Contaminated Sharps Injuries Among Healthcare Workers in Texas: 2014

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TEXAS Department of State Health Services

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Background

Public Health Significance

The transmission of bloodborne pathogens through contaminated sharps injuries represents a significant public health issue. It is estimated that close to 385,000 of these injuries occur annually in the United States (US) in hospitals alone, and medical services rendered outside of hospitals are thought to account for significantly more (CDC, 2008). Three pathogens of primary concern for transmission through blood and other potentially infectious materials are hepatitis B virus (HBV), hepatitis C virus (HCV), and the human immunodeficiency virus (HIV). Costs associated with exposure incidents such as lab tests, investigations, evaluations, immediate and long-term treatments, employee time lost, and anxiety of exposed workers represent a mostly preventable burden on healthcare systems. A 2003 investigation of exposure costs in which four hospitals were presented with hypothetical exposure scenarios revealed costs as high as $4838 per incident. Even when the source individuals were determined to be free of infection, hospitals still spent an average of $376 per incident on testing (O'Malley, 2007).

Regulation, Reporting, and Policy Implementation

With exposure associated expenses and the health risks to providers and patients in mind, federal and state regulators and professional organizations sought to reduce the rate of injuries involving contaminated sharps. Reduction efforts began with the release of Centers for Disease Control and Prevention (CDC) guidelines that urged caution when interacting with patients, regardless of if they harbored a transmissible disease. Shortly thereafter the Occupational Safety and Health Administration (OSHA) developed regulations that require employee education and training on bloodborne pathogen precautions, safety practices, compliance measures, and the implementation of safety engineered devices (OSHA, 2011). In 2001, following the enactment of the federal "Needlestick Prevention and Safety Act of 2000", OSHA updated its bloodborne pathogen regulations to include provisions that mandate the reporting of contaminated

sharps injuries and that employers maintain sharps injury records (OSHA, n.d.). Currently 26 states, Puerto Rico, and the Virgin Islands have implemented OSHA-approved State Plans which are operated by individual states instead of OSHA. These OSHA-approved State Plans can be for private sector, private and public sector, or public sector employers/employees only. In the latter case, private sector employers/employees remain under federal OSHA jurisdiction (OSHA, n.d.). In addition, states can develop their own plans to cover state and local government workers only. All plans must have standards that are "at least as effective as" OSHA standards.

Texas does not have an OSHA-approved State Plan. Therefore private entities in Texas are under federal OSHA jurisdiction and governmental entities, such as publicly funded hospitals and clinics, are not required to adhere to federal OSHA regulations. Texas has instead adopted, by statute, regulation to cover these facilities that mirrors OSHA's standard, notably implementation of safe workplace practices, use of safety engineered devices, exposure protocols, and reporting measures (Texas Administrative Code (TAC) (25 TAC § 96, 2006; Texas Department of State Health Services, 2011)).

Public health policy in Texas is carried out by local and regional health departments (Texas Department of State Health Services, 2011). Texas is divided into eleven public health regions and eight administrative regions. When a blood exposure incident occurs, the chief administrative officer of a covered facility is required to submit a "contaminated sharps injury report form" to the local health authority or the Department of State Health Services (DSHS) regional office if no local authority exists. After a review for completeness, the form is sent to the DSHS Infectious Disease Control Unit (IDCU) in Austin where it is compiled with other injury reports. Finally the reports are analyzed to better understand the factors surrounding sharps injuries and develop more effective prevention measures.

Culture Surrounding Sharps Injuries

Injury induced transmission of bloodborne pathogens in hospitals and clinics is a serious risk faced by healthcare professionals. Transmission of infections from patients

to doctors, nurses, and technicians through accidental injuries is well documented (CDC, 2008). Reporting of the exposure circumstances not only provides valuable data to those concerned with improving healthcare safety through policy, but also is critical in settling insurance claims and workman's compensation. Reporting of exposures to potentially infectious materials is mandated both by OSHA's bloodborne pathogen standard and the analogous chapter of the Texas Administrative Code (25 TAC § 96, 2006; OSHA, 2011). Despite explicit regulations, the potential to contract serious diseases, and forfeiture of insurance and worker's compensations in the event of infection, many healthcare workers choose not to report contaminated sharps injuries. Under reporting is well documented (Doebbeling, 2003; Elmiyeh, 2004). One survey of healthcare workers in a general hospital revealed that 49% of those that had experienced sharps injuries failed to report at least one incident (Elmiyeh, 2004). A statewide survey of Iowa's health care workers observed rates of non-reporting among physicians as high as 62% (Doebbeling, 2003). Another survey found that administrative data in two teaching hospitals only captured 36% of sharps injuries experienced by survey respondents (Boden, 2015). A perceived low risk of transmission and being too busy to report were most often cited as the reason injuries were not formally reported (Elmiyeh, 2004). Physicians and those that experience frequent injuries were less likely to report than other healthcare personnel or those that experience injuries less frequently (Doebbeling, 2003).

Safety Engineered Devices

One approach to reducing the incidence of sharps injuries is the use of safety-engineered devices. Included among these are retractable hypodermic needles, single-use and pre-filled cartridge syringes, shielded needles, disposable scalpels, blunt-tip suture needles and hinged or sliding shields for phlebotomy, winged steel and blood gas needles. Implementation of these safer devices was initially encouraged by the enactment of the "Needlestick Safety and Prevention Act of 2000", which mandated usage of safer sharps when appropriate, employee involvement in the selection of these devices, and maintenance of a sharps injury log (OSHA, n.d.). A study evaluating the incidence of needlestick injuries among healthcare workers found a significant reduction

in injury rates after the implementation of passive safety engineered devices (Goris, 2014). Prior to the implementation of passive safety engineered devices, the incidence of needlestick injuries was 2.21 injuries per 100,000 employee productive hours; after implementation of these devices the incidence dropped to 0.42 injuries per 100,000 employee productive hours (Goris, 2014).

Exposure Control Plans

While Texas has opted out of formal OSHA participation and regulation, Texas' model exposure control plan is explicitly designed to be analogous to that set forth by OSHA. All of OSHA's precaution standards and key elements are present in Texas' plan (25 TAC § 96, 2006; Texas Department of State Health Services, 2011). OSHA regulations dictate implementation of an exposure control plan in any facility in which there is potential for exposures (OSHA, 2011). There is some flexibility within individual plans, but they are all required to adhere to certain standards and include specific elements. These include:

- Identification of occupations and activities that present risks of exposure
- Establishing work environments and practices that limit risks to exposure (i.e. availability of hand washing stations, sharps disposal bins, and appropriate labeling of specimens and containers)
- Provision of appropriate personal protective equipment to those at risk, at no cost
- Maintaining a clean work environment
- Disposing of wastes appropriately
- Laundering or disposing of soiled garments
- Making hepatitis B vaccine available to those at risk at no charge
- Having a post exposure protocol when occupational exposures do occur (OSHA, 2001; OSHA, 2003).

The post exposure protocol must include source testing when possible, drawing of blood from the exposed to act as a base line, a physician consultation to evaluate risk, a physician opinion, and post exposure prophylactics when appropriate (OSHA, 2011).

Bloodborne Pathogens of Concern

Bloodborne pathogens have been associated with occupationally acquired infections in healthcare personnel; of significance are HBV, HCV, and HIV.

HBV

The CDC estimates that there are 700,000 to 1,400,000 persons currently living with a chronic hepatitis B infection in the US (CDC, 2013). HBV is transmitted through activities that involve percutaneous (i.e., puncture through the skin) or mucosal contact with infectious blood or body fluids (TDSHS, 2015). The risk of being infected with HBV due to an exposure from contaminated sharps injury from a known positive source is 6-30%. (CDC, 2008) There are two stages to hepatitis B: acute and chronic (TDSHS, 2015). At the time of infection, people with hepatitis B are considered to have acute hepatitis B. In most cases their hepatitis B will resolve, but about 5% of adults become chronically infected (TDSHS, 2015). Symptoms of acute HBV infection include fever, anorexia, nausea, jaundice, dark urine, and pale feces (TDSHS, 2015). Persons with chronic HBV infection might be asymptomatic, have no evidence of liver disease, or have a spectrum of disease ranging from chronic hepatitis to cirrhosis or hepatocellular carcinoma (TDSHS, 2015). In the event of an HBV exposure, persons are administered hyperimmunoglobulin (high titer, hepatitis B virus surface antigen antibody) and the HBV vaccine in order to confer passive and active immunity respectively. Currently, extremely effective Hepatitis B vaccines are available and both OSHA and Texas' Administrative Code mandate that they be made available to healthcare workers at no cost throughout employment (25 TAC § 96, 2006; OSHA, 2011).

HCV

The CDC estimates that 3.2 million persons in the US live with chronic hepatitis C infections (CDC, 2013). People become infected with the Hepatitis C virus (HCV) by coming in contact with the blood or bodily fluids of an infected person. The risk of being infected with HCV due to an exposure from contaminated sharps injury from a known positive source is ~ 2% (CDC, 2008). HCV infections are most commonly associated

with sharing of needles, syringes, or other equipment to inject drugs, needlestick injuries in healthcare settings, and being born to a mother who has hepatitis C (TDSHS, 2015). Unlike HBV infection, HCV infection is much more likely to result in chronic hepatitis; HCV infection becomes chronic in approximately 75%–85% of cases (CDC, 2013). As with hepatitis B infections, if a person has been infected with hepatitis C for many years, his or her liver may be damaged. Symptoms of acute HCV infection are jaundice, fever, nausea, fatigue, and vomiting, though approximately 70%–80% of people with acute Hepatitis C do not have any symptoms (TDSHS, 2015). For those exposed to the virus, alpha interferon reduces the chances of developing chronic hepatitis. The initial two direct acting oral antiviral agents were approved in 2011 and since then a number of additional medications have been approved for treatment of chronic hepatitis C infection. There is however no effective HCV vaccine available.

HIV

In the US it is estimated that 1.2 million people are currently infected with HIV; 490,000 of those infected with HIV have been diagnosed with AIDS (CDC, 2011). The main routes of transmission for the virus are through sexual contact, injection drug use, and perinatally from mother to child (TDSHS, 2016). Acute HIV infection presents with a fever, lethargy, rash of the arms, legs, and trunk, and swollen lymph nodes (CDC, n.d.). Progression of HIV infection to AIDS results in compromised host immunity and frequent and severe secondary opportunistic infections. In occupational healthcare exposures, the rates of transmission in mucocutaneous, non-intact skin, and percutaneous exposures are 0.1%, <0.1%, and 0.3%, respectively (CDC, 2008). Combinations of antiretroviral drugs designed to inhibit viral replication are effective at reducing viral loads in the body, however there is no cure for AIDS. There is currently no vaccine for HIV.

Methods

Case Definition

An incident is considered reportable if a percutaneous injury occurred from a sharp that was contaminated or possibly contaminated with blood or other potentially infectious materials.

Study Population

The study population consisted of employees from governmental entities in Texas who reported the 1292 occupational sharps injuries that occurred in 2014. Uncontaminated sharps injuries that occurred before the sharp was used for its intended purpose were not included. Such an incident did not pose a bloodborne pathogen transmission risk. Texas law does not require reporting from private healthcare facilities and any sharps injuries and/or contaminated sharps injuries reported to the DSHS from private facilities were removed from the data (25 TAC § 96, 2006).

Diverse sharps were represented in this study including disposable syringes, suture needles, surgical scalpels, surgical drills, and glassware items such as capillary tubes, flasks, and laboratory slides. Individual occupations of the injured HCW included, but were not limited to registered nurses, attending physicians, housekeeping staff, school nurses, medical students, and various types of medical technicians.

Data Analysis

Descriptive statistics, counts and percentages, were used to characterize the responses to each question. Comprehensive denominator data were not available; therefore no rates could be calculated. Cross tabulations were used to examine relationships

between responses to different questions. Variables examined included geographic, temporal, gender and age distributions in addition to the type of sharps Involved.

Public Health Region and County where Injury Occurred. As seen in Figure 1, the number of reported contaminated sharps injuries in each Health Service Region (HSR) is listed below the HSR number. Health Service Regions 6/5S and 2/3 had the most sharps injuries, each with more than 200 cases of sharps injuries.

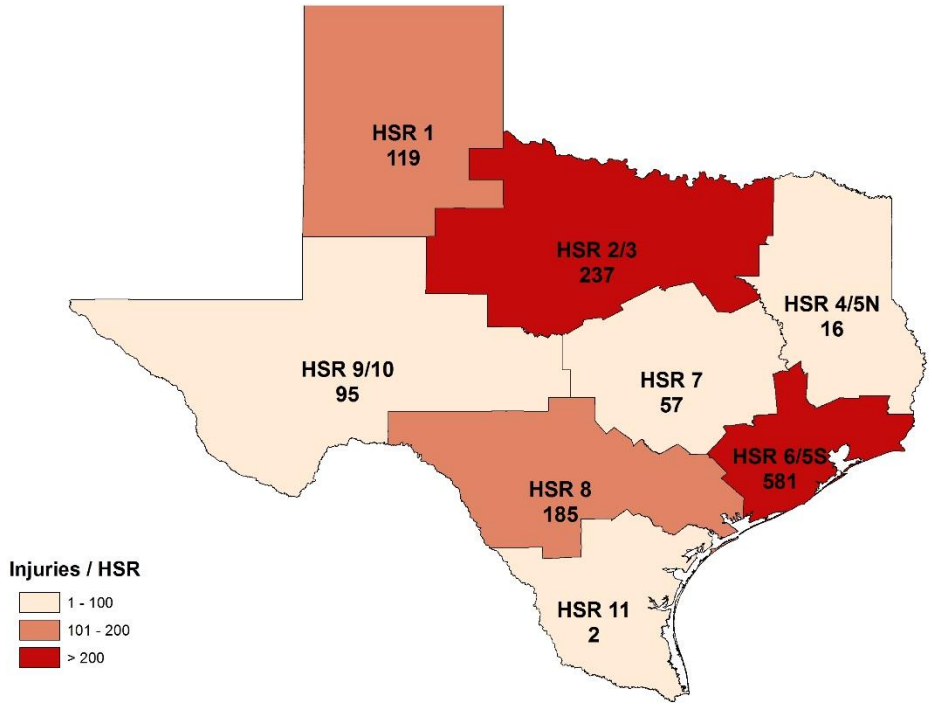

Figure 1. Reported injuries by Health Service Region

Facility where injury occurred. Out of 1292 reported injuries, 79.1% (1022) occurred in hospitals. Clinics reported the second highest number of injuries at 9% (116) with emergency services, school/college, correctional facilities, and residential facilities for a combined total of 4.3% (56) (Table 1).

Facility	Number	Percent
Hospital	1022	79.1%
Clinic	116	9.0%
Correctional Facility	8	0.6%
School/College	13	1.0%
EMS/Fire/Police	30	2.3%
All Others	78	6.0%
Unknown	20	1.5%
Residential Facility (eg. MHMR, shelter)	5	0.4%
Total	1292	100.0%

Table 1. Injuries by facility type

Gender and Injury. Almost two-thirds of the injuries occurred in females – 65.6% (Figure 2).

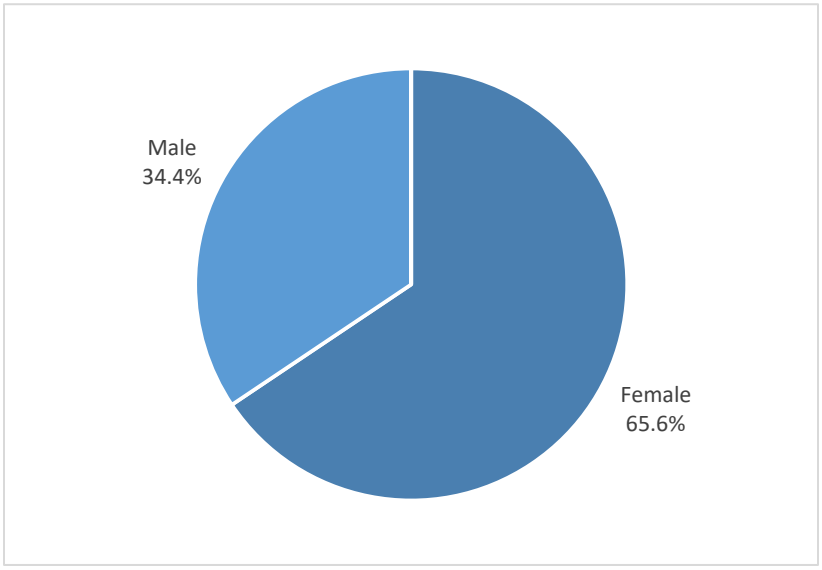

Figure 2. Sharp injuries by gender

Age Distribution and Injury. The distribution of injury reports by age is presented in Figure 3. Twenty-six to thirty-five year olds reported more injuries than any other age group, with 41.4% of all injuries.

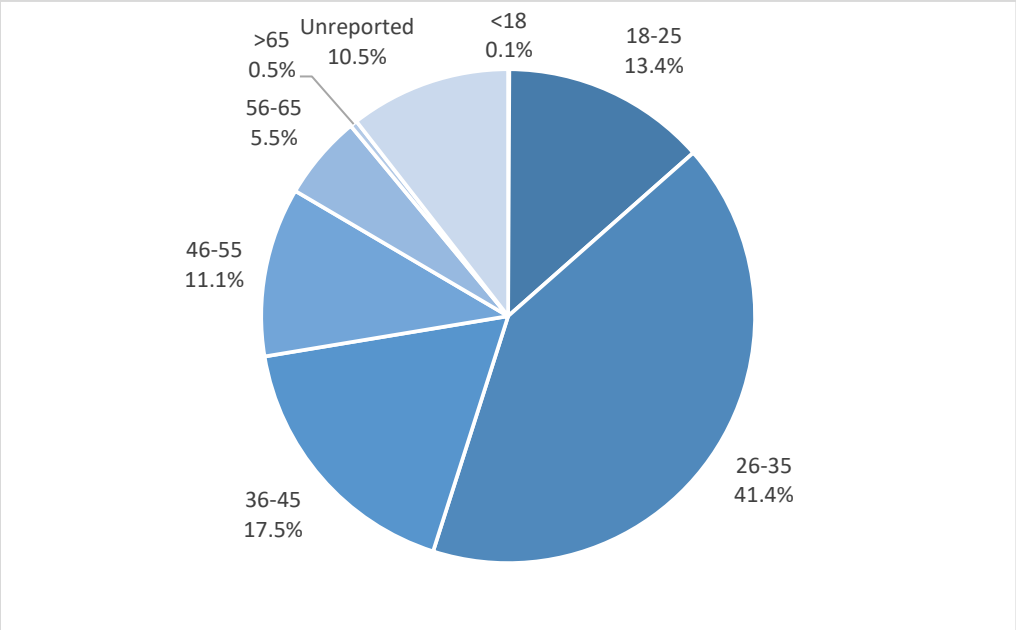

Figure 3. Age distribution of sharps injuries

Occupation of the Injured Healthcare Worker. Table 2 shows the occupations that sustained the most injuries in 2014. Registered nurses sustained more injuries than any other single occupation, accounting for 22.4% of all reported incidents. Interns/residents and attending physicians received 21.3% and 9.6% of reported injuries, respectively.

Job Type	Number	Percent
Registered Nurse	289	22.4%
Intern/resident	275	21.3%
Attending Physician	124	9.6%
OR/Surgical Technician	89	6.9%
Licensed Vocational Nurse	51	3.9%
All Other	443	34.3%
Unknown	21	1.6%
Grand Total	1292	100.0%

Table 2. Top five occupations injured

Injury by Work Shift. Figure 4 shows the time of day, by shift, when the injuries occurred. The majority of injuries, 43.1%, occurred after 7am and before 3pm.

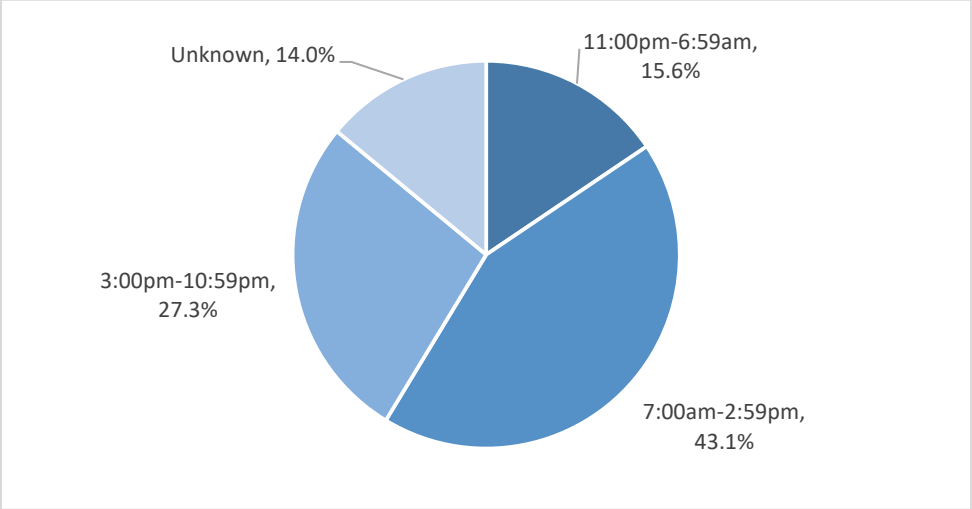

Figure 4. Time of day when reported injuries occurred

Injuries by Work Area. Table 3 shows the location in which the injuries took place. About a third 30.8% (395) of the injuries took place in surgery/operating room. The second most frequent location was in the patient or resident room where 14.6% (188) of injuries took place. The third most frequent location was in the Emergency Department where 7.4% (96) of the injuries took place.

Injuries by Work Area	Number	Percent
Surgery/operating room	398	30.8%
Patient/resident room	188	14.6%
Emergency Department	96	7.4%
Critical care unit	63	4.9%
All Others	547	42.3%
Total	1292	100.0%

Table 3. Injuries by work area

Injury by Device Type. The data were categorized into the top five instrument types that caused injuries. Needles involving syringes accounted for 49.2% of all injuries (Table 4). Further analysis revealed that 23.43% of injuries involving needles/shringes occurred in the patient/resident room and 13.52% occuring in the surgery/operating

room. Suture Needle sharps were the second highest at 23.0% of all injuries. 67% of these injuires occured, as expected, in surgery with 6.06% in L&D/Gynecology unit and 5.72% in the emergency department. IV Catheter/Needles and Scalpels each accounted for less than 10%. Other types of sharps, not included in the top five, accounted for a combined total of 15% of injuries. These included surgical drills, nails, teeth, forceps and other devices. A more detailed list of devices that caused injury can be found in the appendix.

Type of Sharp	Number	Percent
Needle/Syringe	636	49.2%
Suture Needle	297	23.0%
IV Catheter/Needle	76	5.9%
Scalpel	89	6.9%
All Others	169	13.1%
Unknown	25	1.9%
Total	1292	100.0%

Table 4. Injuries by type of sharp device

Intended Sharps Use. The intended use of the device provides another perspective on the injuries and their prevention. Suturing and injections accounted for the largest proportions of injuries, 21.7% and 21.3% respectively (Table 5). Drawing blood or taking tissue samples accounted for an additional 15.2% of the injuries. For 23.3% of devices, the intended use of device was unreported or unknown.

Original Intended Use	Number	Percent
Suturing	281	21.7%
Injection, SC/ID/IM	275	21.3%
Draw Blood/Body Fluid/Tissue Sample	197	15.2%
IV/ Central Line	77	6.0%
Other	161	12.5%
Unknown	301	23.3%
Total	1292	100.0%

Table 5. Injuries by intended use of device

Safety Engineering Status. Table 6 breaks down injuries by whether or not the device had safety engineering protection. A third (30.8%) of all devices involved in injuries did have safety engineered protection compared to 40.9% that were not safety engineered.

24.6% of reporters indicated they did not know if the device that caused the injury was safety engineered.

Was Device Safety-Engineered?	Number	Percent
Yes	398	30.8%
No	529	40.9%
Don't Know	318	24.6%
Unreported	47	3.6%
Total	1292	100.0%

Table 6. Safety engineered status of device causing injury

When During Device Activation Did Injury Occur. Table 7 shows when during activation the injury occurred. The majority (44.5%) of the injuries reportedly happened before activation. About a quarter (27.9%) occurred during activation. There were 17.1% that occurred after activation of the protective mechanism.

When During Device Activation Did Injury Occur	Number	Percent
Before	177	44.5%
During	111	27.9%
(blank)	42	10.6%
After activation of the protective mechanism	68	17.1%
Total	398	100.0%

Table 7. When during activation did injury occur?

Adherence to bloodborne pathogen precautions. Table 8 breaks down the occurrence of sharps injuries by the adherence to bloodborne pathogen precautions at the time of injury. These precautions have been adopted as the minimum standard by Texas law and listed in the exposure control plan developed by the DSHS (25 TAC § 96, 2006). Utilization of bloodborne pathogen precautions was high as demonstrated by 91.56% use of gloves at time of injury, 92.11% HBV vaccinations, 77.24% having received BBP training in past 12 months, and 93.96% had a sharps container available.

Response	Wearing Gloves at Time of Injury?		HBV Vaccinated?		BBP Training in Past 12 mo.?		Sharps Container Available?	
	Num.	%	Num.	%	Num.	%	Num.	%
Yes	1183	91.56%	1190	92.11%	998	77.24%	1214	93.96%
No	64	4.95%	36	2.79%	101	7.82%	24	1.86%
Don't Know	15	2.32%	42	3.25%	0	0	0	0
Unreported	30	1.16%	24	1.86%	193	14.92%	54	4.18%
Total	**1292**	**100.00%**	**1292**	**100.00%**	**1292**	**100.00%**	**1292**	**100.00%**

Table 8. Adherence to bloodborne pathogen precautions.

Sharps injury reports over the years. From 2005 to 2014 the number of contaminated sharps reports received by DSHS has fluctuated, but showed an overall downward trend. Reported sharps injury data from 2011 were unavailable and are not included in the following line graphs.

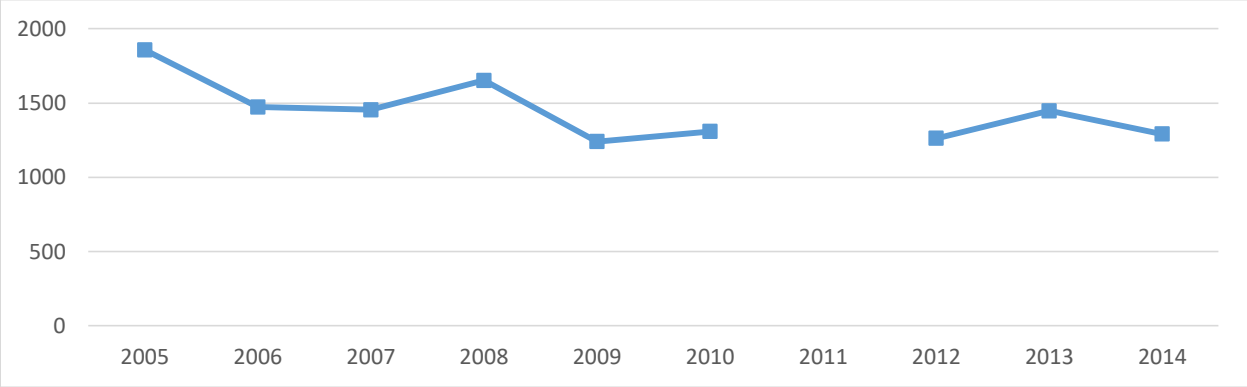

Figure 5. Number of sharps injuries reported: 2005-2014

Distribution of sharps injuries by facility type. Figure 6 shows the top five facility types in which sharps injuries were reported to have occurred over the 8-year period. Hospitals reported approximately 80% of injuries every year. No other facility type accounted for more than 10% of injuries over this time period.

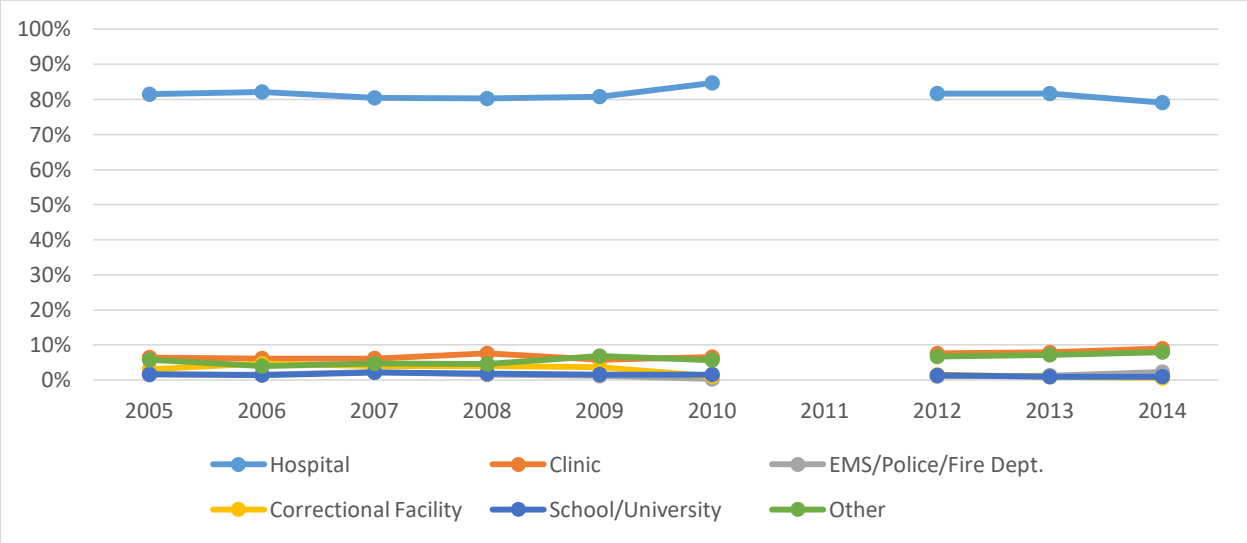

Figure 6. Distribution of sharps injuries by facility type: 2005-2014

Occupations reporting greatest proportion of sharps injuries. Figure 7 presents the distribution of reported sharps injuries among the top reporting occupations between 2005 and 2014. Registered nurses have incurred the highest number of contaminated sharps injuries accounting for 20-26% every year with the exception in 2012 when intern/residents exceeded the RNs by 2%. However, in 2013 the intern/resident rate decreased and the registered nurses returned to being the most frequently reported occupation. In 2014, registered nurses and interns/residents were nearly the same.

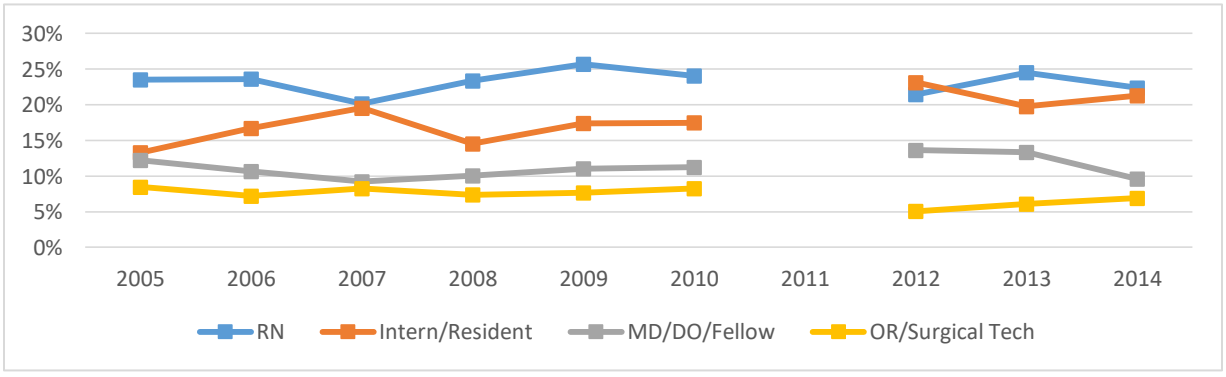

Figure 7. Occupations reporting the greatest proportion of sharps injuries: 2005-2014

Injury by sharp type over time. As with the distribution of injuries across facility types, the breakdown of injuries by the type of device remained fairly stable over the years

(Figure 8). Syringes and suture needles remain the devices that healthcare workers injured themselves with most often.

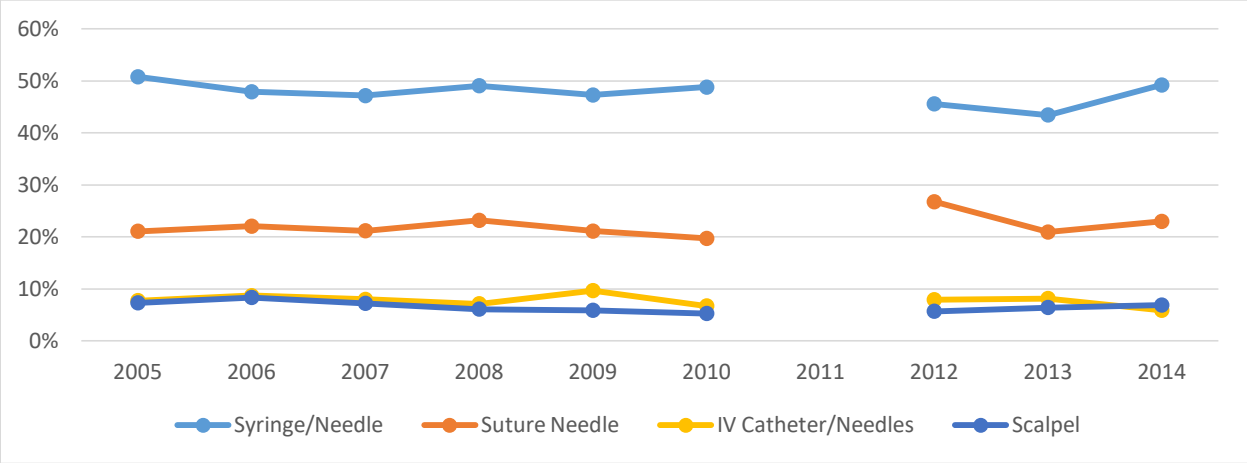

Figure 8. Injury by sharp type: 2005-2014

Injury by safety engineered status. Figure 9 depicts injury trends by safety-engineered status between 2005 and 2014. As expected, non-safety engineered devices continue to be involved in the highest proportion of injuries. From 2012 to 2014, there was a decrease in the proportion of injuries from non-safety engineered devices from 48.3% to 40.9%. However, in 2014 there was an increase in the proportion of devices for which the safety engineering status was unknown.

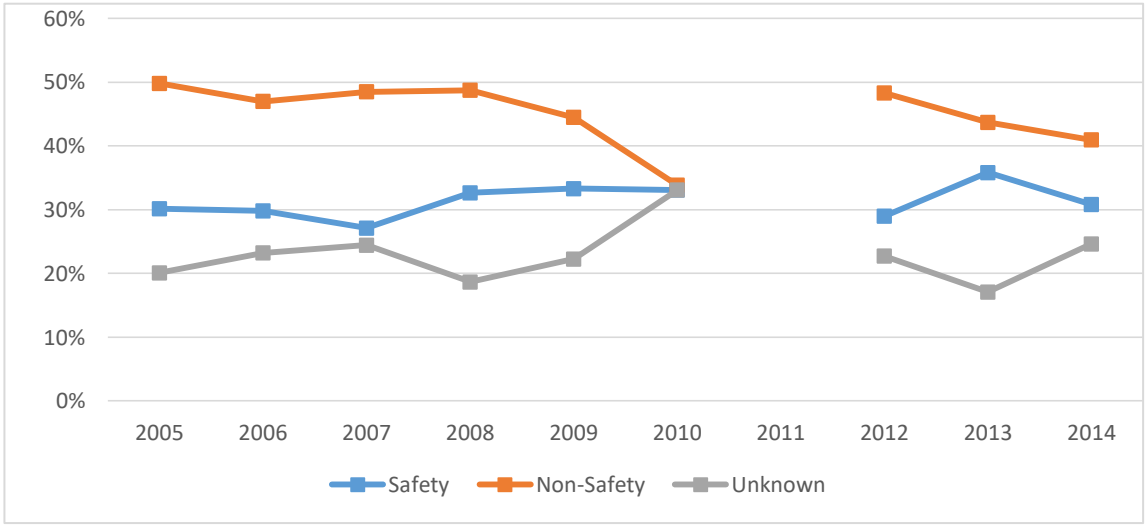

Figure 9. Injury by safety engineered status: 2005-2014

Limitations

This report has five important limitations:

1. There were few denominator data to compute injury rates and therefore denominator data were not included. Good examples of denominator data would be:
    a. The number of total sharps related procedures, broken out by type of sharps used, carried out by facilities in Texas each year within each region
    b. The number, occupation and gender of healthcare workers at risk for sharps injuries each year.
2. Sharps injuries are known to be under-reported. Therefore, this report likely underestimates the total number of sharps injuries that occurred in government entities during 2014.
3. Many of the reporting forms were incomplete. Therefore, the report does not fully characterize the reported injuries.
4. This report also does not include data reported by private entities to the DSHS which are not required by statute to report. Therefore, this report is only representative for injuries occuring in governmental entities and not all Texas entities.
5. Data from 2011 were unavailable and therefore analysis of trends is incomplete.

Additionally, illogical responses to questions resulted in records being removed from the analysis. For example, a report indicating that the device in use did not have safety engineering protection and in a subsequent response indicating that the safety feature was fully activated.

Discussion

The most sharps injuries occurred in the two public health regions with the highest populations: Region 2/3 and Region 6/5S. The gender disparity within the nursing

profession may explain why approximately 2 females were injured for every 1 male. The largest age group (41.3%) that reported sharps injuries were younger healthcare workers (between the ages of 18-35). A survey conducted among medical school graduates indicated that underdeveloped manual skills and a stressful work environment contribute to injuries (Sharma, 2009). Providing additional training and practice to these two risk groups may be an effective way to reduce injuries. The two occupations that incurred the most sharps injuries are registered nurses and interns/residents. This is consistent with national data (Jagger, 2008; Sharma, 2009).

The highest percentage for injury by work area was surgery/operating room at 30.8% (395). In Texas, the operating room has consistently seen the highest number of sharps injuries since 2003. Nationally, 23% of an estimated 384,000 needle stick injuries in hospitals each year occurred in surgical settings (Jagger, 2010). The second most frequent location was in the patient or resident room where 14.6% (188) of injuries took place. This is consistent with OSHA data which specified the surgery room and patient room as having the highest frequency of needlestick injuries (OSHA, n.d. “Healthcare”).

Engineered safety solutions for needles/syringes, are readily available and the recommendations have been in place since 2000. Despite the available resources, injuries involving needles and syringes (49.2%) are the most commonly reported sharps injuries with injuries involving suture needles at 23%. When combined the two intended uses, suturing and injections, were involved in 43% of all reported injuries.

While progress has been made in the engineering of safer syringes, such as syringes with auto-retracting needles, needles remain as the top device for injuries. However, the simplicity of suture needles’ design, essentially a curved hook with a loop for suture, limits its potential for safety-engineering. One safety approach is blunt suture needlepoints and other safety-engineered sharps, which were proven by multiple studies to be effective at reducing injury rates (CDC, 2008; Goris, 2014; Jagger, 2008).

Of the reported injures in 2014, 30.8% (398) of the devices were safety engineered. When devices did possess safety features, 45% of the injured healthcare workers

reported the injury occurred while attempting to activate safety mechanisms. 40.9% of injury reports indicated the device involved was not safety-engineered and 24.6% did not know if the device was safety-engineered. These findings may represent a potential lack of training, a stressful work environment and/or lack of available safety-engineered devices. Ongoing diligence in evaluation of devices and staff training in their use by healthcare facilities would be an important step.

A more positive finding was that, despite being injured, healthcare professionals by and large adhered to the bloodborne pathogen precautions such as hepatitis B vaccination (92.11%), recent exposure risk training (7.24%) and the use of gloves (91.56%). Another positive finding is that trends over the years (excluding 2011) show that fewer sharps injuries are being reported since 2005. Ultimately, it's a facility's embrace and prioritization of a safety culture that will lead to the lowest rates of sharps injuries. To facilitate that, patient safety science must be part of the education of all future healthcare practitioners. Such a program would de-stigmatize accidental occupational injury and promote reporting and the correct use of safety devices.

Appendix

Table 1: Injuries by Facility Type	Number	Percent
Hospital	1022	79.1%
Clinic	116	9.0%
Other	43	3.3%
EMS/Fire/Police	30	2.3%
Unknown	20	1.5%
Dental Facility	19	1.5%
School/College	13	1.0%
Correctional Facility	8	0.6%
Laboratory (freestanding)	8	0.6%
Residential Facility (eg. MHMR, shelter)	5	0.4%
Outpatient treatment (e.g. Dialysis, infusion therapy)	2	0.2%
Blood bank/center/mobile	2	0.2%
Home Health	2	0.2%
Medical examiner office/morgue	2	0.2%
Total	**1292**	**100.0%**

Table 2. Injuries by Work Area	Number	Percent
Surgery/operating room	398	30.8%
Patient/resident room	188	14.6%
Other	115	8.9%
Emergency Department	96	7.4%
Critical care unit	63	4.9%
Medical/Outpatient clinic	57	4.4%
Laboratory	54	4.2%
Medical/surgical unit	54	4.2%
Procedure Room	53	4.1%
L & D/Gynecology unit	36	2.8%
Dental Clinic	33	2.6%
(blank)	23	1.8%
Radiology Department	20	1.5%
Nursery	14	1.1%
Ambulance	13	1.0%
Pediatrics	13	1.0%
Home	12	0.9%
Autopsy/pathology	9	0.7%
Jail Unit	9	0.7%
Floor, not patient room medication room	8	0.6%

Pre-op or PACU	8	0.6%
Rescue Setting (non ER)	5	0.4%
Service/Utility Area (eg. Laundry)	3	0.2%
Endoscopy/bronchoscopt/cystoscopy	2	0.2%
Field (non EMS)	2	0.2%
Dialysis room/center	2	0.2%
Blood bank center/mobile	1	0.1%
Seclusion Room/Psychiatric Unit	1	0.1%
Total	**1292**	**100.0%**

Table 3. Injuries by Occupation	**Number**	**Percent**
Registered nurse	289	22.4%
Intern/resident	275	21.3%
Attending physician (MD, DO)	124	9.6%
Other	102	7.9%
OR/Surgical Technician	79	6.1%
Phlebotomist/venipuncture/IV team	59	4.6%
Licensed Vocational Nurse	51	3.9%
Fellow	35	2.7%
EMT/Paramedic	31	2.4%
Medical Student	31	2.4%
Housekeeper/laundry	31	2.4%
Aide (eg. CAN, HHA, Orderly)	25	1.9%
Physician assistant	21	1.6%
Unknown	21	1.6%
Dental Student	17	1.3%
Clinical Lab Tech	15	1.2%
Respiratory therapist/technician	12	0.9%
Radiologic Technician	10	0.8%
Surgery Assistant/OR Tech	10	0.8%
CRNA/NP	9	0.7%
Nursing Student	7	0.5%
Researcher	6	0.5%
Dentist	6	0.5%
Law Enforcement Officer	5	0.4%
Firefighter	5	0.4%
Morgue tech/autopsy tech	3	0.2%
Dental Assistant/Tech	3	0.2%
School Personnel (not a nurse)	2	0.2%
Clerical/Administrative	2	0.2%

Hemodialysis Tech	1	0.1%
Nurse Midwife	1	0.1%
Volunteer	1	0.1%
Public health worker	1	0.1%
Maintenance Staff	1	0.1%
Material Clerk	1	0.1%
Total	**1292**	**100.0%**

Table 4. Age Group	**Number**	**Percent**
< 18	**5**	**0.39%**
18-25	**172**	**13.31%**
26-35	**531**	**41.10%**
36-45	**224**	**17.34%**
46-55	**142**	**10.99%**
56-65	**71**	**5.50%**
> 65	**12**	**0.93%**
Unreported	**135**	**10.45%**
Total	**1292**	**100.00%**

Table 5. Area of the Body Injured	**Number**	**Percent**
Hand	1230	95.2%
Arm	27	2.1%
Leg/foot	9	0.7%
face/head/neck	4	0.3%
Torso (front or back)	4	0.3%
Unreported	18	1.4%
Total	**1292**	**100.0%**

Table 6. Injuries by Sharp Type	**Number**	**Percent**
Needle/Syringe	636	49.2%
Suture Needle	297	23.0%
Other	104	8.0%
Scalpel	89	6.9%
IV Catheter/Needle	76	5.9%
Lancet (Finger/Heel Stick)	26	2.0%
Unknown	25	1.9%
Scissors	12	0.9%
Glass	11	0.9%

Other Blade	7	0.5%
Trocar	6	0.5%
Nail/Tooth	3	0.2%
(blank)		0.0%
Total	**1292**	**100.0%**

Table 7. Injuries by Original Intended Use of Sharp	**Number**	**Percent**
Injection, intra-muscular/subcutaneous/intra-dermal, or other injection through the skin (syringe)	275	21.3%
Other	218	16.9%
Suturing	127	9.8%
Draw venous blood sample	108	8.4%
Suturing-Skin	106	8.2%
Cutting	95	7.4%
Unknown/not applicable	64	5.0%
Start IV or set up heparin lock (IV catheter or winged set-type needle)	53	4.1%
Suturing-Deep	48	3.7%
Obtain a Body Fluid or Tissue Sample	34	2.6%
Draw arterial Blood Sample, direct stick	30	2.3%
Finger/heel Stick	25	1.9%
(blank)	18	1.4%
Wiring	14	1.1%
Finger Stick/Heel Stick	14	1.1%
Other Injection into (or aspiration from) IV	10	0.8%
Connect IV line (intermittent IV/ piggyback/IV infusion/other IV line connection)	8	0.6%
Dental	7	0.5%
Remove Central Line/Porta Catheter	6	0.5%
Drilling	6	0.5%
Dental, Restorative	6	0.5%
Dental, Extraction	4	0.3%
Dental, Hygiene	4	0.3%
Dialysis	3	0.2%
Contain a specimen or pharmaceutical (glass item)	2	0.2%
Dental, Periodontal	2	0.2%
Unknown/NA	1	0.1%
Tattoo	1	0.1%
Electrocautery	1	0.1%
Dental Extraction	1	0.1%
Dental	1	0.1%
Total	**1292**	**100.0%**

Table 8. When and How the Injury Occurred	Number	Percent
Between steps of a multistep procedure (carrying, handling, passing/receiving syringe/instrument, etc.)	324	25.1%
Other	206	15.9%
Suturing	114	8.8%
Activating Safety Device	98	7.6%
(blank)	94	7.3%
Interaction with another person	83	6.4%
Patient Moved during the procedure	70	5.4%
Found in an inappropriate place (eg. Table, bed, linen, floor, trash)	68	5.3%
Use of sharps container	56	4.3%
Unsafe Practice	45	3.5%
Recapping	41	3.2%
Disassembling device or equipment	31	2.4%
Laboratory procedure/process	24	1.9%
Device Malfunctioned	16	1.2%
Preparation for reuse of instrument (Cleaning, Sorting, disinfecting, Sterlizing, etc.)	13	1.0%
Use of IV/Central Line	9	0.7%
Total	**1292**	**100.0%**

Table 9. Safety Engineered Protection	Number	Percent
Yes	398	30.8%
No	529	40.9%
Don't Know	318	24.6%
Unreported	47	3.6%
Total	**1292**	**100.0%**

Table 10. Protective Mechanism Activation	Number	Percent
No	219	55.0%
Yes	127	31.9%
Do not know	32	8.0%
Unreported	20	5.0%
Total	**398**	**100.0%**

Table 11. When During Device Activation Did Injury Occur	Number	Percent
Before	177	44.5%
During	111	27.9%
(blank)	42	10.6%
After activation of the protective Mechanism	68	17.1%
Total	**398**	**100.0%**

Table 12. Was the injured person wearing gloves	Number	Percent
Yes	1183	91.56%
No	64	4.95%
(blank)	30	2.32%
Do not know	15	1.16%
Total	**1292**	**100.00%**

Table 13. Was the injured person vaccinated for Hepatitis B	Number	Percent
Yes	1190	92.11%
No	36	2.79%
(blank)	24	1.9%
Do not know	42	3.25%
Total	**1292**	**100.00%**

Table 14. Was a sharps container available for disposal	Number	Percent
Yes	1214	94.0%
No	24	1.9%
(blank)	54	4.2%
Total	**1292**	**100.00%**

Table 15. Injured person received exposure control training within last 12 months	Number	Percent
Yes	998	77.24%
No	101	7.82%
(blank)	193	14.94%
Total	**1292**	**100.00%**

Table 16: Reported Sharps Injuries over the years.	
Year	**Injury Count**
2005	1858
2006	1473
2007	1454
2008	1652
2009	1241
2010	1309
2011	N/A
2012	1263
2013	1447
2014	1292

Table 17: Distribution of sharps injuries by facility type.

Year	Hospital	Clinic	EMS/Police/Fire Dept.	Correctional Facility	School/University	Other	Total
2005	81%	6%	2%	3%	2%	6%	100%
2006	82%	6%	2%	5%	1%	4%	100%
2007	80%	6%	2%	4%	2%	5%	100%
2008	80%	8%	2%	4%	2%	5%	100%
2009	81%	6%	1%	4%	2%	7%	100%
2010	85%	7%	0%	1%	2%	6%	100%
2011							
2012	82%	8%	1%	2%	1%	7%	100%
2013	82%	8%	1%	1%	1%	7%	100%
2014	79%	9%	2%	1%	1%	8%	100%

Table 18: Occupation reporting greatest proportion of injuries					
Year	**RN**	**Intern/Resident**	**MD/DO/Fellow**	**OR/Surgical Tech**	**Totals**
2005	24%	13%	12%	8%	1858
2006	24%	17%	11%	7%	1473
2007	20%	20%	9%	8%	1454
2008	23%	15%	10%	7%	1652
2009	26%	17%	11%	8%	1241
2010	24%	17%	11%	8%	1309
2011					
2012	21%	23%	14%	5%	1263
2013	25%	20%	13%	6%	1447
2014	22%	21%	10%	7%	1292

Table 19: Injury by sharp type						
Year	**Syringe/Needle**	**Suture Needle**	**IV Catheter/Needles**	**Scalpel**	**Other**	**Unknown**
2005	51%	21%	8%	7%	11%	2%
2006	48%	22%	9%	8%	9%	4%
2007	47%	21%	8%	7%	14%	2%
2008	49%	23%	7%	6%	12%	2%
2009	47%	21%	10%	6%	11%	5%
2010	49%	20%	7%	5%	14%	6%
2011						
2012	46%	27%	8%	6%	11%	3%
2013	43%	21%	8%	6%	20%	1%
2014	49%	23%	6%	7%	13%	2%

Table 20: Injury by safety engineered status			
Year	**Safety**	**Non-Safety**	**Unknown**
2005	30%	50%	20%
2006	30%	47%	23%
2007	27%	48%	24%
2008	33%	49%	19%
2009	33%	44%	22%
2010	33%	34%	33%
2011			
2012	29%	48%	23%
2013	36%	44%	17%
2014	31%	41%	25%

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