries in the mining industry and their association with cold ambient temperature. Using a combination of ambient temperature and wind data from the National Climatic Data Center and injury data from mines reported to the Mine Safety and Health Administration (MSHA) during 1985-1990 covering 72,716 injuries from seven states, the authors found that as temperatures decreased, injury rates increased for both cold exposure injuries and slip and fall injuries. However, the association of slip and fall injuries with temperature was inverse and not strictly linear. Furthermore, the strongest association appeared with temperatures 29 degrees F and below, and the injury rates for other accident categories increased with increasing ambient temperatures. Still in the mining industry and specifically coal mining, *Asfaw, Mark, et al. (2013)* studied the association between occupational injuries and profitability, and found that after controlling for other variables, a 10% increase in real total revenue per hour worked was associated with 0.9%, 1.1%, and 1.6% decrease, respectively, in the incidence rates of all

reported injuries, reported injuries with lost workdays, and the most serious injuries reported. Other industry-specific studies on occupational injuries include *Olorunnishola, Kidd-Taylor, et al. (2010)* on solid waste industry and *Konda, Reichard, et al. (2012)* on U.S. correction officers. In the latter study, the authors found that whereas workplace violence was the primary cause of both fatal and nonfatal injuries among correctional officers, transportation events and bodily reactions were leading causes as well.

Table 1 - Literature Review Summary: Sample of Studies on Occupational Injury and Illness in the United States over the Past Decades

Author (Year)	Title	Results
Zwerling, Sprince, et al. (1993)	Occupational Injuries: Comparing the Rates of Male and Female Postal Workers	Compared with men, women have an increased relative risk for occupational injuries in each of the three largest job classifications: • Letter carrier (1st year employment only, (RR) = 1.93, 95% confidence interval (CI) 1.40–2.67) • Letter-sorting machine clerk (1st year of employment only, RR = 2.60, 95% CI 1.31–5.15) • Mail handler (after 1st year of employment only, RR = 2.13,95% CI 1.09–4.15)
Kelsh and Sahl (1996)	Sex Differences in Work-related Injury Rates among Electric Utility Workers	Unadjusted injury rates were higher for men, but adjusted rates (for occupation, job experience, and age) were higher for women. Mantel-Haenszel summary rate ratios and 95% confidence intervals: • 1.49 (1.43–1.54) for all types of injuries, • 1.27 (1.16–1.39) for head and neck injuries, • 1.48 (1.38–1.58) for upper extremity injuries, • 1.11 (1.01–1.21) for back injuries • 2.11 (1.97–2.25) for lower extremity injuries.
Gardner, Landsittel, et al. (1999)	Risk Factors for Back Injury in 31,076 Retail Merchandise Store Workers	Injury rate per 100 person-years by work requirements: • Greatest physical work requirements (3.64) • Lesser work requirements (1.82). The unadjusted injury rate per 100 person-years by gender • Males (3.67) • Females (2.34) The injury rate ratio by duration of employment • Short versus long: 3.53 (95% CI: 2.90-4.30) • Medium versus long: 1.38 (95% CI: 1.18-1.62)

Table 1 (Continued)

Author (Year)	Title	Results
Hassi, Gardner, et al. (2000)	Occupational injuries in the mining industry and their association with statewide cold ambient temperatures in the USA	• As temperatures decreased, injury rates increased for both cold exposure injuries and slip and fall injuries. • Association of slip and fall injuries with temperature was inverse but not strictly linear. • The strongest association appeared with temperatures 29 degrees F and below. • Injury rates for other accident categories increased with increasing ambient temperatures.
McGwin, Enochs, et al. (2000)	Increased Risk of Agricultural Injury among African-American Farm Workers from Alabama and Mississippi	Injury rates were 2.9 times (95% CI: 2.0-4.3) higher for African-American farm workers vs. Caucasian and African-American owners. Independently associated with injury rates were: • Part-time farming (relative risk (RR)=2.0, 95% CI: 1.3-2.5) • Prior agricultural injury (RR=1.5, 95% CI: 1.0, 2.1) • Farm machinery in fair/poor condition (RR=1.8, 95% CI: 1.2-2.7)
Leigh, Cone, et al. (2001)	Costs of occupational injuries and illnesses in California	Annual estimates of occupational injuries in the civilian California workforce in 1992: • 660 job-related deaths from injury, • 1.645 million nonfatal injuries, • 7,079 deaths from diseases, • 0.133 Million illnesses. Costs estimated to $20.7 billion. • Injuries $17.8 billion (86%) • Illnesses $2.9 billion (14%). Estimates likely to be low because: • Ignore costs associated with pain and suffering, • Ignore home care provided by family members, • Numbers of occupational injuries and illnesses are likely to be undercounted.
Leigh, McCurdy, et al. (2001)	Costs of occupational injuries in agriculture	1992 injuries estimated: • 841 fatal • 512,539 non-fatal (281,896 led to at least one full day of work loss). 1992 cost estimated to $4.57 billion (95% CI $3.14 - $13.99) • Direct $1.66 billion • Indirect costs, $2.93 billion. On a per person basis, farming contributes roughly 30% more than the national average to occupational injury costs.
Pransky, Moshenberg, et al. (2002)	Occupational risks and injuries in non-agricultural immigrant Latino workers	Urban immigrant workers have increased risk of occupational injuries, with adverse outcomes
Leigh, Marcin, et al. (2004)	An estimate of the U.S. Government's undercount of nonfatal occupational injuries	BLS estimated to miss between 33% and 69% of all injuries. Substantial under-capture in the BLS Annual Survey, because: • Excluded categories of government workers and the self-employed, • Underreporting.

Table 1 (Continued)

Author (Year)	Title	Results
Leigh, Waehrer, et al. (2006)	Costs differences across demographic groups and types of occupational injuries and illnesses	• The youngest (age < or = 17) and oldest (age > or = 65) workers had exceptionally high fatality costs. • Whereas men's costs for non-fatal incidents were nearly double those for women, men's costs for fatal injuries were 10 times the costs for women. • The highest ranking occupation (farming, forestry, and fishing) for combined fatal and non-fatal costs had costs-per-worker (5,163 US dollars) over 18 times the lowest ranking occupation-executives and managers (279 US dollars). • The occupation of handlers, cleaners, and laborers, ranked highest for non-fatal costs. • Gunshot wounds generated especially high fatal costs • Compared to whites, African-Americans had a lower percentage of costs due to carpal tunnel syndrome, circulatory, and digestive diseases.
Taiwo, Cantley, et al. (2009)	Sex Differences in Injury Patterns Among Workers in Heavy Manufacturing	Female workers in this industry have a greater risk for sustaining all forms of injury after adjustment for age, tenure, and standardized job category (OR = 1.365, 95% CI: 1.290-1.445). Excess risk for female workers persisted when injuries were dichotomized into: • Acute injuries (OR = 1.2) • Musculoskeletal disorder-related injuries (OR = 1.1)
Leigh (2011)	Economic burden of occupational injury and illness in the United States	2007 occupational injuries and illnesses count and cost estimates: • Fatal injuries over 5,600 & $6 billion • Non-Fatal injuries almost 8,559,000 & $186 billion. • Fatal illnesses more than 53,000 & $46 billion • Non-Fatal illnesses nearly 427,000 & $12 billion. For injuries and diseases combined, medical cost estimates were: • $67 billion (27% of the total), • Indirect costs were almost $183 billion (73%). Distribution • Injuries 77% • Diseases 23%. The total estimated costs were approximately $250 billion, compared with the inflation-adjusted cost of $217 billion for 1992.

Table 1 (Continued)

Author (Year)	Title	Results
Konda, Reichard, et al. (2012)	Occupational injuries among U.S. correctional officers, 1999-2008	1999-2008 injuries estimates: • Fatal 113 • Non-fatal 125,200 (CI=+/-70,100) Primary fatal injury events: • Assaults and violent acts (n=45, 40%) • Transportation related fatalities (n=45, 40%) Primary non-fatal injury events: • Assaults and violent acts (n=47,500 (CI=+/-24,500), 38%) • Bodily reaction and exertion (n=25,400 (CI=+/-16,800), 20%)
Leigh and Marcin (2012)	Workers' compensation benefits and shifting costs for occupational injury and illness	Total benefits in 2007 were estimated to be $51.7 billion, • $29.8 billion (medical benefits) • $21.9 billion (for indemnity benefits). Coverage for medical costs not covered by workers' compensation: • $14.22 billion (other insurance, i.e. non-workers' compensation) • $7.16 billion (Medicare) • $5.47 billion (Medicaid)
Xiang, Shi, et al. (2012)	Medical expenditures associated with nonfatal occupational injuries among immigrant and U.S.-born workers	The average medical expenditure per injured worker (2004-2009) • $2357 (U.S.-born) • $2,351 (immigrant) Workers' compensation payments for : • 57.0% (95% CI: 49.4%-63.6%) - U.S.-born • 43.2% (95% CI: 33.0%-53.7%) - Immigrant Out-of-Pocket Payments: • 6.7% (95% CI: 5.5%-8.3%) - U.S.-born • 7.1% (95% CI: 5.2%-9.6%) - Immigrant
Asfaw, Mark, et al. (2013)	Profitability and occupational injuries in U.S. underground coal mines	After controlling for other variables, a 10% increase in real total revenue per hour worked was associated with 0.9%, 1.1%, and 1.6% decrease, respectively, in the incidence rates of: • All reported injuries, • Reported injuries with lost workdays, • The most serious injuries reported

Table 1 (Continued)

Author (Year)	Title	Results
Lander, Shah, et al. (2013)	Healthcare cost usage for hospitalized injuries sustained in industrial settings in the USA	A total of 5826 patients were hospitalized in 2006 with injuries sustained in industrial settings (weighted, 28,354 patients). • Mean age 42.9 years (82% men) • 48% Caucasian, • 19% Hispanic • 6% African-American. • Majority were admitted from ER (72%) • Majority of admissions were discharged home (79%; 9% with home healthcare) • 10.7% were transferred to another facility. • Mean length of stay was 4.5 days (range 0-109 days). • Mean total charges per admission was $32,254 (median $18,364, 90th percentile $66,607). Common diagnoses: • Orthopedic injuries (including amputations) to: finger/hand (20.9%), foot/ankle (8.2%), leg (10.2%) and spine (8.4%); • Infection (10.8%), • Pulmonary diagnosis (6.6%), • Soft tissue injuries (3.6%) • Burns to <10% of the body (3.6%). Comorbidities: • Hypertension (17.0%) • Diabetes mellitus (6.3%). Most common procedures performed: • Fracture reduction (17.6%), • Blood transfusions (3.1%) • Spinal surgery (3%). 194 (0.7%) patients died in the hospital.

METHODS AND MATERIALS

This study was funded and supported by the Sunshine Educational Research Center (SERC), which is largely supported by a training grant from the National Institute for Occupational Safety and Health (NIOSH). The primary data source used during this study is the annual National Inpatient Sample (NIS) data from the Healthcare and Cost and Utilization Project (HCUP) covering the period 1998-2009. HCUP is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ)[1].

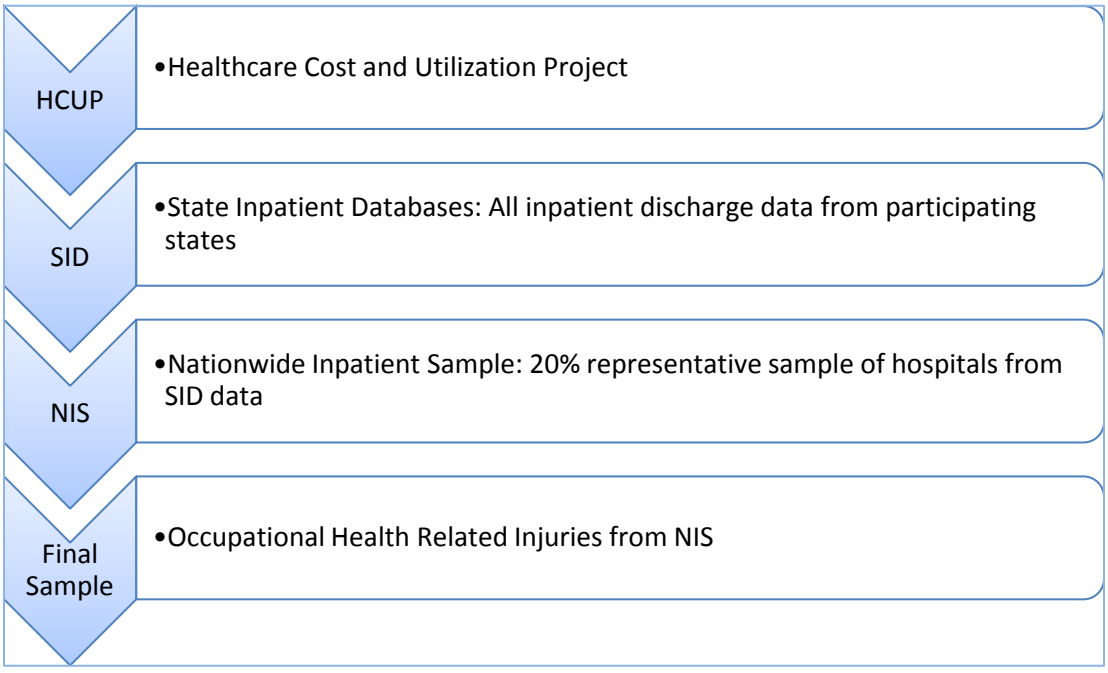

Figure 2 - Study Data Path

Study Design and Data Source

We conducted a cross-sectional analysis of occupational injuries-related hospital discharges using 1998-2009 annual data from the Nationwide Inpatient Sample (NIS), the largest all-payer, publicly available inpatient database in the U.S. (HCUP, 2011b). Each year, the Healthcare and Cost of Utilization Project (HCUP) stratifies all non-federal community hospitals from participating states into groups based on five major hospital characteristics: rural/urban location, number of beds, geographic region, teaching status, and ownership. Within each stratum, a 20% sample of hospitals is drawn using a systematic random sampling technique, and all inpatient discharges from selected hospitals are included. The final database includes hospital stratum identifiers and discharge-level sampling weights to facilitate generation of national prevalence estimates that take into account the complex sampling design of the NIS. At present, 1051 hospitals from 45 states contribute inpatient hospitalization data to HCUP.

Identifying Occupational Injury Cases and Clinical Conditions

To identify hospital stays for occupational injuries and illnesses, we took advantage of the embedded International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9 CM) code E849.3 (industrial place and premises) [8]. Multiple ICD-9 codes were used to identify types of injuries and anatomical location of the injuries. Each hospital discharge record contains ICD-9-CM codes for a patient's principal diagnosis and up to 14 secondary diagnoses. Beginning in 2009, the NIS included up to 24 secondary diagnosis fields. A detailed list of the specific diagnosis and procedure codes used to identify occupational injuries and illness records are listed in Table 10 and Table 11 in the Appendix section (HCUP, 2008). We also considered length of the occupational injuries-related hospitalization as an indicator of healthcare

utilization and as a proxy for severity of complications. We defined a prolonged hospitalization as a length of stay (LOS) as one that met or exceeded the 95th percentile based on the distribution among all occupational injuries-related discharges (≥13 days in our sample).

Demographics and Covariates

The following age groups were devised to better categorize patients based on a commonly studied age groups demographics: <14, 14-17, 18-24, 25-34, 35-44, 45-54, 55-64, and ≥65. Race-ethnicity was first determined by self-reported ethnicity (Hispanic or non-Hispanic) with the non-Hispanic (NH) group further subdivided by race (white, black, or other). Median household income was estimated using the documented zip code of residence, and was then ranked into quartiles by HCUP. Primary payers for each hospital stay were classified into one of the following three groups: government (Medicare/Medicaid), private (commercial carriers and private HMOs and PPOs), and other sources (including self-pay and no charge). We also assessed several hospital characteristics including teaching status (teaching, in which the ratio of full-time equivalent interns and residents to non-nursing home beds is ≥ 0.25, vs. non-teaching), urban-rural location, and U.S. census region (Northeast, Midwest, South, or West).

Conversion of Charges to Costs

While charges represent what a hospital bills for services, they do not reflect the actual cost of the service. Moreover, the markup from what it costs a hospital to provide its services to what it charges varies significantly across hospitals, among different departments within the same hospital, and over time [*Salemi, Comins, et al. (2013)*]. Therefore, a better estimate of actual resource consumption than charges should be used as a measure of cost [*Finkler (1982)*]. We converted hospital charges to cost estimates using two steps. First, we multiplied the total

charge of the hospitalization, provided in the NIS dataset, by a hospital-specific cost-to-charge ratio (CCR). The CCRs were calculated by HCUP using hospital accounting reports from the Center for Medicaid Services (CMS) (HCUP, 2011a). Second, we also multiplied reported charges by an HCUP-generated ―adjustment factor‖ (AF) that attempts to account for interdepartmental variations in markup within each hospital [*Sun and Friedman, 2012*]. The final formula for calculating the cost for each discharge record is provided below:

$$\textbf{Total cost} = \text{total charges} \times (\text{hospital specific CCR}) \times \text{AF}$$

Data Analysis

Descriptive statistics were used to describe the study population and to calculate the frequency and rate of injuries in industrial premises, by selected socio-demographic, geographic, diagnostic, and hospital characteristics. All estimates were weighted to account for the complex sampling design of the NIS.

We used the Joinpoint Regression Program to identify statistically significant changes in the temporal trends of injuries in industrial settings. The Joinpoint Regression Program is a statistical software package from the U.S. National Cancer Institute (NCI)[30] that computes and analyzes non-linear, piecewise trends of time series (e.g. time series of occupational injuries rates). Joinpoint regression begins by modeling annual trend data by fitting a straight line [30]. The Monte Carlo permutation test then examines whether adding one Joinpoint is statistically significant, and if so, incorporates it into the model. This process is repeated until a model of best fit is specified with an optimal number of Joinpoint. Each Joinpoint in the final model corresponds to a significant increase or decrease in the trend, and an annual percent change (APC) is calculated to describe how the rate changes within each time interval. The model also

estimates the average annual percent change (AAPC), which describes the trend over the entire study period, even when there are significant changes in the trend over time. Since the NIS sampling design has changed, we used the NIS-Trends files, supplied by HCUP, for all trend analyses to ensure that trend weights and data elements were consistently defined over time [*Houchens, Elixhauser, et al. (2008)*].

Logistic regression modeling was used to calculate odds ratios (OR) and 95% confidence intervals (CI) for the association between occupational injuries and each discharge. For each association of interest, we constructed two crude (unadjusted) multivariable models. Covariates were identified through a review of the literature and findings of the bivariate analyses. In the first multivariable model, we included year of admission, age, gender, income, injury site on the body, U.S. census region, primary payer, race/ethnicity, admission source, and admission's day of the week in order to control for variation in socio-demographic and geographic characteristics between the groups.

In the second multivariable model, we included injury types (fracture, open wound, internal or crush, internal, contusion or superficial, physical environment or burn, sprain & strain, contusion, burn, crushing, superficial, dislocation, physical environment, poisoning, and foreign body entering through orifice) and the injury location on the body (extremity, upper extremity, lower extremity, trunk, and head) to control for variations in diagnosis and anatomical position.

Statistical analyses were performed with SAS software, version 9.3 (SAS Institute, Inc., Cary, NC), Stata statistical software, release 11 (StataCorp LP, College Station, TX), and the Joinpoint Regression Program, version 4.0.1 (NCI, 2013). This study is considered exempt from

institutional review board approval by the University of South Florida because of the de-identified nature of the data.

RESULTS

The overall sample consisted of 307,586 (weighted) patients admitted for injuries or illness sustained in industrial settings from various locations across the United States between 1998 and 2009.

Socio-Demographic Proportions

Multivariate socio-demographic proportions are shown in Table 2, Table 3, and Table 4 - Occupational Injury Proportions by Injury Type (weighted) –Part 2. These tables provide detailed distribution of occupational injuries and illnesses across multiple socio-demographic parameters, presented by injury site (anatomical position) or injury type (diagnostic).

The majority of patients were male (81.6%), and admitted through an emergency department –ER (61.2%). The hospital of admission was overwhelmingly likely to be in an urban setting (88.6%). Approximately 46.6% of participants were Caucasian, 18.2% Hispanic, and 6.2% African American.

As further illustrated in Figure 3 below, more than two-thirds of admissions were for patients in the [25 – 54] age demographic. While the younger "<14" age group represented just about 0.6% of the whole sample, 28.5% of their injuries involved the head compared to just 8.9% for the whole sample. Similar disparities were found for injuries where alcohol was involved. Of the 9,172 (weighted) alcohol related injury cases reported, 18.8% were to the head compared to less than half (8.6%) for the whole sample.

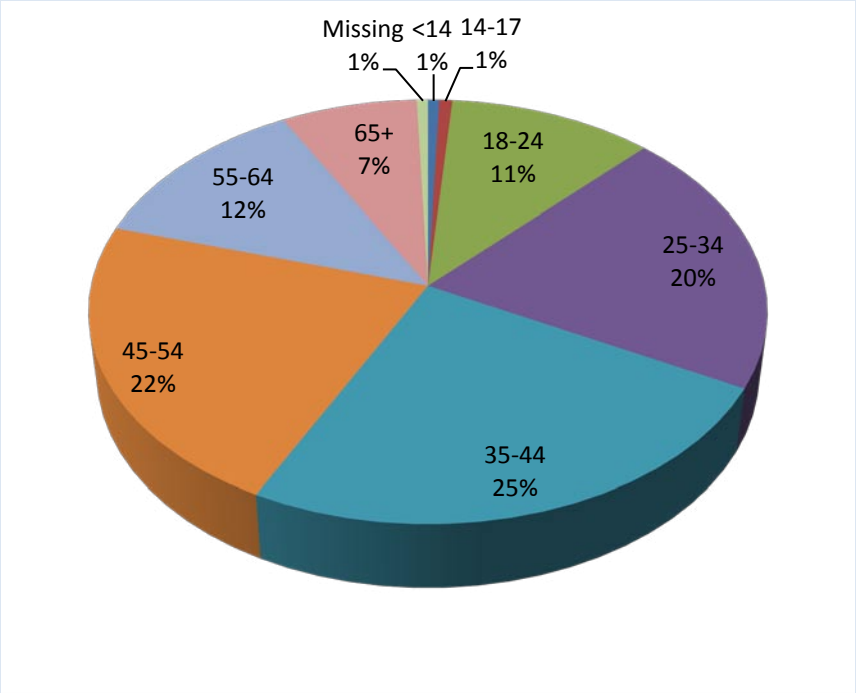

Figure 3 -Age Group Distribution of Occupational Injuries (1998 - 2009)

Compared to men, female patients had relatively fewer injuries to the head (8% vs.9.1%) or trunk (8.5% vs. 9.4%), and in relative terms, had less than half the rate of multiple injuries as their male counterparts (7.3% vs. 15.8%).

As shown in Figure 4 below, over half of all injuries occurred on either lower or upper extremities (53%) versus 9% for trunk and head. While patients were overwhelmingly discharged home (81.7%), a small fraction (0.7%) died during the stay. Of the estimated 2,180 persons (weighted) who died, 50% involved a fracture and 42.6% an internal crush injury.

Table 3 and Table 4 - Occupational Injury Proportions by Injury Type (weighted) –Part 2 revealed an interesting finding about women and industrial occupational injuries. Although it's rare for women to be admitted for occupational injuries relative to men (81.8% vs. 16.6%), with regards to poisoning however they had a much higher rate (4.8%) compared to men (1.9%). On

the bright side and relative to other injury types, women suffered from fewer injuries (about 2-to-1 ratio) when compared to the whole sample, especially internal injuries (7.9% vs. 15.4%), open wounds (12.6% vs. 25.7%), crush injuries (2.1% vs. 5%), burns (3.2% vs. 5.8%), and internal crush injuries (9.7% vs. 19.4%).

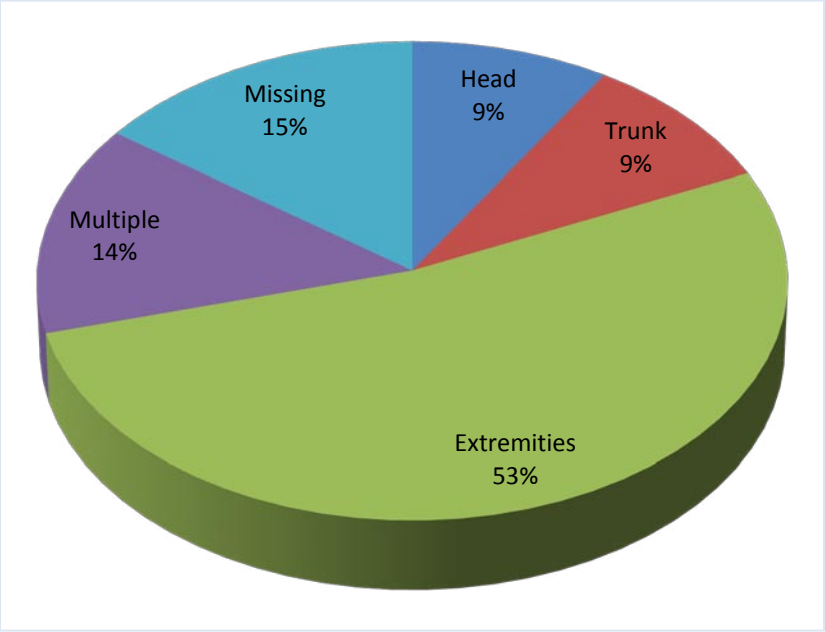

Figure 4 - Distribution of Occupational Injuries by Injury Site (1998 - 2009)

As for geographical distribution, 38.9% were admitted in the West, 24.6% in the South, 19.5% in the Midwest, and 17% in the Northeast.

Among persons who were injured in their extremities, the diagnostic included crush injuries (89.4%), fractures (65.4%), dislocations (53.2%), sprains and strains (61.1%), open wounds (68.8%), and burns (47%).

As shown in Figure 5 below, of all the admissions, 48.4% involved fractures, followed by open wounds (25.7%), internal crush injuries (19.4%), and superficial contusions (10.1%).

Foreign body entering through orifice (0.5%) and poisoning (2.3%) scored the lowest, while burn (5.8%), dislocation (3.9%), and crushing (5%) were noted as well.

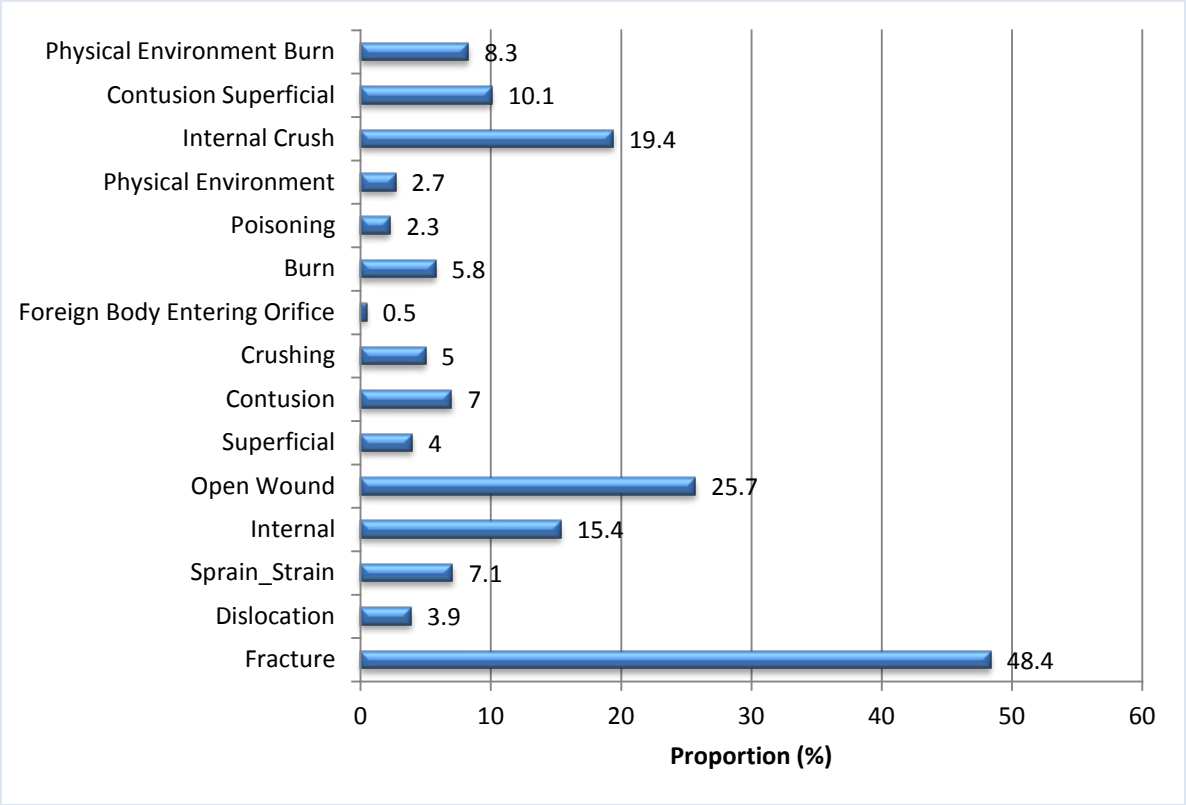

Figure 5 - Occupational Injuries Proportions by Injury Type

A few disparities were noted within age groups distribution with regards to injury diagnostics. Of the 2,175 (weighted) discharges belonging to the [14 -17] age group, the proportion of "open wound" was 10 points higher (35.3%) when compared to the whole sample (25.7%). Similar patterns for the same age group were found for burns (11.3% vs. 5.8%), and poisoning (5.8% vs. 2.3%).

Table 2 - Occupational Injury Proportions by Body Site (weighted)

	All		Head			Trunk			Extremity			Multiple			Missing		
	N	C%	N	R%	C%	N	R%	C%	N	R%	C%	N	R%	C%	N	R%	C%
All	307,586	100	27,312	8.9	100	28,536	9.3	100	161,799	52.6	100	43,692	14.2	100	46,248	15	100
Age Group																	
<14	1,790	0.6	510	28.5	1.9	170	9.5	0.6	532	29.7	0.3	200	11.1	0.5	379	21.2	0.8
14-17	2,175	0.7	186	8.6	0.7	175	8.1	0.6	1,181	54.3	0.7	374	17.2	0.9	258	11.8	0.6
18-24	33,694	11	3,400	10.1	12.4	2,818	8.4	9.9	19,281	57.2	11.9	5,063	15	11.6	3,132	9.3	6.8
25-34	62,725	20.4	5,127	8.2	18.8	5,814	9.3	20.4	34,191	54.5	21.1	9,745	15.5	22.3	7,848	12.5	17
35-44	76,191	24.8	6,062	8	22.2	7,811	10.3	27.4	38,431	50.4	23.8	11,725	15.4	26.8	12,162	16	26.3
45-54	68,085	22.1	5,875	8.6	21.5	6,232	9.2	21.8	35,776	52.5	22.1	9,195	13.5	21	11,008	16.2	23.8
55-64	38,510	12.5	3,502	9.1	12.8	3,335	8.7	11.7	20,552	53.4	12.7	5,016	13	11.5	6,105	15.9	13.2
≥65	22,565	7.3	2,473	11	9.1	2,012	8.9	7.1	10,516	46.6	6.5	2,324	10.3	5.3	5,240	23.2	11.3
Missing	1,850	0.6	177	9.6	0.6	168	9.1	0.6	1,340	72.4	0.8	50	2.7	0.1	116	6.3	0.3
Gender																	
Male	251,741	81.8	22,866	9.1	83.7	23,756	9.4	83.2	131,560	52.3	81.3	39,833	15.8	91.2	33,726	13.4	72.9
Female	51,112	16.6	4,076	8	14.9	4,347	8.5	15.2	26,866	52.6	16.6	3,719	7.3	8.5	12,104	23.7	26.2
Missing	4,733	1.5	370	7.8	1.4	434	9.2	1.5	3,372	71.2	2.1	140	2.9	0.3	418	8.8	0.9
Race																	
NH-White	149,488	48.6	12,920	8.6	47.3	14,220	9.5	49.8	76,422	51.1	47.2	20,813	13.9	47.6	25,113	16.8	54.3
NH-Black	19,186	6.2	2,056	10.7	7.5	1,456	7.6	5.1	10,485	54.6	6.5	1,870	9.7	4.3	3,320	17.3	7.2
Hispanic	56,020	18.2	4,754	8.5	17.4	4,895	8.7	17.2	30,676	54.8	19	9,365	16.7	21.4	6,329	11.3	13.7
Other	17,774	5.8	1,895	10.7	6.9	1,617	9.1	5.7	9,490	53.4	5.9	2,716	15.3	6.2	2,055	11.6	4.4
Missing	65,119	21.2	5,686	8.7	20.8	6,348	9.7	22.2	34,727	53.3	21.5	8,928	13.7	20.4	9,430	14.5	20.4
Income																	
Lowest	77,691	25.3	6,583	8.5	24.1	7,294	9.4	25.6	41,826	53.8	25.9	10,527	13.5	24.1	11,461	14.8	24.8
2nd	83,438	27.1	7,305	8.8	26.7	7,832	9.4	27.4	44,320	53.1	27.4	11,630	13.9	26.6	12,351	14.8	26.7
3rd	78,286	25.5	6,799	8.7	24.9	7,079	9	24.8	40,872	52.2	25.3	11,652	14.9	26.7	11,883	15.2	25.7
Highest	58,507	19	5,661	9.7	20.7	5,478	9.4	19.2	29,930	51.2	18.5	8,205	14	18.8	9,234	15.8	20
Missing	9,663	3.1	963	10	3.5	853	8.8	3	4,851	50.2	3	1,677	17.4	3.8	1,319	13.7	2.9
Alcohol																	
Yes	9,172	3	1,724	18.8	6.3	855	9.3	3	3,268	35.6	2	1,441	15.7	3.3	1,884	20.5	4.1
No	298,414	97	25,587	8.6	93.7	27,681	9.3	97	158,531	53.1	98	42,251	14.2	96.7	44,364	14.9	95.9
Any Drug Component																	
Yes	6,216	2	705	11.3	2.6	521	8.4	1.8	2,093	33.7	1.3	798	12.8	1.8	2,100	33.8	4.5
No	301,370	98	26,607	8.8	97.4	28,015	9.3	98.2	159,707	53	98.7	42,894	14.2	98.2	44,148	14.6	95.5
Primary Payer																	
Government	27,917	9.1	3,256	11.7	11.9	2,609	9.3	9.1	11,122	39.8	6.9	3,096	11.1	7.1	7,834	28.1	16.9
Private	62,382	20.3	7,075	11.3	25.9	6,360	10.2	22.3	29,538	47.3	18.3	7,813	12.5	17.9	11,596	18.6	25.1
Other	217,288	70.6	16,980	7.8	62.2	19,567	9	68.6	121,140	55.8	74.9	32,782	15.1	75	26,818	12.3	58

Table 2 (Continued)

	All		Head			Trunk			Extremity			Multiple			Missing		
	N	C%	N	R%	C%	N	R%	C%	N	R%	C%	N	R%	C%	N	R%	C%
All	307,586	100	27,312	8.9	100	28,536	9.3	100	161,799	52.6	100	43,692	14.2	100	46,248	15	100
Disposition of patient (uniform)																	
Died	2,180	0.7	626	28.7	2.3	228	10.5	0.8	173	7.9	0.1	799	36.6	1.8	355	16.3	0.8
Routine	251,230	81.7	22,940	9.1	84	23,262	9.3	81.5	135,577	54	83.8	31,707	12.6	72.6	37,744	15	81.6
Short term hosp	5,041	1.6	566	11.2	2.1	601	11.9	2.1	1,903	37.7	1.2	1,196	23.7	2.7	774	15.3	1.7
Another type of facility	24,286	7.9	2,058	8.5	7.5	2,499	10.3	8.8	10,651	43.9	6.6	5,910	24.3	13.5	3,167	13	6.8
Home health care	22,159	7.2	674	3	2.5	1,654	7.5	5.8	12,580	56.8	7.8	3,677	16.6	8.4	3,574	16.1	7.7
AMA	2,350	0.8	407	17.3	1.5	245	10.4	0.9	807	34.3	0.5	345	14.7	0.8	546	23.2	1.2
Missing	341	0.1	40	11.8	0.1	47	13.8	0.2	108	31.6	0.1	57	16.8	0.1	89	26.1	0.2
Admission source (uniform)																	
ER	188,352	61.2	18,421	9.8	67.4	19,232	10.2	67.4	100,373	53.3	62	31,114	16.5	71.2	19,210	10.2	41.5
Another hosp	8,065	2.6	902	11.2	3.3	710	8.8	2.5	3,313	41.1	2	1,764	21.9	4	1,375	17.1	3
Another health facility	3,736	1.2	235	6.3	0.9	231	6.2	0.8	2,328	62.3	1.4	398	10.7	0.9	544	14.6	1.2
Court/law enforcement	95	0	0	0	0	14	14.7	0	66	69.8	0	0	0	0	15	15.5	0
Routine/other	68,267	22.2	3,872	5.7	14.2	4,480	6.6	15.7	36,705	53.8	22.7	4,799	7	11	18,410	27	39.8
Missing	39,072	12.7	3,880	9.9	14.2	3,869	9.9	13.6	19,012	48.7	11.8	5,617	14.4	12.9	6,694	17.1	14.5
Admission day is a weekend																	
Weekday	264,633	86	23,141	8.7	84.7	24,137	9.1	84.6	139,663	52.8	86.3	37,754	14.3	86.4	39,938	15.1	86.4
Weekend	42,373	13.8	4,102	9.7	15	4,350	10.3	15.2	21,849	51.6	13.5	5,850	13.8	13.4	6,222	14.7	13.5
Missing	580	0.2	69	11.8	0.3	49	8.4	0.2	287	49.5	0.2	87	15.1	0.2	88	15.2	0.2
Region of hospital																	
Northeast	52,302	17	5,542	10.6	20.3	5,270	10.1	18.5	29,114	55.7	18	6,805	13	15.6	5,572	10.7	12
Midwest	60,037	19.5	5,413	9	19.8	5,701	9.5	20	31,369	52.2	19.4	8,891	14.8	20.3	8,663	14.4	18.7
South	75,571	24.6	6,453	8.5	23.6	6,828	9	23.9	40,629	53.8	25.1	9,992	13.2	22.9	11,668	15.4	25.2
West	119,676	38.9	9,903	8.3	36.3	10,737	9	37.6	60,687	50.7	37.5	18,004	15	41.2	20,345	17	44
Bed size of hospital																	
Small	29,946	9.7	1,957	6.5	7.2	2,877	9.6	10.1	16,983	56.7	10.5	2,789	9.3	6.4	5,339	17.8	11.5
Medium	78,433	25.5	6,304	8	23.1	6,947	8.9	24.3	42,293	53.9	26.1	10,439	13.3	23.9	12,450	15.9	26.9
Large	198,493	64.5	18,948	9.5	69.4	18,675	9.4	65.4	102,197	51.5	63.2	30,350	15.3	69.5	28,325	14.3	61.2
Missing	714	0.2	103	14.4	0.4	37	5.2	0.1	326	45.6	0.2	114	16	0.3	134	18.7	0.3
Location (urban/rural) of hospital																	
Urban	272,420	88.6	25,163	9.2	92.1	24,734	9.1	86.7	142,636	52.4	88.2	39,986	14.7	91.5	39,902	14.6	86.3
Rural	34,452	11.2	2,046	5.9	7.5	3,764	10.9	13.2	18,837	54.7	11.6	3,592	10.4	8.2	6,212	18	13.4
Missing	714	0.2	103	14.4	0.4	37	5.2	0.1	326	45.6	0.2	114	16	0.3	134	18.7	0.3
Teaching status of hospital																	
Teaching	152,059	49.4	15,954	10.5	58.4	13,353	8.8	46.8	78,689	51.7	48.6	26,428	17.4	60.5	17,636	11.6	38.1
Non-teaching	154,813	50.3	11,255	7.3	41.2	15,145	9.8	53.1	82,784	53.5	51.2	17,150	11.1	39.3	28,479	18.4	61.6
Missing	714	0.2	103	14.4	0.4	37	5.2	0.1	326	45.6	0.2	114	16	0.3	134	18.7	0.3

Table 2 (Continued)

	All		Head			Trunk			Extremity			Multiple			Missing		
	N	C%	N	R%	C%	N	R%	C%	N	R%	C%	N	R%	C%	N	R%	C%
All	307,586	100	27,312	8.9	100	28,536	9.3	100	161,799	52.6	100	43,692	14.2	100	46,248	15	100
Year																	
1998	27,363	8.9	2,418	8.8	8.9	2,742	10	9.6	14,608	53.4	9	4,133	15.1	9.5	3,462	12.7	7.5
1999	24,314	7.9	2,027	8.3	7.4	2,404	9.9	8.4	13,542	55.7	8.4	3,347	13.8	7.7	2,994	12.3	6.5
2000	24,198	7.9	2,119	8.8	7.8	2,369	9.8	8.3	13,185	54.5	8.1	3,213	13.3	7.4	3,311	13.7	7.2
2001	26,133	8.5	2,085	8	7.6	2,287	8.8	8	14,129	54.1	8.7	3,677	14.1	8.4	3,956	15.1	8.6
2002	26,038	8.5	2,203	8.5	8.1	2,465	9.5	8.6	14,217	54.6	8.8	3,408	13.1	7.8	3,745	14.4	8.1
2003	26,559	8.6	2,406	9.1	8.8	2,474	9.3	8.7	13,101	49.3	8.1	4,080	15.4	9.3	4,499	16.9	9.7
2004	26,315	8.6	2,263	8.6	8.3	2,213	8.4	7.8	14,881	56.5	9.2	3,308	12.6	7.6	3,650	13.9	7.9
2005	24,086	7.8	2,381	9.9	8.7	2,074	8.6	7.3	12,410	51.5	7.7	3,508	14.6	8	3,713	15.4	8
2006	28,354	9.2	2,488	8.8	9.1	2,574	9.1	9	14,803	52.2	9.1	4,257	15	9.7	4,232	14.9	9.2
2007	26,845	8.7	2,520	9.4	9.2	2,499	9.3	8.8	13,903	51.8	8.6	3,871	14.4	8.9	4,052	15.1	8.8
2008	25,962	8.4	2,364	9.1	8.7	2,276	8.8	8	12,799	49.3	7.9	3,946	15.2	9	4,578	17.6	9.9
2009	21,420	7	2,038	9.5	7.5	2,158	10.1	7.6	10,222	47.7	6.3	2,945	13.7	6.7	4,056	18.9	8.8
Length of Stay > 13 Days (95th Percentile)																	
Yes	13,333	4.3	1,087	8.2	4	1,198	9	4.2	4,659	34.9	2.9	4,554	34.2	10.4	1,835	13.8	4
No	294,254	95.7	26,225	8.9	96	27,338	9.3	95.8	157,140	53.4	97.1	39,138	13.3	89.6	44,413	15.1	96
Died during hospitalization																	
Yes	2,180	0.7	626	28.7	2.3	228	10.5	0.8	173	7.9	0.1	799	36.6	1.8	355	16.3	0.8
No	305,406	99.3	26,686	8.7	97.7	28,308	9.3	99.2	161,626	52.9	99.9	42,893	14	98.2	45,893	15	99.2

Table 3 - Occupational Injury Proportions by Injury Type (weighted) –Part 1

	Discharges		Fracture			Dislocation			Sprain Strain			Internal			Open Wound			Superficial		
	N	C%	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate
All	307,586	100	148,928	100	48.4	11,982	100	3.9	21,938	100	7.1	47,261	100	15.4	79,050	100	25.7	12,438	100	4
Age																				
<14	1,790	0.6	804	0.5	44.9	0	0	0	5	0	0.3	230	0.5	12.9	277	0.4	15.5	111	0.9	6.2
14-17	2,175	0.7	914	0.6	42	67	0.6	3.1	65	0.3	3	415	0.9	19.1	768	1	35.3	104	0.8	4.8
18-24	33,694	11	15,861	10.6	47.1	1,146	9.6	3.4	1,518	6.9	4.5	6,432	13.6	19.1	12,656	16	37.6	1,601	12.9	4.8
25-34	62,725	20.4	29,332	19.7	46.8	2,864	23.9	4.6	3,713	16.9	5.9	10,755	22.8	17.1	19,983	25.3	31.9	2,751	22.1	4.4
35-44	76,191	24.8	35,824	24.1	47	3,472	29	4.6	5,932	27	7.8	11,905	25.2	15.6	19,736	25	25.9	3,099	24.9	4.1
45-54	68,085	22.1	33,142	22.3	48.7	2,795	23.3	4.1	5,827	26.6	8.6	9,753	20.6	14.3	14,977	18.9	22	2,478	19.9	3.6
55-64	38,510	12.5	20,077	13.5	52.1	1,182	9.9	3.1	3,712	16.9	9.6	5,585	11.8	14.5	7,357	9.3	19.1	1,452	11.7	3.8
≥65	22,565	7.3	12,063	8.1	53.5	393	3.3	1.7	1,087	5	4.8	2,059	4.4	9.1	2,800	3.5	12.4	805	6.5	3.6
Missing	1,850	0.6	910	0.6	49.2	64	0.5	3.5	80	0.4	4.3	127	0.3	6.9	496	0.6	26.8	38	0.3	2
Gender																				
Male	251,741	81.8	122,751	82.4	48.8	10,313	86.1	4.1	17,230	78.5	6.8	42,884	90.7	17	71,245	90.1	28.3	11,141	89.6	4.4
Female	51,112	16.6	23,987	16.1	46.9	1,539	12.8	3	4,499	20.5	8.8	4,022	8.5	7.9	6,417	8.1	12.6	1,189	9.6	2.3
Missing	4,733	1.5	2,190	1.5	46.3	130	1.1	2.8	210	1	4.4	355	0.8	7.5	1,388	1.8	29.3	108	0.9	2.3
Race																				
NH-White	149,488	48.6	72,319	48.6	48.4	5,677	47.4	3.8	11,085	50.5	7.4	22,050	46.7	14.8	34,633	43.8	23.2	6,359	51.1	4.3
NH-Black	19,186	6.2	7,779	5.2	40.5	770	6.4	4	1,641	7.5	8.6	2,675	5.7	13.9	4,867	6.2	25.4	542	4.4	2.8
Hispanic	56,020	18.2	27,790	18.7	49.6	2,237	18.7	4	3,512	16	6.3	9,835	20.8	17.6	18,307	23.2	32.7	2,285	18.4	4.1
Other	17,774	5.8	8,694	5.8	48.9	611	5.1	3.4	1,033	4.7	5.8	3,115	6.6	17.5	5,419	6.9	30.5	710	5.7	4
Missing	65,119	21.2	32,346	21.7	49.7	2,688	22.4	4.1	4,667	21.3	7.2	9,585	20.3	14.7	15,824	20	24.3	2,541	20.4	3.9
Income																				
Lowest	77,691	25.3	36,989	24.8	47.6	2,972	24.8	3.8	5,419	24.7	7	11,467	24.3	14.8	20,643	26.1	26.6	2,985	24	3.8
2nd	83,438	27.1	40,777	27.4	48.9	3,426	28.6	4.1	6,029	27.5	7.2	12,573	26.6	15.1	21,411	27.1	25.7	3,322	26.7	4
3rd	78,286	25.5	38,238	25.7	48.8	3,262	27.2	4.2	5,818	26.5	7.4	12,405	26.2	15.8	19,797	25	25.3	3,240	26	4.1
Highest	58,507	19	28,273	19	48.3	1,978	16.5	3.4	4,044	18.4	6.9	9,206	19.5	15.7	14,506	18.4	24.8	2,511	20.2	4.3
Missing	9,663	3.1	4,651	3.1	48.1	345	2.9	3.6	629	2.9	6.5	1,610	3.4	16.7	2,693	3.4	27.9	380	3.1	3.9
Alcohol																				
Yes	9,172	3	3,793	2.5	41.4	220	1.8	2.4	353	1.6	3.9	1,691	3.6	18.4	2,210	2.8	24.1	463	3.7	5.1
No	298,414	97	145,135	97.5	48.6	11,763	98.2	3.9	21,585	98.4	7.2	45,570	96.4	15.3	76,840	97.2	25.7	11,975	96.3	4
Any Drug Component																				
Yes	6,216	2	2,055	1.4	33.1	132	1.1	2.1	223	1	3.6	822	1.7	13.2	1,296	1.6	20.9	282	2.3	4.5
No	301,370	98	146,873	98.6	48.7	11,850	98.9	3.9	21,715	99	7.2	46,438	98.3	15.4	77,754	98.4	25.8	12,156	97.7	4
Primary Payer																				
Government	27,917	9.1	11,862	8	42.5	439	3.7	1.6	1,046	4.8	3.7	3,212	6.8	11.5	5,000	6.3	17.9	1,098	8.8	3.9
Private	62,382	20.3	27,288	18.3	43.7	2,194	18.3	3.5	4,663	21.3	7.5	9,261	19.6	14.8	14,668	18.6	23.5	2,644	21.3	4.2
Other	217,288	70.6	109,778	73.7	50.5	9,349	78	4.3	16,230	74	7.5	34,788	73.6	16	59,382	75.1	27.3	8,697	69.9	4

Table 3(Continued)

	Discharges		Fracture			Dislocation			Sprain Strain			Internal			Open Wound			Superficial		
	N	C%	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate
All	307,586	100	148,928	100	48.4	11,982	100	3.9	21,938	100	7.1	47,261	100	15.4	79,050	100	25.7	12,438	100	4
Disposition of patient (uniform)																				
Died	2,180	0.7	1,090	0.7	50	19	0.2	0.9	5	0	0.2	919	1.9	42.2	339	0.4	15.6	84	0.7	3.9
Routine	251,230	81.7	114,472	76.9	45.6	9,733	81.2	3.9	19,335	88.1	7.7	38,347	81.1	15.3	69,549	88	27.7	10,049	80.8	4
Short term hosp	5,041	1.6	2,860	1.9	56.7	267	2.2	5.3	169	0.8	3.4	935	2	18.6	976	1.2	19.4	213	1.7	4.2
Another type of facility	24,286	7.9	17,778	11.9	73.2	1,022	8.5	4.2	1,131	5.2	4.7	4,349	9.2	17.9	3,317	4.2	13.7	927	7.5	3.8
Home health care	22,159	7.2	11,915	8	53.8	853	7.1	3.8	1,178	5.4	5.3	2,221	4.7	10	4,157	5.3	18.8	998	8	4.5
AMA	2,350	0.8	600	0.4	25.5	75	0.6	3.2	115	0.5	4.9	438	0.9	18.6	649	0.8	27.6	159	1.3	6.8
Missing	341	0.1	214	0.1	62.7	14	0.1	4.1	4	0	1.3	51	0.1	15.1	62	0.1	18.2	9	0.1	2.6
Admission source (uniform)																				
ER	188,352	61.2	101,938	68.4	54.1	6,218	51.9	3.3	10,240	46.7	5.4	34,695	73.4	18.4	57,643	72.9	30.6	8,684	69.8	4.6
Another hosp	8,065	2.6	3,350	2.2	41.5	242	2	3	197	0.9	2.4	1,249	2.6	15.5	1,453	1.8	18	221	1.8	2.7
Another health facility	3,736	1.2	1,553	1	41.6	134	1.1	3.6	321	1.5	8.6	460	1	12.3	955	1.2	25.6	64	0.5	1.7
Court/law enforcement	95	0	23	0	24.8	0	0	0	14	0.1	15.1	19	0	19.9	38	0	40	0	0	0
Routine/other	68,267	22.2	23,506	15.8	34.4	3,675	30.7	5.4	8,740	39.8	12.8	4,883	10.3	7.2	10,102	12.8	14.8	1,433	11.5	2.1
Missing	39,072	12.7	18,557	12.5	47.5	1,714	14.3	4.4	2,427	11.1	6.2	5,954	12.6	15.2	8,859	11.2	22.7	2,037	16.4	5.2
Admission day is a weekend																				
Weekday	264,633	86	128,980	86.6	48.7	10,703	89.3	4	19,462	88.7	7.4	40,521	85.7	15.3	67,564	85.5	25.5	10,604	85.3	4
Weekend	42,373	13.8	19,685	13.2	46.5	1,263	10.5	3	2,465	11.2	5.8	6,671	14.1	15.7	11,285	14.3	26.6	1,824	14.7	4.3
Missing	580	0.2	264	0.2	45.5	16	0.1	2.8	11	0.1	1.9	69	0.1	11.9	201	0.3	34.6	11	0.1	1.8
Region of hospital																				
Northeast	52,302	17	24,916	16.7	47.6	2,141	17.9	4.1	3,867	17.6	7.4	8,318	17.6	15.9	13,992	17.7	26.8	1,799	14.5	3.4
Midwest	60,037	19.5	29,256	19.6	48.7	2,565	21.4	4.3	4,600	21	7.7	8,626	18.3	14.4	14,532	18.4	24.2	2,450	19.7	4.1
South	75,571	24.6	38,121	25.6	50.4	2,873	24	3.8	4,084	18.6	5.4	11,090	23.5	14.7	19,900	25.2	26.3	2,822	22.7	3.7
West	119,676	38.9	56,635	38	47.3	4,403	36.7	3.7	9,388	42.8	7.8	19,227	40.7	16.1	30,625	38.7	25.6	5,368	43.2	4.5
Bed size of hospital																				
Small	29,946	9.7	13,686	9.2	45.7	1,082	9	3.6	2,992	13.6	10	3,098	6.6	10.3	6,550	8.3	21.9	952	7.7	3.2
Medium	78,433	25.5	36,597	24.6	46.7	3,154	26.3	4	6,142	28	7.8	10,956	23.2	14	19,363	24.5	24.7	2,975	23.9	3.8
Large	198,493	64.5	98,349	66	49.5	7,696	64.2	3.9	12,786	58.3	6.4	33,079	70	16.7	52,952	67	26.7	8,488	68.2	4.3
Missing	714	0.2	297	0.2	41.6	51	0.4	7.2	19	0.1	2.6	128	0.3	17.9	184	0.2	25.7	24	0.2	3.3

Table 3(Continued)

	Discharges		Fracture			Dislocation			Sprain Strain			Internal			Open Wound			Superficial		
	N	C%	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate
All	307,586	100	148,928	100	48.4	11,982	100	3.9	21,938	100	7.1	47,261	100	15.4	79,050	100	25.7	12,438	100	4
Location (urban/rural) of hospital																				
Urban	272,420	88.6	132,704	89.1	48.7	10,835	90.4	4	18,471	84.2	6.8	43,464	92	16	71,512	90.5	26.3	11,047	88.8	4.1
Rural	34,452	11.2	15,926	10.7	46.2	1,096	9.1	3.2	3,449	15.7	10	3,669	7.8	10.6	7,355	9.3	21.3	1,368	11	4
Missing	714	0.2	297	0.2	41.6	51	0.4	7.2	19	0.1	2.6	128	0.3	17.9	184	0.2	25.7	24	0.2	3.3
Teaching status of hospital																				
Teaching	152,059	49.4	76,062	51.1	50	6,168	51.5	4.1	8,477	38.6	5.6	28,088	59.4	18.5	44,292	56	29.1	6,493	52.2	4.3
Non-teaching	154,813	50.3	72,569	48.7	46.9	5,763	48.1	3.7	13,443	61.3	8.7	19,044	40.3	12.3	34,574	43.7	22.3	5,921	47.6	3.8
Missing	714	0.2	297	0.2	41.6	51	0.4	7.2	19	0.1	2.6	128	0.3	17.9	184	0.2	25.7	24	0.2	3.3
Year																				
1998	27,363	8.9	13,104	8.8	47.9	1,323	11	4.8	2,447	11.2	8.9	4,249	9	15.5	7,676	9.7	28.1	1,062	8.5	3.9
1999	24,314	7.9	12,067	8.1	49.6	1,026	8.6	4.2	1,950	8.9	8	3,682	7.8	15.1	6,809	8.6	28	859	6.9	3.5
2000	24,198	7.9	11,450	7.7	47.3	944	7.9	3.9	2,510	11.4	10.4	3,349	7.1	13.8	6,136	7.8	25.4	948	7.6	3.9
2001	26,133	8.5	11,909	8	45.6	960	8	3.7	2,204	10	8.4	3,628	7.7	13.9	6,482	8.2	24.8	863	6.9	3.3
2002	26,038	8.5	12,567	8.4	48.3	969	8.1	3.7	1,854	8.5	7.1	4,127	8.7	15.8	7,115	9	27.3	1,001	8	3.8
2003	26,559	8.6	12,071	8.1	45.4	1,041	8.7	3.9	1,938	8.8	7.3	4,141	8.8	15.6	6,784	8.6	25.5	1,074	8.6	4
2004	26,315	8.6	13,675	9.2	52	1,029	8.6	3.9	1,810	8.2	6.9	4,081	8.6	15.5	7,082	9	26.9	958	7.7	3.6
2005	24,086	7.8	11,470	7.7	47.6	814	6.8	3.4	1,529	7	6.3	3,720	7.9	15.4	6,203	7.8	25.8	964	7.8	4
2006	28,354	9.2	14,371	9.6	50.7	956	8	3.4	1,744	7.9	6.2	4,617	9.8	16.3	7,126	9	25.1	1,232	9.9	4.3
2007	26,845	8.7	13,558	9.1	50.5	998	8.3	3.7	1,569	7.2	5.8	4,600	9.7	17.1	7,082	9	26.4	1,182	9.5	4.4
2008	25,962	8.4	12,639	8.5	48.7	1,063	8.9	4.1	1,321	6	5.1	3,768	8	14.5	5,751	7.3	22.2	1,371	11	5.3
2009	21,420	7	10,049	6.7	46.9	860	7.2	4	1,063	4.8	5	3,299	7	15.4	4,804	6.1	22.4	924	7.4	4.3
Length of Stay > 13 Days (95th percentile)																				
Yes	13,333	4.3	7,155	4.8	53.7	654	5.5	4.9	404	1.8	3	3,587	7.6	26.9	2,948	3.7	22.1	419	3.4	3.1
No	294,254	95.7	141,773	95.2	48.2	11,328	94.5	3.8	21,534	98.2	7.3	43,674	92.4	14.8	76,102	96.3	25.9	12,019	96.6	4.1
Died during hospitalization																				
Yes	2,180	0.7	1,090	0.7	50	19	0.2	0.9	5	0	0.2	919	1.9	42.2	339	0.4	15.6	84	0.7	3.9
No	305,406	99.3	147,838	99.3	48.4	11,964	99.8	3.9	21,934	100	7.2	46,341	98.1	15.2	78,711	99.6	25.8	12,354	99.3	4
Injury Site																				
Head	27,312	8.9	8,724	5.9	31.9	853	7.1	3.1	32	0.1	0.1	9,401	19.9	34.4	10,285	13	37.7	1,260	10.1	4.6
Trunk	28,536	9.3	14,103	9.5	49.4	1,940	16.2	6.8	3,634	16.6	12.7	8,403	17.8	29.4	1,432	1.8	5	592	4.8	2.1
Extremity	161,799	52.6	97,423	65.4	60.2	6,378	53.2	3.9	13,399	61.1	8.3	13,995	29.6	8.6	54,410	68.8	33.6	4,240	34.1	2.6
Multi	43,692	14.2	28,678	19.3	65.6	2,811	23.5	6.4	4,558	20.8	10.4	15,421	32.6	35.3	12,907	16.3	29.5	6,199	49.8	14.2
Missing	46,248	15	0	0	0	0	0	0	317	1.4	0.7	40	0.1	0.1	15	0	0	148	1.2	0.3

Table 4 - Occupational Injury Proportions by Injury Type (weighted) –Part 2

	Discharges		Contusion			Crushing			Foreign Body Entering Orifice			Burn			Poisoning			Physical Environment		
	N	C%	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate
All	307,586	100	21,462	100	7	15,236	100	5	1,609	100	0.5	17,787	100	5.8	7,178	100	2.3	8,323	100	2.7
Age																				
<14	1,790	0.6	155	0.7	8.7	32	0.2	1.8	89	5.5	5	108	0.6	6	143	2	8	105	1.3	5.9
14-17	2,175	0.7	131	0.6	6	109	0.7	5	14	0.9	0.7	246	1.4	11.3	126	1.8	5.8	43	0.5	2
18-24	33,694	11	2,104	9.8	6.2	2,786	18.3	8.3	213	13.2	0.6	2,614	14.7	7.8	720	10	2.1	758	9.1	2.3
25-34	62,725	20.4	4,144	19.3	6.6	3,915	25.7	6.2	360	22.4	0.6	4,325	24.3	6.9	1,245	17.3	2	1,664	20	2.7
35-44	76,191	24.8	5,126	23.9	6.7	3,544	23.3	4.7	321	20	0.4	4,890	27.5	6.4	1,811	25.2	2.4	1,942	23.3	2.5
45-54	68,085	22.1	4,826	22.5	7.1	3,018	19.8	4.4	307	19.1	0.5	3,649	20.5	5.4	1,623	22.6	2.4	1,760	21.1	2.6
55-64	38,510	12.5	2,886	13.4	7.5	1,444	9.5	3.7	174	10.8	0.5	1,517	8.5	3.9	849	11.8	2.2	1,081	13	2.8
≥65	22,565	7.3	2,024	9.4	9	273	1.8	1.2	130	8.1	0.6	351	2	1.6	633	8.8	2.8	946	11.4	4.2
Missing	1,850	0.6	66	0.3	3.6	115	0.8	6.2	0	0	0	89	0.5	4.8	28	0.4	1.5	24	0.3	1.3
Gender																				
Male	251,741	81.8	17,748	82.7	7.1	13,923	91.4	5.5	1,357	84.4	0.5	15,986	89.9	6.4	4,693	65.4	1.9	6,954	83.6	2.8
Female	51,112	16.6	3,581	16.7	7	1,068	7	2.1	232	14.4	0.5	1,655	9.3	3.2	2,429	33.8	4.8	1,331	16	2.6
Missing	4,733	1.5	133	0.6	2.8	246	1.6	5.2	20	1.2	0.4	146	0.8	3.1	56	0.8	1.2	38	0.5	0.8
Race																				
NH-White	149,488	48.6	10,499	48.9	7	6,195	40.7	4.1	820	51	0.5	8,328	46.8	5.6	3,982	55.5	2.7	4,686	56.3	3.1
NH-Black	19,186	6.2	1,078	5	5.6	1,206	7.9	6.3	90	5.6	0.5	1,140	6.4	5.9	638	8.9	3.3	605	7.3	3.2
Hispanic	56,020	18.2	4,169	19.4	7.4	3,459	22.7	6.2	359	22.3	0.6	3,445	19.4	6.1	1,039	14.5	1.9	1,293	15.5	2.3
Other	17,774	5.8	1,258	5.9	7.1	939	6.2	5.3	97	6.1	0.5	1,120	6.3	6.3	322	4.5	1.8	463	5.6	2.6
Missing	65,119	21.2	4,457	20.8	6.8	3,437	22.6	5.3	242	15.1	0.4	3,754	21.1	5.8	1,197	16.7	1.8	1,275	15.3	2
Income																				
Lowest	77,691	25.3	5,191	24.2	6.7	4,511	29.6	5.8	440	27.3	0.6	4,605	25.9	5.9	1,855	25.8	2.4	2,322	27.9	3
2nd	83,438	27.1	5,614	26.2	6.7	4,134	27.1	5	452	28.1	0.5	4,744	26.7	5.7	1,866	26	2.2	2,113	25.4	2.5
3rd	78,286	25.5	5,711	26.6	7.3	3,762	24.7	4.8	376	23.4	0.5	4,523	25.4	5.8	1,748	24.3	2.2	2,004	24.1	2.6
Highest	58,507	19	4,159	19.4	7.1	2,436	16	4.2	293	18.2	0.5	3,303	18.6	5.6	1,493	20.8	2.6	1,628	19.6	2.8
Missing	9,663	3.1	787	3.7	8.1	393	2.6	4.1	48	3	0.5	612	3.4	6.3	217	3	2.2	255	3.1	2.6
Alcohol																				
Yes	9,172	3	965	4.5	10.5	226	1.5	2.5	57	3.6	0.6	435	2.4	4.7	595	8.3	6.5	379	4.5	4.1
No	298,414	97	20,497	95.5	6.9	15,010	98.5	5	1,551	96.4	0.5	17,352	97.6	5.8	6,583	91.7	2.2	7,944	95.5	2.7
Any Drug Component																				
Yes	6,216	2	440	2	7.1	155	1	2.5	51	3.2	0.8	370	2.1	5.9	892	12.4	14.4	271	3.3	4.4
No	301,370	98	21,022	98	7	15,081	99	5	1,557	96.8	0.5	17,417	97.9	5.8	6,286	87.6	2.1	8,052	96.7	2.7
Primary Payer																				
Government	27,917	9.1	2,024	9.4	7.3	310	2	1.1	256	15.9	0.9	935	5.3	3.4	1,436	20	5.1	1,328	16	4.8
Private	62,382	20.3	4,894	22.8	7.8	2,176	14.3	3.5	342	21.2	0.5	3,121	17.5	5	2,488	34.7	4	2,027	24.4	3.2
Other	217,288	70.6	14,544	67.8	6.7	12,749	83.7	5.9	1,011	62.8	0.5	13,731	77.2	6.3	3,253	45.3	1.5	4,968	59.7	2.3

Table 4 - Occupational Injury Proportions by Injury Type (weighted) –Part 2 **(Continued)**

	Discharges		Contusion			Crushing			Foreign Body Entering Orifice			Burn			Poisoning			Physical Environment		
	N	C%	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate
All	307,586	100	21,462	100	7	15,236	100	5	1,609	100	0.5	17,787	100	5.8	7,178	100	2.3	8,323	100	2.7
Disposition of patient (uniform)																				
Died	2,180	0.7	95	0.4	4.4	52	0.3	2.4	48	3	2.2	246	1.4	11.3	49	0.7	2.2	314	3.8	14.4
Routine	251,230	81.7	17,956	83.7	7.1	12,948	85	5.2	1,331	82.8	0.5	14,149	79.5	5.6	5,829	81.2	2.3	6,446	77.4	2.6
Short term hosp	5,041	1.6	373	1.7	7.4	216	1.4	4.3	27	1.7	0.5	376	2.1	7.4	196	2.7	3.9	204	2.4	4
Another type of facility	24,286	7.9	1,577	7.3	6.5	608	4	2.5	125	7.8	0.5	559	3.1	2.3	801	11.2	3.3	786	9.4	3.2
Home health care	22,159	7.2	1,130	5.3	5.1	1,322	8.7	6	58	3.6	0.3	2,353	13.2	10.6	108	1.5	0.5	431	5.2	1.9
AMA	2,350	0.8	308	1.4	13.1	76	0.5	3.2	14	0.9	0.6	99	0.6	4.2	155	2.2	6.6	142	1.7	6.1
Missing	341	0.1	23	0.1	6.8	14	0.1	4.2	5	0.3	1.5	5	0	1.6	41	0.6	11.9	0	0	0
Admission source (uniform)																				
ER	188,352	61.2	15,691	73.1	8.3	9,995	65.6	5.3	921	57.3	0.5	8,193	46.1	4.3	4,853	67.6	2.6	5,613	67.4	3
Another hosp	8,065	2.6	281	1.3	3.5	396	2.6	4.9	39	2.4	0.5	1,741	9.8	21.6	149	2.1	1.8	222	2.7	2.8
Another health facility	3,736	1.2	80	0.4	2.1	214	1.4	5.7	10	0.6	0.3	517	2.9	13.8	96	1.3	2.6	35	0.4	0.9
Court/law enforcement	95	0	5	0	4.8	5	0	5.2	0	0	0	0	0	0	10	0.1	10.5	0	0	0
Routine/other	68,267	22.2	2,452	11.4	3.6	2,301	15.1	3.4	288	17.9	0.4	5,275	29.7	7.7	912	12.7	1.3	1,006	12.1	1.5
Missing	39,072	12.7	2,955	13.8	7.6	2,325	15.3	6	351	21.8	0.9	2,061	11.6	5.3	1,159	16.1	3	1,448	17.4	3.7
Admission day is a weekend																				
Weekday	264,633	86	18,442	85.9	7	13,180	86.5	5	1,280	79.6	0.5	15,075	84.8	5.7	5,615	78.2	2.1	6,916	83.1	2.6
Weekend	42,373	13.8	2,988	13.9	7.1	2,056	13.5	4.9	323	20.1	0.8	2,671	15	6.3	1,538	21.4	3.6	1,401	16.8	3.3
Missing	580	0.2	33	0.2	5.6	0	0	0	5	0.3	0.8	41	0.2	7.1	26	0.4	4.5	6	0.1	1
Region of hospital																				
Northeast	52,302	17	3,366	15.7	6.4	2,070	13.6	4	301	18.7	0.6	3,249	18.3	6.2	1,399	19.5	2.7	1,299	15.6	2.5
Midwest	60,037	19.5	4,653	21.7	7.8	3,539	23.2	5.9	208	13	0.3	4,039	22.7	6.7	1,443	20.1	2.4	1,606	19.3	2.7
South	75,571	24.6	4,469	20.8	5.9	4,366	28.7	5.8	324	20.1	0.4	4,154	23.4	5.5	1,812	25.2	2.4	2,318	27.9	3.1
West	119,676	38.9	8,974	41.8	7.5	5,262	34.5	4.4	775	48.2	0.6	6,346	35.7	5.3	2,524	35.2	2.1	3,099	37.2	2.6
Bed size of hospital																				
Small	29,946	9.7	2,078	9.7	6.9	1,195	7.8	4	190	11.8	0.6	1,064	6	3.6	892	12.4	3	960	11.5	3.2
Medium	78,433	25.5	5,500	25.6	7	3,962	26	5.1	324	20.1	0.4	5,039	28.3	6.4	2,013	28	2.6	2,207	26.5	2.8
Large	198,493	64.5	13,835	64.5	7	10,037	65.9	5.1	1,089	67.7	0.5	11,605	65.2	5.8	4,235	59	2.1	5,137	61.7	2.6
Missing	714	0.2	49	0.2	6.9	42	0.3	5.8	5	0.3	0.7	79	0.4	11.1	38	0.5	5.3	19	0.2	2.6
Location (urban/rural) of hospital																				
Urban	272,420	88.6	18,468	86	6.8	13,768	90.4	5.1	1,417	88.1	0.5	16,628	93.5	6.1	6,174	86	2.3	6,996	84.1	2.6
Rural	34,452	11.2	2,945	13.7	8.5	1,426	9.4	4.1	186	11.6	0.5	1,080	6.1	3.1	967	13.5	2.8	1,308	15.7	3.8
Missing	714	0.2	49	0.2	6.9	42	0.3	5.8	5	0.3	0.7	79	0.4	11.1	38	0.5	5.3	19	0.2	2.6

Table 4 - Occupational Injury Proportions by Injury Type (weighted) –Part 2 **(Continued)**

	Discharges		Contusion			Crushing			Foreign Body Entering Orifice			Burn			Poisoning			Physical Environment		
	N	C%	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate	N	C%	Rate
All	307,586	100	21,462	100	7	15,236	100	5	1,609	100	0.5	17,787	100	5.8	7,178	100	2.3	8,323	100	2.7
Teaching status of hospital																				
Teaching	152,059	49.4	9,455	44.1	6.2	9,139	60	6	940	58.4	0.6	12,159	68.4	8	2,851	39.7	1.9	3,374	40.5	2.2
Non-teaching	154,813	50.3	11,958	55.7	7.7	6,055	39.7	3.9	664	41.3	0.4	5,549	31.2	3.6	4,290	59.8	2.8	4,930	59.2	3.2
Missing	714	0.2	49	0.2	6.9	42	0.3	5.8	5	0.3	0.7	79	0.4	11.1	38	0.5	5.3	19	0.2	2.6
Year																				
1998	27,363	8.9	1,884	8.8	6.9	1,137	7.5	4.2	139	8.6	0.5	1,694	9.5	6.2	471	6.6	1.7	406	4.9	1.5
1999	24,314	7.9	1,655	7.7	6.8	958	6.3	3.9	142	8.8	0.6	1,146	6.4	4.7	398	5.5	1.6	469	5.6	1.9
2000	24,198	7.9	1,790	8.3	7.4	731	4.8	3	230	14.3	1	1,081	6.1	4.5	523	7.3	2.2	441	5.3	1.8
2001	26,133	8.5	1,724	8	6.6	896	5.9	3.4	119	7.4	0.5	2,104	11.8	8.1	573	8	2.2	538	6.5	2.1
2002	26,038	8.5	1,872	8.7	7.2	1,154	7.6	4.4	151	9.4	0.6	1,215	6.8	4.7	599	8.3	2.3	465	5.6	1.8
2003	26,559	8.6	1,836	8.6	6.9	1,094	7.2	4.1	92	5.7	0.3	1,641	9.2	6.2	545	7.6	2.1	557	6.7	2.1
2004	26,315	8.6	1,674	7.8	6.4	1,486	9.8	5.6	141	8.7	0.5	1,302	7.3	4.9	563	7.8	2.1	549	6.6	2.1
2005	24,086	7.8	1,800	8.4	7.5	1,212	8	5	113	7	0.5	1,472	8.3	6.1	639	8.9	2.7	823	9.9	3.4
2006	28,354	9.2	2,035	9.5	7.2	1,750	11.5	6.2	114	7.1	0.4	1,645	9.2	5.8	649	9	2.3	1,001	12	3.5
2007	26,845	8.7	1,750	8.2	6.5	1,805	11.8	6.7	105	6.5	0.4	1,316	7.4	4.9	706	9.8	2.6	1,056	12.7	3.9
2008	25,962	8.4	1,878	8.8	7.2	1,686	11.1	6.5	130	8.1	0.5	1,860	10.5	7.2	712	9.9	2.7	1,103	13.3	4.2
2009	21,420	7	1,564	7.3	7.3	1,326	8.7	6.2	133	8.3	0.6	1,310	7.4	6.1	801	11.2	3.7	913	11	4.3
Length of Stay > 13 Days (95th percentile)																				
Yes	13,333	4.3	575	2.7	4.3	1,015	6.7	7.6	122	7.6	0.9	2,350	13.2	17.6	171	2.4	1.3	778	9.3	5.8
No	294,254	95.7	20,887	97.3	7.1	14,221	93.3	4.8	1,487	92.4	0.5	15,438	86.8	5.2	7,007	97.6	2.4	7,545	90.7	2.6
Died during hospitalization																				
Yes	2,180	0.7	95	0.4	4.4	52	0.3	2.4	48	3	2.2	246	1.4	11.3	49	0.7	2.2	314	3.8	14.4
No	305,406	99.3	21,367	99.6	7	15,185	99.7	5	1,561	97	0.5	17,541	98.6	5.7	7,129	99.3	2.3	8,009	96.2	2.6
Injury Site																				
Head	27,312	8.9	3,545	16.5	13	79	0.5	0.3	797	49.5	2.9	1,013	5.7	3.7	219	3	0.8	316	3.8	1.2
Trunk	28,536	9.3	3,060	14.3	10.7	489	3.2	1.7	403	25	1.4	472	2.7	1.7	64	0.9	0.2	545	6.5	1.9
Extremity	161,799	52.6	4,725	22	2.9	13,622	89.4	8.4	76	4.7	0	8,365	47	5.2	155	2.2	0.1	1,422	17.1	0.9
Multi	43,692	14.2	9,928	46.3	22.7	1,033	6.8	2.4	274	17	0.6	7,776	43.7	17.8	163	2.3	0.4	884	10.6	2
Missing	46,248	15	204	1	0.4	14	0.1	0	59	3.7	0.1	161	0.9	0.3	6,577	91.6	14.2	5,156	61.9	11.1

Table 4

Prevalence Rates and Means of Occupational Injuries Incurred in Industrial Settings

Overall and looking at all hospital discharges in the U.S. for the period [1998-2009], the prevalence rate for occupational injuries was 6.7 for every 10,000 admissions with a 95% confidence interval of (6.3–7.2). As further detailed by socio-demographic characteristics in Table 5, men were at much higher risk of occupational injuries with an prevalence rate of 13.4 compared to women (1.9).

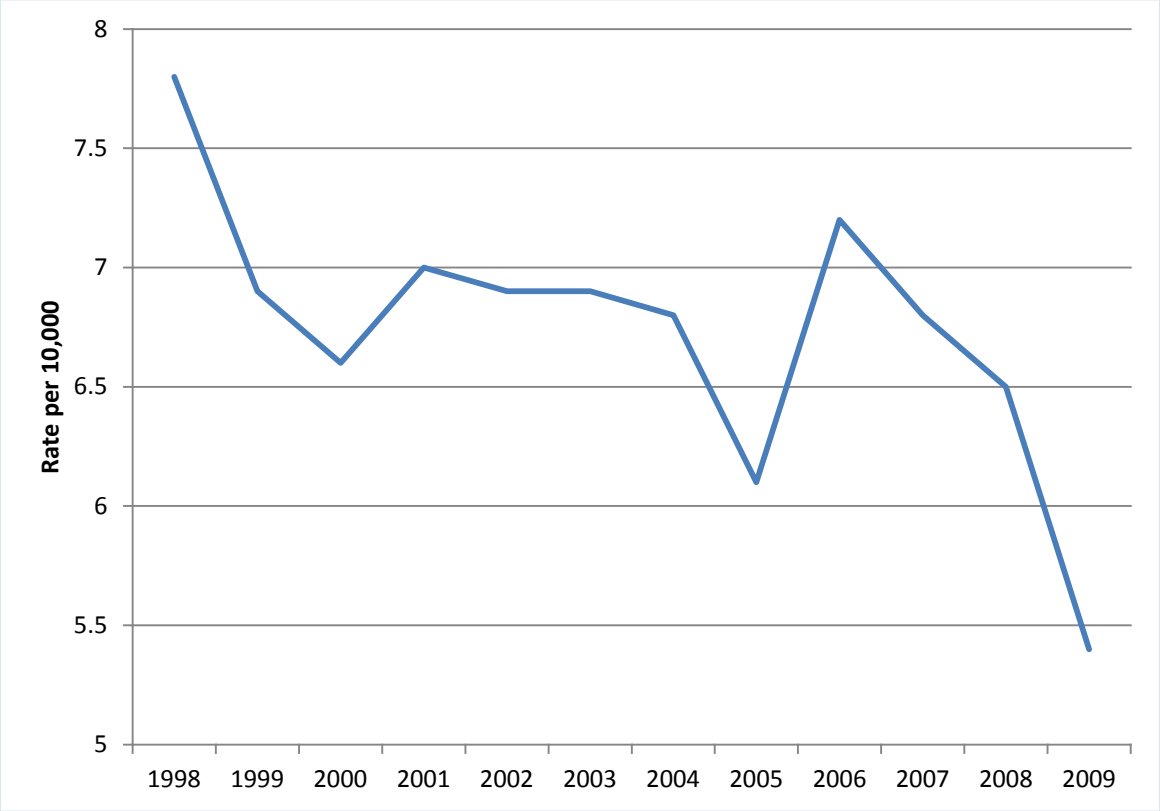

Figure 6 - Prevalence Trends for Occupational Injuries (1998 - 2009)

Starting at a rate of 7.8 per 10,000 in 1998, the prevalence of occupational injuries declined over time, with just two upticks observed in 2001 and 2006, reaching 5.4 per 10,000 admissions in 2009 (Figure 6).

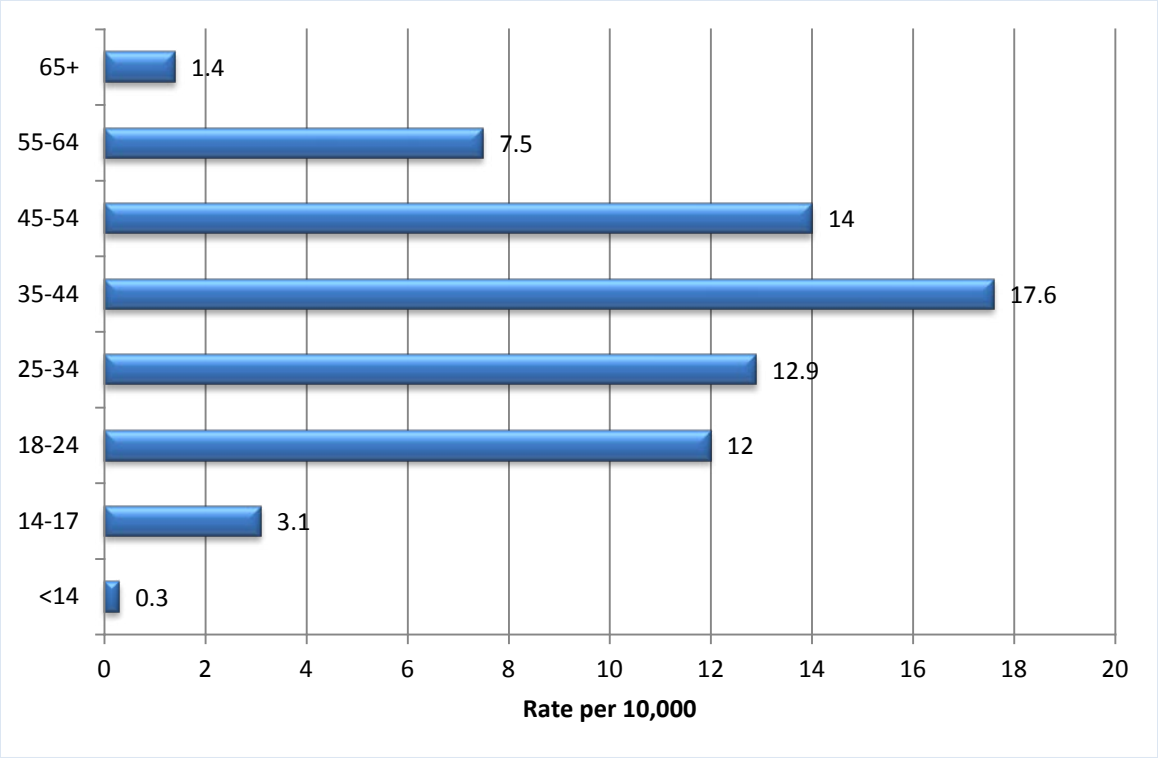

Figure 7 - Occupational Injuries Prevalence by Age Group

Noted disparities in prevalence included age bias (Figure 7) where the highest risk pool was made up of the [35-44] age group with an prevalence rate of 17.6 per 10,000 admissions and closely followed by [45-54] with 14 per 10,000 ,and [25-34] with 12 per 10,000. The much younger "<14" and older "≥65" age groups had the lowest prevalence rate, with 0.3 and 1.4 respectively per 10,000 admissions.

From a geographical standpoint, the rate of occupational injuries was significantly higher in the Western US (13.8 for every 10,000), more than double the rate found for any other region. Such a large disparity can be found on the racial/ethnic characteristic where Hispanics with a prevalence rate of 13.4 per 10,000 admissions were at a much higher risk of occupational injuries than any other racial group.

Table 5 – Prevalence of Occupational Injuries per 10,000 Discharges by Socio-Demographic characteristics (weighted)

Factor	Level	n (weighted)	95% Confidence Interval (LCL - UCL)	Prevalence per 10,000	95% Confidence Interval (LCL - UCL)	Standard Error
OVERALL		307,586	(286,129 - 329,043)	6.7	(6.3 - 7.2)	0.221
Year	1998	27,363	(22,804 - 31,922)	7.8	(6.7 - 9.0)	0.568
	1999	24,314	(20,385 - 28,243)	6.9	(5.9 - 7.8)	0.487
	2000	24,198	(19,824 - 28,572)	6.6	(5.6 - 7.7)	0.546
	2001	26,133	(21,639 - 30,627)	7	(6.0 - 8.1)	0.533
	2002	26,038	(21,484 - 30,593)	6.9	(5.9 - 7.9)	0.518
	2003	26,559	(21,780 - 31,338)	6.9	(5.9 - 8.0)	0.544
	2004	26,315	(20,913 - 31,717)	6.8	(5.6 - 8.1)	0.634
	2005	24,086	(20,324 - 27,847)	6.1	(5.3 - 7.0)	0.421
	2006	28,354	(23,759 - 32,948)	7.2	(6.2 - 8.2)	0.507
	2007	26,845	(22,274 - 31,415)	6.8	(5.8 - 7.7)	0.489
	2008	25,962	(21,900 - 30,025)	6.5	(5.7 - 7.3)	0.413
	2009	21,420	(18,015 - 24,824)	5.4	(4.8 - 6.1)	0.343
Age	<14	1,790	(1,424 - 2,156)	0.3	(0.2 - 0.3)	0.025
	14-17	2,175	(1,869 - 2,481)	3.1	(2.7 - 3.5)	0.219
	18-24	33,694	(30,792 - 36,597)	12	(11.0 - 12.9)	0.483
	25-34	62,725	(57,523 - 67,927)	12.9	(11.9 - 14.0)	0.517
	35-44	76,191	(70,424 - 81,957)	17.6	(16.4 - 18.9)	0.629
	45-54	68,085	(63,409 - 72,762)	14	(13.1 - 14.9)	0.449
	55-64	38,510	(36,033 - 40,987)	7.5	(7.1 - 8.0)	0.231
	≥65	22,565	(21,064 - 24,065)	1.4	(1.3 - 1.5)	0.044
Gender	Male	251,741	(233,043 - 270,439)	13.4	(12.5 - 14.4)	0.468
	Female	51,112	(47,993 - 54,231)	1.9	(1.8 - 2.0)	0.054
Income	Lowest	77,691	(71,245 - 84,138)	6.1	(5.7 - 6.6)	0.229
	2nd	83,438	(77,008 - 89,868)	7.1	(6.6 - 7.6)	0.249
	3rd	78,286	(71,936 - 84,636)	7.5	(6.9 - 8.0)	0.281
	Highest	58,507	(52,864 - 64,150)	6.1	(5.5 - 6.7)	0.292
	Unknown	9,663	(8,414 - 10,913)	9.3	(8.4 - 10.2)	0.468
Location	Rural	34,452	(29,840 - 39,064)	5.4	(4.7 - 6.0)	0.332
	Urban	272,420	(251,491 - 293,349)	7	(6.5 - 7.5)	0.252
Region	NE	52,302	(43,310 - 61,294)	5.8	(4.8 - 6.7)	0.485
	Midwest	60,037	(51,630 - 68,445)	5.7	(5.0 - 6.4)	0.367
	South	75,571	(64,110 - 87,032)	4.4	(3.8 - 4.9)	0.301
	West	119,676	(106,353 - 132,998)	13.8	(12.4 - 15.2)	0.715
Payer	Gov't	27,917	(25,862 - 29,972)	1.1	(1.0 - 1.2)	0.038
	Private	62,382	(57,109 - 67,655)	3.8	(3.5 - 4.1)	0.16
	Other	217,288	(199,837 - 234,738)	55.4	(50.9 - 59.9)	2.293
Race/Ethnicity	White	149,488	(137,403 - 161,572)	6.4	(6.0 - 6.9)	0.232
	Black	19,186	(16,704 - 21,669)	4.1	(3.6 - 4.5)	0.23
	Hispanic	56,020	(49,503 - 62,536)	13.4	(12.0 - 14.7)	0.703
	Other	17,774	(14,158 - 21,389)	8.4	(7.0 - 9.8)	0.721
	Unknown	65,119	(56,032 - 74,205)	5.8	(5.1 - 6.5)	0.367
Admission Source	ER	188,352	(173,595 - 203,108)	11.4	(10.6 - 12.2)	0.418
	Another hospital	8,065	(6,577 - 9,554)	6.1	(5.1 - 7.2)	0.543
	Another health facility	3,736	(2,226 - 5,247)	6.4	(4.0 - 8.8)	1.226
	Court/law enforce	95	(3 - 186)	2.3	(0.2 - 4.4)	1.076
	Routine/other	68,267	(61,659 - 74,874)	3.4	(3.1 - 3.7)	0.161
Day of the Week	Weekday	264,633	(246,029 - 283,237)	7.2	(6.7 - 7.7)	0.239
	Weekend	42,373	(39,312 - 45,435)	4.8	(4.5 - 5.1)	0.161

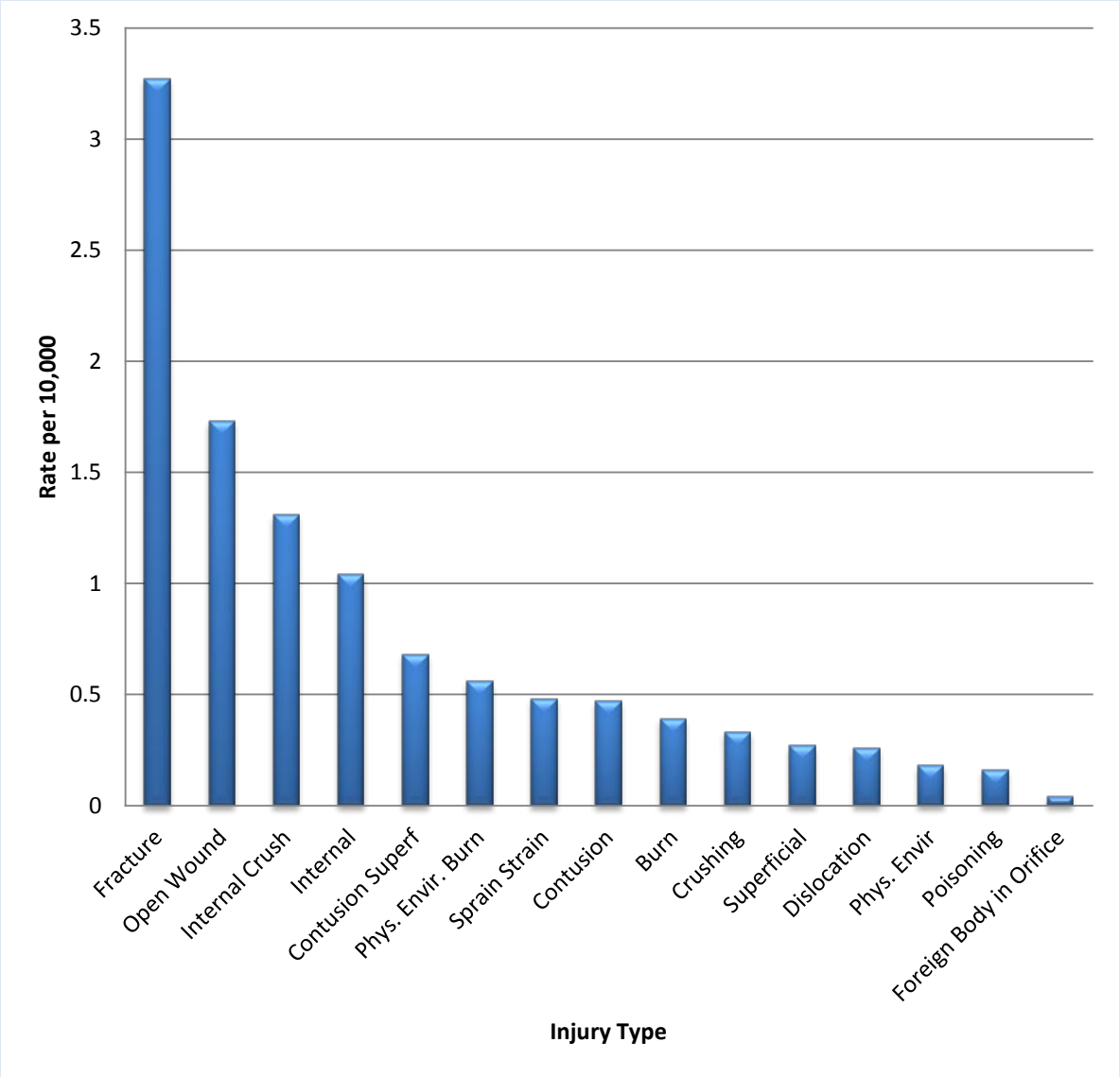

Figure 8 – Prevalence of Occupational Injuries by Injury Type

As illustrated in Figure 8, an analysis of prevalence by diagnostic characteristics, such as injury types and injury location (site) identified fractures as the injury diagnostic group with the high prevalence rate of 3.27 per 10,000 admissions (95% confidence interval [3.05 – 3.48]), nearly double that of "open wounds" which came second at 1.73 per 10,000 admissions (95% confidence interval [1.57 – 1.89]).

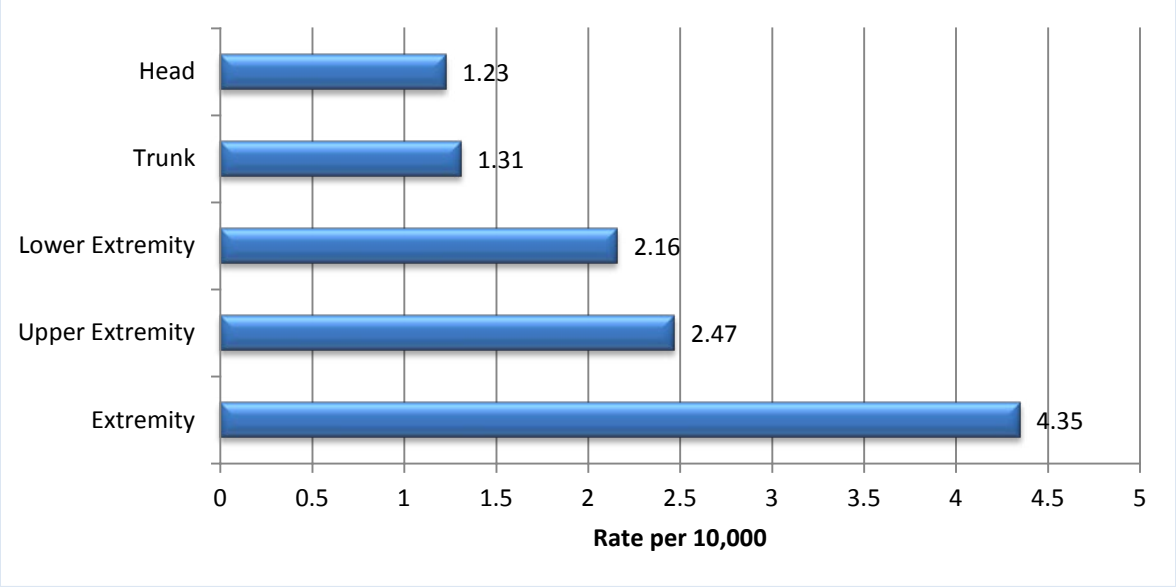

Figure 9 – Prevalence of occupational Injuries by Injury Site (Anatomical position)

From a location or site angle as illustrated in Figure 9, injuries to extremities were the most prevalent, at 4.35 per 10,000 admissions (95% confidence interval [4.04 – 4.66]) whereas those to the head and trunk were the least prevalent, at respectively 1.23 and 1.31 per 10,000 admissions. Table 7 and Table 8 provide mean length of stay (LOS) and mean cost in U.S. Dollars for. While the mean length of stay for the whole sample was 4.09 days (95% confidence interval [3.96 – 4.22]) and the 95th percentile of all stays was just below 13 days, several disparities were identified.

On average, patients falling under the "Multiple" injury site category stayed the longest, 6.25 days (95% confidence interval [5.85 – 6.57]) and paid the average highest cost of all, $17,518 (95% confidence interval [$16,104 - $18,930]). By contrast, those diagnosed with injuries to extremities stay the shortest on average, 3.53 days (95% confidence interval [3.42 – 3.65]) and at the lowest average cost of $8,269 (95% confidence interval [$7,920 - $8,616]).

Table 6 – Prevalence of Occupational Injuries per 10,000 Discharges by Diagnostic Characteristics (weighted)

	n (weighted)	95% Confidence Interval (LCL - UCL)	Prevalence per 10,000	95% Confidence Interval (LCL - UCL)	Standard Error
Overall	307,586	(286,129 - 329,043)	6.74	(6.31 - 7.18)	0.22
Type of Injury					
Fracture	148,928	(138,149 - 159,707)	3.27	(3.05 - 3.48)	0.11
Open Wound	79,050	(71,353 - 86,747)	1.73	(1.57 - 1.89)	0.08
Internal or Crush	59,801	(53,769 - 65,834)	1.31	(1.19 - 1.44)	0.06
Internal	47,261	(42,496 - 52,025)	1.04	(0.94 - 1.14)	0.05
Contusion or Superficial	31,052	(28,401 - 33,703)	0.68	(0.62 - 0.74)	0.03
Physical Environment or Burn	25,382	(20,892 - 29,871)	0.56	(0.46 - 0.65)	0.05
Sprain & Strain	21,938	(20,198 - 23,679)	0.48	(0.44 - 0.52)	0.02
Contusion	21,462	(19,613 - 23,312)	0.47	(0.43 - 0.51)	0.02
Burn	17,787	(13,467 - 22,107)	0.39	(0.30 - 0.48)	0.05
Crushing	15,236	(13,239 - 17,233)	0.33	(0.29 - 0.38)	0.02
Superficial	12,438	(11,153 - 13,724)	0.27	(0.25 - 0.30)	0.01
Dislocation	11,982	(10,939 - 13,026)	0.26	(0.24 - 0.28)	0.01
Physical Environment.	8,323	(7,659 - 8,987)	0.18	(0.17 - 0.20)	0.01
Poisoning	7,178	(6,587 - 7,769)	0.16	(0.14 - 0.17)	0.01
Foreign Body Entering Through Orifice	1,609	(1,300 - 1,917)	0.04	(0.03 - 0.04)	0
Injury Site					
Extremity	198,486	(183,368 - 213,604)	4.35	(4.04 - 4.66)	0.16
Upper Extremity	112,582	(101,911 - 123,253)	2.47	(2.25 - 2.69)	0.11
Lower Extremity	98,593	(92,105 - 105,082)	2.16	(2.03 - 2.29)	0.07
Trunk	59,559	(54,418 - 64,699)	1.31	(1.20 - 1.41)	0.05
Head	56,103	(50,721 - 61,485)	1.23	(1.12 - 1.34)	0.06

Average cost viewed from the perspective of injury type as illustrated in Figure 10 was dominated by the "foreign body entered orifice" diagnostic type as it was found to be the most expensive, costing on average $17,837 (95% confidence interval [$11,700 - $22,370]), but with an average length of stay of 4.54 days (95% confidence interval [3.48 - 5.59]). It was closely followed by burns, $16,495 (95% confidence interval [$14,023 - $18,965]), while poisoning by contrast and on average cost the least, $6,077 (95% confidence interval [$5,486 - $6,667]) and had one of the shortest lengths of stay, 2.92 days (95% confidence interval [2.69 - 3.16])

Average cost viewed from the perspective of injury type as illustrated in Figure 10 was dominated by the "foreign body entered orifice" diagnostic type as it was found to be the most expensive, costing on average $17,837 (95% confidence interval [$11,700 - $22,370]), but with an average length of stay of 4.54 days (95% confidence interval [3.48 - 5.59]). It was closely followed by burns, $16,495 (95% confidence interval [$14,023 - $18,965]), while poisoning by contrast and on average cost the least, $6,077 (95% confidence interval [$5,486 - $6,667]) and had one of the shortest lengths of stay, 2.92 days (95% confidence interval [2.69 - 3.16])

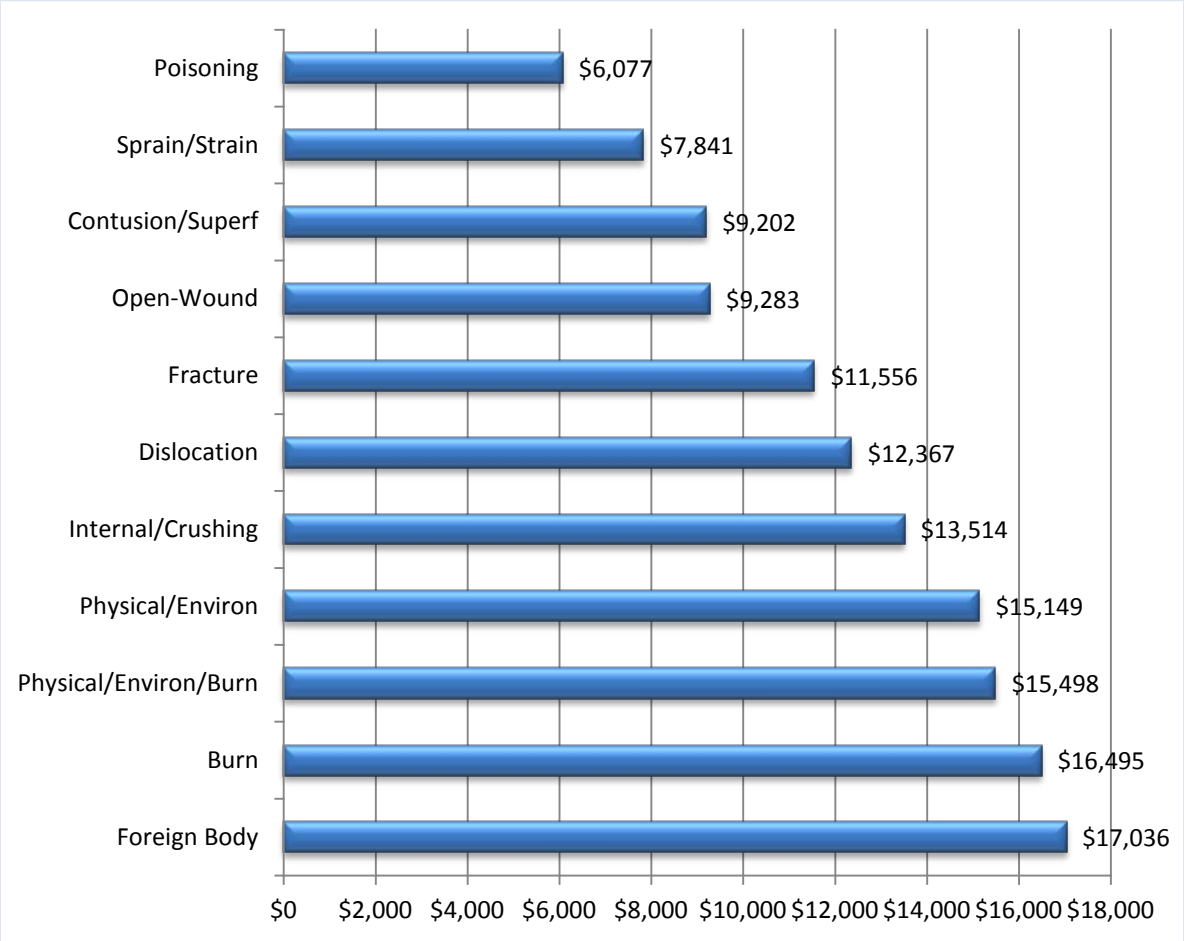

Figure 10 - Occupational Injuries Cost by Injury Type

Table 7 - Mean Length of Stay in Days (LOS)

Average length of stay at the hospital (days) and dependent confidence interval

Diagnostic Characteristic	Mean Length of Stay (Days)	95% Confidence Interval (LCL - UCL)
Overall	4.09	(3.96 - 4.22)
Injury Site		
Multiple	6.21	(5.85 - 6.57)
Trunk	4.4	(4.19 - 4.61)
Missing	4.04	(3.8 - 4.3)
Head	3.76	(3.56 - 3.95)
Extremity	3.53	(3.42 - 3.65)
Injury Type		
Burn	7.21	(6.52 - 7.9)
Physical/Environ/Burn	6.59	(5.99 - 7.18)
Physical/Environ	5.58	(4.79 - 6.38)
Internal/Crushing	4.97	(4.75 - 5.2)
Foreign Body Entering Through Orifice	4.54	(3.48 - 5.59)
Fracture	4.41	(4.28 - 4.55)
Dislocation	4.26	(3.98 - 4.54)
Contusion/Superficial	3.71	(3.57 - 3.85)
Open Wound	3.61	(3.46 - 3.77)
Poisoning	2.92	(2.69 - 3.16)
Sprain/Strain	2.87	(2.71 - 3.02)

Table 8 - Mean Cost of Treatment (in U.S. Dollars)

Average cost of treatment and dependent 95% confidence interval (in U.S. dollars).

Diagnostic Characteristic	Mean Treatment Cost ($)	95% Confidence Interval (LCL - UCL)
Overall	$10,153	($9,672 - $10,633)
Injury Site		
Multiple	$17,518	($16,104 - $18,930)
Trunk	$10,530	($9,768 - $11,291)
Head	$10,456	($9,771 - $11,140)
Missing	$9,345	($8,604 - $10,085)
Extremity	$8,269	($7,920 - $8,616)
Injury Type		
Foreign Body Entering Through Orifice	$17,036	($11,700 - $22,370)
Burn	$16,495	($14,023 - $18,965)
Physical/Environ/Burn	$15,498	($13,572 - $17,423)
Physical/Environ	$15,149	($12,401 - $17,897)
Internal/Crushing	$13,514	($12,697 - $14,329)
Dislocation	$12,367	($11,338 - $13,395)
Fracture	$11,556	($11,006 - $12,105)
Open-Wound	$9,283	($8,713 - $9,853)
Contusion/Superficial	$9,202	($8,604 - $9,799)
Sprain/Strain	$7,841	($7,252 - $8,431)
Poisoning	$6,077	($5,486 - $6,667)

Joinpoint Regression Results

While all results presented indicate a downward trend for occupational injuries incurred in industrial settings, we did not assume such a trend to be linear and monolithic during the entire study timeframe. Joinpoint regression analysis therefore gave us the opportunity to detect significant changes in trends (Table 9).

Overall, a single trend was identified for the period 1998-2009. During that timeframe, the rate of industry-related occupational injuries in the United States decreased on average by -1.73% yearly (95% confidence interval [-3.04 ~ -0.41]) and was statistically significant (significance level=1 or $\alpha = .05$). By contrast, a single upward trend pattern was identified for women as well as "Medicaid/Medicare" covered patients. During the entire study period, the Annual Percentage rate Change (APC) for women was 1.53% (95% confidence interval [0.35% ~ 2.72%]) and was statistically significant. As for the Government (Medicaid/Medicare) payer group, the rate of occupational injuries increased yearly by 7.72% (95% confidence interval [6.02% ~ 9.44%]) from 1998 through 2009.

Analysis by age group characteristics revealed two different downward trends for the [18-24] demographic. From 1998 through 2007, this group had a subtle APC decrease of -2.08% (95% confidence interval [-3.86% ~ -0.27%]), followed by a much drastic decrease of -18.34% between 2007 and 2009 (95% confidence interval [-33.24% ~ -0.11%]).

Similarly, three models were identified for the "Lowest" income group demographic but only two of the three were statistically significant, -6.27% (95% confidence interval [-4.14% ~ -1.32%]) from 1998 through 2003 and a much higher decrease of -10.31% (95% confidence interval [-17.91% ~ -2%]) from 2006 to 2009.

Joinpoint regression analysis by race/ethnicity revealed 3 models each for Caucasian and Hispanic groups. However, only 1 model was statistically significant for the former versus two for the latter. On the one hand and from 1998 to 2004, Caucasians had a subtle but insignificant APC decrease of -1.86% (95% confidence interval [-3.95% ~ 0.27%]), followed by an insignificant APC increase of 4.47% (95% confidence interval [-7.57% ~ 18.07%]) from 2004 to 2007, and finally a significant APC decrease of -11.65% (95% confidence interval [-20.06% ~ -1.24%]) from 2007 to 2009. Hispanics on the other hand saw a nearly two digits significant APC decrease of -9.65% (95% confidence interval [-12.09% ~ 7.15 %]) from 1998 to 2004, followed by an insignificant APC increase of 9.75% (95% confidence interval [-4.88% ~ 26.63%]) from 2004 to 2007, and finally a much more drastic and significant APC decrease of -18.65% (95% confidence interval [-27.91% ~ -8.21%]) from 2007 to 2009.

Table 9 - Joinpoint Regression Trends Summary (weighted)

Factor	Level	Model	Segment	Segment Start	Segment End	APC	95% Confidence Interval (LCL ~ UCL)	APC Significance Level 1=significant, 0=not significant
OVERALL		0	0	1998	2009	-1.73	(-3.04 ~ -0.41)	1
Age	<14	0	0	1998	2009	2.33	(-2.74 ~ 7.67)	0
	14-17	0	0	1998	2009	-3.79	(-8.85 ~ 1.55)	0
	18-24	1	0	1998	2007	-2.08	(-3.86 ~ -0.27)	1
	18-24	1	1	2007	2009	-18.34	(-33.24 ~ -0.11)	1
	25-34	0	0	1998	2009	-4.05	(-5.72 ~ -2.35)	1
	35-44	0	0	1998	2009	-3.51	(-4.86 ~ -2.15)	1
	45-54	0	0	1998	2009	-1.62	(-3.13 ~ -0.09)	1
	55-64	0	0	1998	2009	-0.47	(-1.78 ~ 0.86)	0
	≥65	0	0	1998	2009	9.16	(7.63 ~ 10.71)	1
Gender	Male	0	0	1998	2009	-2.74	(-4.14 ~ -1.32)	1
	Female	0	0	1998	2009	1.53	(0.35 ~ 2.72)	1
Income	Lowest	2	0	1998	2003	-6.27	(-9.72 ~ -2.68)	1
	Lowest	2	1	2003	2006	9.54	(-8.02 ~ 30.45)	0
	Lowest	2	2	2006	2009	-10.31	(-17.91 ~ -2.00)	1
	2nd	0	0	1998	2009	-1.51	(-2.76 ~ -0.24)	1
	3rd	0	0	1998	2009	-1.96	(-3.67 ~ -0.22)	1
	Highest	0	0	1998	2009	-0.76	(-2.83 ~ 1.35)	0
Location	Rural	0	0	1998	2009	-0.84	(-4.36 ~ 2.82)	0
	Urban	0	0	1998	2009	-1.68	(-3.09 ~ -0.25)	1
Payer	Gov't	0	0	1998	2009	7.72	(6.02 ~ 9.44)	1
	Private	0	0	1998	2009	-0.21	(-1.69 ~ 1.29)	0
	Other	0	0	1998	2009	-4.04	(-5.65 ~ -2.39)	1
Race / Ethnicity	White	2	0	1998	2004	-1.86	(-3.95 ~ 0.27)	0
	White	2	1	2004	2007	4.47	(-7.57 ~ 18.07)	0
	White	2	2	2007	2009	-11.15	(-20.06 ~ -1.24)	1
	Black	0	0	1998	2009	-1.85	(-4.71 ~ 1.09)	0
	Hispanic	2	0	1998	2004	-9.65	(-12.09 ~ -7.15)	1
	Hispanic	2	1	2004	2007	9.75	(-4.88 ~ 26.63)	0
	Hispanic	2	2	2007	2009	-18.65	(-27.91 ~ -8.21)	1
	Other	0	0	1998	2009	-4.01	(-6.95 ~ -0.98)	1
	Unknown	0	0	1998	2009	-2.39	(-6.38 ~ 1.77)	0
Region	NE	0	0	1998	2009	1.08	(-1.78 ~ 4.02)	0
	Midwest	0	0	1998	2009	-2.14	(-4.84 ~ 0.63)	0
	South	0	0	1998	2009	0.04	(-2.75 ~ 2.91)	0
	West	0	0	1998	2009	-4.07	(-5.99 ~ -2.11)	1

DISCUSSION AND CONCLUSION

Occupational injuries and illnesses are associated with numerous individual, social, and work related risk factors that are not always well understood and therefore avoided by workers, despite the best effort put forward by the U.S. Department of Labor directly or through dependent government agencies such as the *Occupational Safety and Health Administration (OSHA)* and the *Bureau of Labor Statistics (BLS)*.

OSHA and state and local governments actions through the enforcement of workplace safety rules and injuries prevention programs have greatly contributed towards the gradual reduction of occupational injuries and fatalities in the U.S.[31]. Some pillars of these rules and regulations include the requirement for employers to report workplace injuries[*Dohms (1993)*], and the *U.S. Bureau of Labor Statistics* annual survey data released every year and relied upon by policy makers and researchers in the field[20; 23; 24; 27]. According to one study, BLS data suffers from undercounting, missing approximately 33% to 69% of all injuries [*Leigh, Marcin, et al. (2004)*] due to underreporting and the exclusion by design of groups such as self-employed and government employees.

In this study, we used nation-wide hospital discharge data from the *National Inpatient Sample* (NIS) database provided by the U.S. *Agency for Healthcare Research and Quality (AHRQ)* through the *Healthcare and Cost Utilization Project (HCUP)*[1], to analyze decade long (1998-2009) trends and costs of workplace injuries and illnesses, by various clinical and socio-demographic characteristics.

From 1998 through 2009, a total of 300,586 workers were hospitalized in the United States due to injuries and illnesses sustained in industrial premises. Of the 4 regions we devised for the study, the "Western" U.S. had the highest proportion of admissions (39%), which was comparable to ratios reported in other studies[17; 25]. As expected and consistent with findings in similar studies, the patients were overwhelmingly male (82%) and about two-thirds were aged between 25 and 55 years. The large share of males in the patient pool could be partly explained by the fact that most industries have traditionally devised a distribution of tasks influenced by gender, with men more likely to be involved with more physically demanding and thus risky tasks than women [17; 25]. The study design unfortunately did not provide for stratification by industry that could better explain the gender disparity, e.g., by comparing heavy manufacturing to a more service oriented industry, like banking.

The youngest patient group (<14) made up just 0.6% of the total population studied, yet 28.5% of their injuries occurred on the head, about 4 times the rate observed for almost all other age groups. This higher rate could be partially explained by their lack of maturity, exposing them to more risk than the average worker. As to why the risk would be more elevated on the head than the more prevalent upper and lower limbs, further research is warranted, given the gap observed. Similar counter-trend results were found with respect to women. While women were across the board less likely to be injured than men, they were more than twice as likely to be hospitalized for poisoning as men. This finding is worth further research as well.

About 62% of patients were admitted through an Emergency Department (ED), which is comparable to findings from other studies. The high proportion can be explained by the urgent need for care when most injuries take place. This proportion could be much higher if all ED visits for injuries incurred in industrial settings, including those that did not lead to an

admission, were included in the data. As a result, a weakness of the data lies in the fact that it only includes injuries that were deemed severe enough to warrant a hospital visit followed by an admission, ignoring injuries either treated on premises or at outpatient clinics.

Upper and lower limbs were by a high margin (53%) the most likely injury sites, yet they had the lowest average cost ($8,269) per admission and consequently the shortest average hospital stay (3.53 days). This included conditions such as fracture of upper or lower limb; dislocation of the hip, knee, ankle, foot, shoulder, elbow, wrist, and finger; sprains and strains of shoulder, upper limb, hip and thigh, knee and leg, ankle and foot ; burns of the upper or lower limb, to name a few.

Similarly, fractures were by far the most common diagnostic condition of all admissions (48%), costing on average $11,556 per admission. Diagnostics for "Foreign Body Entering through Orifice" group were the most expensive, costing on average $17,036 and included conditions such as inhalation and ingestion of food or other objects causing obstruction of respiratory tract or suffocation; accidental mechanical suffocation; and foreign bodies accidentally entering the eyes and adnexa, or other surface. Overall, the average cost per admission unadjusted for inflation for all admissions recorded between 2001 and 2009 was $10,153 which, compared to prior studies, was much lower [17; 20].

Overall the annual percentage rate change (APC) of occupational injuries and illnesses in the United States between 1998 and 2009 decreased on average by a subtle 1.73% yearly and the prevalence during the entire period was 6.7 per 10,000 admissions. The general downward trends and patterns were however not homogenous across the board on various demographic characteristics. During this period it was estimated that the annual percentage rate change for

women, older workers (+65), and patients covered by government insurance (Medicare/Medicaid) defied the downward trends and increased respectively on average by 1.53%, 9.16%, and 7.72% yearly. For women, this could partially be explained by their increasing participation in the labor force, especially in high risk areas traditionally dominated by men, such as heavy manufacturing [38]. Another possibility is the fact that safety training tends to be mostly gender neutral in most industries, ignoring any gender disparity that may affect their effectiveness. The alarming positive rate recorded for the other two groups is likely related, given the fact that patients over 65 years old are very likely to be Medicare recipients. Furthermore, the alarming APC for the oldest age group could be partially explained by the fact that people are now retiring much later in life than in the past and for those in risky jobs, as they lose agility to age they become more exposed to risks. On the bright side, two demographic groups in particular saw the most reduction, recording a double digit negative APC during the study period. The [18-24] age group had a yearly decrease of -18.34% while Hispanics recorded a drop at a rate of -9.65% and -18.65% for the period 1998-2004 and 2007-2009 respectively. While the numbers are very encouraging for Hispanics, one should be reminded of the fact that this group has the highest prevalence rate, 13.4 per 10,000 admissions, more than double the rate computed for any other ethnic group.

In conclusion, while the rate of occupational injuries and illnesses in the United States has been gradually decreasing over the past decades, there is a call for action to address disturbing trends found for women and older workers. Intervention strategies should be developed for these two demographic groups. Likewise, further studies are warranted to drill down on gender disparities by industry sub-segments and occupation groups to gain a better understanding of the gradual increase of workplace injuries for women.

REFERENCES

1. ***Agency for Healthcare Research and Quality (AHRQ)***. The Healthcare Cost and Utilization Project (Hcup) Overview. Rockville, MD: Agency for Healthcare Research and Quality; 2009 [updated 11/12/09; cited 2014]. Available from: www.hcup-us.ahrq.gov/overview.jsp.

2. ***Arlinghaus A, Lombardi DA, Willetts JL, Folkard S, Christiani DC***. A Structural Equation Modeling Approach to Fatigue-Related Risk Factors for Occupational Injury. American journal of epidemiology. 2012;176(7):597-607. doi: 10.1093/aje/kws219.

3. ***Asfaw A, Mark C, Pana-Cryan R***. Profitability and Occupational Injuries in U.S. Underground Coal Mines. Accident; analysis and prevention. 2013;50:778-86. doi: 10.1016/j.aap.2012.07.002. PubMed PMID: 22884379.

4. ***Bhushan A, Leigh JP***. National Trends in Occupational Injuries before and after 1992 and Predictors of Workers' Compensation Costs. Public health reports. 2011;126(5):625-34. Epub 2011/09/03. PubMed PMID: 21886322; PubMed Central PMCID: PMCPMC3151179.

5. ***Brooks MM***. Re: "Association between Body Mass Index and Acute Traumatic Workplace Injury in Hourly Manufacturing Employees". American journal of epidemiology. 2008;167(1):123. doi: 10.1093/aje/kwm346.

6. ***Centers for Disease C, Prevention***. Nonfatal Occupational Injuries and Illnesses Treated in Hospital Emergency Departments--United States, 1998. MMWR Morbidity and mortality weekly report. 2001;50(16):313-7. PubMed PMID: 11465899.

7. ***Centers for Disease C, Prevention***. Nonfatal Occupational Injuries and Illnesses among Workers Treated in Hospital Emergency Departments--United States, 2003. MMWR Morbidity and mortality weekly report. 2006;55(16):449-52. PubMed PMID: 16645569.

8. ***Centers for Disease Control and Prevention (CDC)***. Classification of Diseases, Functioning, and Disability. 1600 Clifton Rd. Atlanta, GA 30333: Centers for Disease Control and Prevention (CDC),; 2014 [cited 2014]. Available from: http://www.cdc.gov/nchs/icd/icd9cm.htm.

9. ***Dohms J***. Osha Recordkeeping Guidelines for Occupational Injuries and Illnesses. Radiology management. 1993;15(1):37-41. PubMed PMID: 10125040.

10. ***Finkler SA***. The Distinction between Cost and Charges. Annals of internal medicine. 1982;96(1):102-9. PubMed PMID: 7053682.

11. ***Gardner LI, Landsittel DP, Nelson NA***. Risk Factors for Back Injury in 31,076 Retail Merchandise Store Workers. American journal of epidemiology. 1999;150(8):825-33.

12. ***Hassi J, Gardner L, Hendricks S, Bell J***. Occupational Injuries in the Mining Industry and Their Association with Statewide Cold Ambient Temperatures in the USA. American journal of industrial medicine. 2000;38(1):49-58. PubMed PMID: 10861766.

13. ***Houchens RL, Elixhauser A, Romano PS***. How Often Are Potential Patient Safety Events Present on Admission? Joint Commission journal on quality and patient safety / Joint Commission Resources. 2008;34(3):154-63. PubMed PMID: 18419045.

14. ***Jackson LL***. Non-Fatal Occupational Injuries and Illnesses Treated in Hospital Emergency Departments in the United States. Injury prevention : journal of the International Society for Child and Adolescent Injury Prevention. 2001;7 Suppl 1:i21-6. PubMed PMID: 11565966; PubMed Central PMCID: PMC1765409.

15. ***Kelsh MA, Sahl JD***. Sex Differences in Work-Related Injury Rates among Electric Utility Workers. American journal of epidemiology. 1996;143(10):1050-8.

16. ***Konda S, Reichard AA, Tiesman HM***. Occupational Injuries among U.S. Correctional Officers, 1999-2008. Journal of safety research. 2012;43(3):181-6. doi: 10.1016/j.jsr.2012.06.002. PubMed PMID: 22974683.

17. ***Lander L, Shah RK, Li Y, Mahalingam-Dhingra A, Smith LM, Sorock G***. Healthcare Cost Usage for Hospitalised Injuries Sustained in Industrial Settings in the USA. Injury prevention : journal of the International Society for Child and Adolescent Injury Prevention. 2013;19(2):112-8. doi: 10.1136/injuryprev-2011-040166. PubMed PMID: 22627781.

18. ***Layne LA, Pollack KM***. Nonfatal Occupational Injuries from Slips, Trips, and Falls among Older Workers Treated in Hospital Emergency Departments, United States 1998. American journal of industrial medicine. 2004;46(1):32-41. doi: 10.1002/ajim.20038. PubMed PMID: 15202123.

19. ***Leigh JP***. A Report Card for Occupational Injuries and Illnesses. American journal of industrial medicine. 1998;33(4):422-4. PubMed PMID: 9513651.

20. ***Leigh JP***. Economic Burden of Occupational Injury and Illness in the United States. The Milbank quarterly. 2011;89(4):728-72. Epub 2011/12/23. doi: 10.1111/j.1468-0009.2011.00648.x. PubMed PMID: 22188353; PubMed Central PMCID: PMC3250639.

21. ***Leigh JP, Cone JE, Harrison R***. Costs of Occupational Injuries and Illnesses in California. Preventive medicine. 2001;32(5):393-406. doi: 10.1006/pmed.2001.0841. PubMed PMID: 11330988.

22. ***Leigh JP, Marcin JP***. Workers' Compensation Benefits and Shifting Costs for Occupational Injury and Illness. Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine. 2012;54(4):445-50. Epub 2012/03/27. doi: 10.1097/JOM.0b013e3182451e54. PubMed PMID: 22446573.

23. ***Leigh JP, Marcin JP, Miller TR***. An Estimate of the U.S. Government's Undercount of Nonfatal Occupational Injuries. Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine. 2004;46(1):10-8. doi: 10.1097/01.jom.0000105909.66435.53. PubMed PMID: 14724473.

24. ***Leigh JP, McCurdy SA, Schenker MB***. Costs of Occupational Injuries in Agriculture. Public health reports. 2001;116(3):235-48. PubMed PMID: 12034913; PubMed Central PMCID: PMC1497330.

25. ***Leigh JP, Waehrer G, Miller TR, McCurdy SA***. Costs Differences across Demographic Groups and Types of Occupational Injuries and Illnesses. American journal of industrial medicine. 2006;49(10):845-53. doi: 10.1002/ajim.20374. PubMed PMID: 16917837.

26. ***Loomis DP, Richardson DB, Wolf SH, Runyan CW, Butts JD***. Fatal Occupational Injuries in a Southern State. American journal of epidemiology. 1997;145(12):1089-99.

27. ***Mannan MS, O'Connor TM, Keren N***. Patterns and Trends in Injuries Due to Chemicals Based on Osha Occupational Injury and Illness Statistics. Journal of hazardous materials. 2009;163(1):349-56. doi: 10.1016/j.jhazmat.2008.06.121. PubMed PMID: 18718716.

28. ***McGwin G, Enochs R, Roseman JM***. Increased Risk of Agricultural Injury among African-American Farm Workers from Alabama and Mississippi. American journal of epidemiology. 2000;152(7):640-50. doi: 10.1093/aje/152.7.640.

29. ***Melamed S, Yekutieli D, Froom P, Kristal-Boneh E, Ribak J***. Adverse Work and Environmental Conditions Predict Occupational Injuries: The Israeli Cardiovascular Occupational Risk Factors Determination in Israel (Cordis) Study. American journal of epidemiology. 1999;150(1):18-26.

30. ***National Cancer Institute (NCI)***. Joinpoint Regression Program: National Cancer Institute (NCI),; 2013 [cited 2014]. Available from: http://surveillance.cancer.gov/joinpoint/.

31. ***Occupational Safety & Health Administration (OSHA)***. Injury and Illness Prevention Programs: Occupational Safety & Health Administration (OSHA); 2012 [cited 2014]. White Paper]. Available from: https://www.osha.gov/dsg/InjuryIllnessPreventionProgramsWhitePaper.html.

32. ***Olorunnishola OA, Kidd-Taylor A, Byrd L***. Occupational Injuries and Illnesses in the Solid Waste Industry: A Call for Action. New solutions : a journal of environmental and occupational health policy : NS. 2010;20(2):211-23. doi: 10.2190/NS.20.2.f. PubMed PMID: 20621885.

33. ***Pransky G, Moshenberg D, Benjamin K, Portillo S, Thackrey JL, Hill-Fotouhi C***. Occupational Risks and Injuries in Non-Agricultural Immigrant Latino Workers. American journal of industrial medicine. 2002;42(2):117-23. doi: 10.1002/ajim.10092. PubMed PMID: 12125087.

34. ***Quandt SA, Schulz MR, Talton JW, Verma A, Arcury TA***. Occupational Eye Injuries Experienced by Migrant Farmworkers. Journal of agromedicine. 2012;17(1):63-9. doi: 10.1080/1059924X.2012.629918. PubMed PMID: 22191504; PubMed Central PMCID: PMC3286547.

35. ***Rhee KY, Choe SW, Kim YS, Koo KH***. The Trend of Occupational Injuries in Korea from 2001 to 2010. Safety and health at work. 2013;4(1):63-70. doi: 10.5491/SHAW.2013.4.1.63. PubMed PMID: 23515324; PubMed Central PMCID: PMC3601298.

36. ***Salemi JL, Comins MM, Chandler K, Mogos MF, Salihu HM***. A Practical Approach for Calculating Reliable Cost Estimates from Observational Data: Application to Cost Analyses in Maternal and Child Health. Applied health economics and health policy. 2013;11(4):343-57. doi: 10.1007/s40258-013-0040-2. PubMed PMID: 23807539.

37. ***Saltzman BE***. Recent Risk Rates of Occupational Fatalities, Injuries, and Illnesses in U.S. Industries and Their Use in Planning Environmental Controls. Applied occupational and environmental hygiene. 2001;16(7):742-4. doi: 10.1080/10473220119842. PubMed PMID: 11458921.

38. ***Taiwo OA, Cantley LF, Slade MD, Pollack KM, Vegso S, Fiellin MG, et al.*** Sex Differences in Injury Patterns among Workers in Heavy Manufacturing. American journal of epidemiology. 2009;169(2):161-6. doi: 10.1093/aje/kwn304.

39. ***Tiesman HM, Swedler DI, Konda S, Pollack KM***. Fatal Occupational Injuries among U.S. Law Enforcement Officers: A Comparison of National Surveillance Systems. American journal of industrial medicine. 2013;56(6):693-700. doi: 10.1002/ajim.22182. PubMed PMID: 23532837.

40. ***U.S. Bureau of Labor Statistics (BLS)***. Workplace Injuries, Illnesses, and Fatalities. OCWC/OSH, PSB Suite 3180, 2 Massachusetts Avenue, NE Washington, DC 20212-00012013 [cited 2013]. Available from: http://www.bls.gov/iif/.

41. ***Utterback DF, Charles LE, Schnorr TM, Tiesman HM, Storey E, Vossenas P***. Occupational Injuries, Illnesses, and Fatalities among Workers in the Services Sector Industries: 2003 to 2007. Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine. 2012;54(1):31-41. doi: 10.1097/JOM.0b013e3182398e36. PubMed PMID: 22193113.

42. ***Xiang H, Shi J, Lu B, Wheeler K, Zhao W, Wilkins JR, 3rd, et al.*** Medical Expenditures Associated with Nonfatal Occupational Injuries among Immigrant and U.S.-Born Workers. BMC public health. 2012;12:678. doi: 10.1186/1471-2458-12-678. PubMed PMID: 22905938; PubMed Central PMCID: PMC3490770.

43. ***Yokoyama K, Iijima S, Ito H, Kan M***. The Socio-Economic Impact of Occupational Diseases and Injuries. Industrial health. 2013;51(5):459-61. PubMed PMID: 24201289.

44. ***Zwerling C, Sprince NL, Ryan J, Jones MP***. Occupational Injuries: Comparing the Rates of Male and Female Postal Workers. American journal of epidemiology. 1993;138(1):46-55.

APPENDIX

ICD9 (CM) Diagnosis and Procedure Codes

The following ICD9 (CM) diagnosis and procedure codes were used to identify and classify occupational injuries and illness records.

Table 10 - ICD9 (CM) Codes by Injury Type

Type	Description	ICD9(CM) Code or Range
Fracture	Fracture of skull	(800-804)
	Spine and trunk	(805-809)
	Upper limb	(810-819)
	Lower limb	(820-829)
Dislocation	Dislocation	(830-839)
Sprains and strains	Sprains and strains of joints and adjacent muscles	(840-848)
Internal Injury	Intracrania, excluding Those With Skull Fracture	(850-854)
	Chest, Abdomen, And Pelvis	(860-869)
	Injury To Blood Vessels	(900-904)
	Injury To Nerves And Spinal Cord	(950-957)
Open Wound	Head, Neck, and Trunk	(870-879)
	Upper Limb	(880-887)
	Lower Limb	(890-897)
Superficial Injury	Superficial Injury	(910-919)
Contusion	Contusion with Intact Skin Surface	(920-924)
Crushing Injury	Crushing Injury	(925-929)
Foreign Body Entering through Orifice	Effects of Foreign Body Entering through Orifice	(930-939)
	Inhalation and ingestion of food causing obstruction of respiratory tract or suffocation	(E911)
	Inhalation and ingestion of other object causing obstruction of respiratory tract or suffocation	(E912)
	Accidental mechanical suffocation	(E913)
	Foreign body accidentally entering eye and adnexa	(E914)
	Foreign body accidentally entering other surface	(E915)
Burns	Burns	(940-949)
	Injury by burns or fire, undetermined whether accidentally or purposely inflicted	(E988.1)
	Injury by scald, undetermined whether accidentally or purposely inflicted	(E988.2)
Poisoning	Poisoning By Drugs, Medicinal and Biological Substances	(960-979)
	Toxic Effects Of Substances Chiefly Non-medicinal As To Source)	(980-989
	Accidental Poisoning By Drugs, Medicinal Substances, and Biologicals	(E850-E858)
	Accidental Poisoning By Other Solid And Liquid Substances, Gases, And Vapors	(E860-E869)
	Poisoning by solid or liquid substances undetermined whether accidentally or purposely inflicted	(E980)
	Poisoning by other gases undetermined whether accidentally or purposely inflicted	(E982)

Table 10 (Continued)

Type	Description	ICD9(CM) Code or Range
Other and Unspecified Effects of External Cause	Radiation	(990)
	Cold	(991)
	Heat/Light	(992)
	Air Pressure	(993)
	Other	(994)
	NEC	(995)
	Prickly heat disorders of sweat glands	(705.1)
	Asphyxia and hypoxemia	(799.0)
	Injury by extremes of cold, undetermined whether accidentally or purposely inflicted	(E988.3)
	Injury by electrocution, undetermined whether accidentally or purposely inflicted	(E988.4)

Table 11 - ICD9 (CM) Codes by Anatomical Location

Anatomical Location	Description	ICD9 (CM) Code or Range
Head, face, and neck	Fracture Of Skull	(800-804)
	Closed fracture of cervical vertebra with and w/o spinal cord injury	(805.0, 806.0)
	Open fracture of cervical vertebra with and w/o spinal cord injury	(805.1, 806.1)
	Dislocation of jaw	(830)
	Dislocation of cervical vertebra	(839.0-1)
	Sprain of septal cartilage of nose	(848.0)
	Sprain of jaw	(848.1)
	Sprain of thyroid region	(848.2)
	Intracranial Injury, Excluding Those With Skull Fracture	(850-854)
	Open Wound Of ocular adnexa, eyeball, ear, head, neck	(870-874)
	Injury to blood vessels of head and neck	(900)
	Superficial injury of face neck and scalp	(910)
	Superficial injury of eye and adnexa	(918)
	Contusion of face, scalp, and neck	(920)
	Contusion of eye and adnexa	(921)
	Crushing injury of face scalp and neck	(925)
	Foreign body on external eye	(930)
	Foreign body on ear	(931)
	Foreign body on nose	(932)
	Foreign body on larynx	(933)
	Burn confined to eye and adnexa	(940)
	Burn confined to face, head and neck	(941)
	Burn confined to mouth and pharynx	(947.0)
	Injury to optic nerve and pathways	(950)
	Injury to other cranial nerve(s)	(951)
	Injury to cervical spinal cord	(952.0)
	Injury to cervical nerve root	(953.0)
	Injury to superficial nerves of head and neck	(957.0)
	Other and unspecified injury to head face and neck	(959.0)

Table 11 (Continued)

Anatomical Location	Description	ICD9 (CM) Code or Range
Trunk	Closed/Open fracture of dorsal [thoracic] vertebra with and w/o spinal cord injury	(805.2-3, 806.2-3)
	Closed/open fracture of lumbar vertebra with and w/o spinal cord injury	(805.4-5, 806.4-5)
	Closed/open fracture of sacrum and coccyx with and w/o spinal cord injury	(805.6-7, 806.6-7)
	Closed fracture of unspecified vertebral column with and w/o spinal cord injury	(805.8-9, 806.8-9)
	Fracture of rib(s), sternum, larynx and trachea	(807)
	Fracture of pelvis	(808)
	Fracture of bones of trunk	(809)
	Dislocation of thoracic, lumbar, other vertebra, sternum	(839.2-7)
	Sprains and strains of sacroiliac region	(846)
	Sprains and strains of other and unspecified parts of back	(847)
	Sprain of septal cartilage of ribs	(848.3)
	Sprain of sternum	(848.4)
	Sprain of pelvis	(848.5)
	Internal Injury Of Chest, Abdomen, And Pelvis	(860-869)
	Open Wound Of chest, back, buttock, genital organs	(875-878)
	Open Wound Of breast	(879.0-1)
	Open Wound Of abdominal wall	(879.2-5)
	Open Wound Of other parts of trunk	(879.6-7)
	Injury to blood vessels of thorax	(901)
	Injury to blood vessels of abdomen and pelvis	(902)
	Superficial injury of trunk	(911)
	Contusion of trunk	(922)
	Crushing injury of trunk	(926)
	Foreign body in trachea bronchus and lung	(934)
	Foreign body in esophagus and stomach	(935)
	Foreign body in intestine and colon	(936)
	Foreign body in anus and rectum	(937)
	Foreign body in digestive system unspec	(938)
	Foreign body in genitourinary tract	(939)
	Foreign body in Burn of trunk	(942)
	Foreign body in larynx, trachea, and lung	(947.1)
	Foreign body in esophagus	(947.2)
	Foreign body in gastrointestinal tract	(947.3)
	Foreign body in vagina and uterus	(947.8)
	Injury to dorsal/thoracic, lumbar, and other sites of spinal cord	(952.1-4, 8-9)
	Injury to nerve root, other than cervical and brachial plexus	(953.1-3, 5, 8-9)
	Injury to other nerve(s) of trunk	(954)
	Other and unspecified injury to trunk	(959.1)

Table 11 (Continued)

Anatomical Location	Description	ICD9 (CM) Code or Range
Upper extremity	Fracture of upper limb	(810-819)
	Dislocation of shoulder, elbow, wrist, finger	(831-834)
	Sprains and strains of shoulder and upper arm	(840)
	Sprains and strains of elbow and forearm	(841)
	Sprains and strains of wrist and hand	(842)
	Open Wound Of Upper Limb	(880-887)
	Injury to blood vessels of upper extremity	(903)
	Superficial injury of shoulder and upper arm	(912)
	Superficial injury of elbow forearm and wrist	(913)
	Superficial injury of hand	(914)
	Superficial injury of fingers	(915)
	Contusion of upper limb	(923)
	Crushing injury of upper limb	(927)
	Burn of upper limb	(943)
	Burn of wrist and hand	(944)
	Injury to brachial plexus	(953.4)
	Injury to peripheral nerve(s) of shoulder girdle and upper limb	(955)
	Injury to Shoulder and upper arm	(959.2)
	Injury to elbow, forearm, and wrist	(959.3)
	Injury to hand	(959.4)
	Injury to finger	(959.5)
Lower extremity	Fracture of lower limb	(820-829)
	Dislocation of hip, knee, ankle, foot	(835-838)
	Sprains and strains of hip and thigh	(843)
	Sprains and strains of knee and leg	(844)
	Sprains and strains of ankle and foot	(845)
	Open Wound Of Lower Limb	(890-897)
	Injury to blood vessels of lower extremity	(904.0-8)
	Superficial injury of hip thigh leg and ankle	(916)
	Superficial injury of foot and toe	(917)
	Contusion of lower limb	(924.0-5)
	Crushing injury of lower limb	(928)
	Burn of lower limb	(945)
	Injury to peripheral nerve(s) of pelvic girdle and lower limb	(956)
	Injury to Hip and thigh	(959.6)
	Injury to knee, leg, ankle, and foot	(959.7)