Sharps Injuries among Hospital Workers in Massachusetts, 2010

Findings from the Massachusetts Sharps Injury Surveillance System

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Contents

BACKGROUND

Sharps Injuries

Health care worker exposures to bloodborne pathogens as a result of injuries caused by contaminated needles and other sharp devices, also known as percutaneous injuries, are a significant public health concern. Estimates by the U.S. Centers for Disease Control and Prevention (CDC) put the number of sharps injuries in healthcare as well in excess of half a million each year, with about half of those injuries, or approximately 1,000 percutaneous injuries per day, occurring in U.S. hospitals (Panlillio et al., 2004). While several studies report that injuries occur frequently to nurses, physicians and technicians, housekeeping and other support staff are also at risk (Hiransuthikul, Tanthitippong & Jiamjarasrangsi, 2006). As a measure of likelihood of injury among hospital workers, it has been estimated that 28 sharps injuries occur annually for every 100 occupied hospital beds (Perry, Parker & Jagger, 2009).

Sharps injuries have been associated with occupational transmission of hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV) as well as over 20 other pathogens (OSHA, 2001). U.S. Public Health Service guidelines provide recommendations for post-exposure management of all workers who have sustained occupational exposure to bloodborne pathogens (CDC, 2001; CDC, 2005). These guidelines provide information for determining when post-exposure prophylaxis is appropriate. Preventive medical treatment following exposure may decrease the likelihood of infection with HIV and HBV (Cardo et al., 1997; CDC, 2001). The average direct costs, including laboratory costs for tests of both source patients and exposed employees, labor costs associated with testing and counseling, and the costs of post-exposure prophylaxis, are estimated to be $3,042 (ranging from $1,663 to $4,838) (O'Malley, Scott, Gayle, Dekutoski, Foltzer, Lundstrom, et al., 2007).

Sharps injuries are preventable and the overall goal should be their elimination. As a step in that direction, the U.S. Public Health Service has called for the reduction of sharps injuries among health care workers by 30% as a national health objective for 2010 (DHHS, 2006). In addition, health care facilities are required by federal regulations to implement comprehensive plans to reduce these injuries. Preventing sharps injuries requires the combined effort of government agencies, employers, and equipment manufacturers, as well as health care workers themselves. Elements of a successful sharps injury prevention program, as outlined by the CDC, include: promoting an overall culture of safety in the workplace, eliminating the unnecessary use of needles and other sharp devices, using devices with sharps injury prevention features (SESIPs), employing safe workplace practices, and training health care personnel (CDC, 2008). Sharps injury surveillance is also a key component of a comprehensive program.

Prior to 2000, while some national data had been collected, little was known about the extent and distribution of sharps injuries among health care workers in Massachusetts. In 2001, pursuant to An Act Relative to Needlestick Injury Prevention (MGL Chapter 111 §53D) the Massachusetts Department of Public Health (MDPH) promulgated regulations requiring acute and non-acute care hospitals licensed by the Department to implement sharps injury prevention plans and also to report sharps injury data to MDPH. This led to the establishment of the Massachusetts Sharps Injury Surveillance System, which has collected data from all MDPH licensed hospitals for the past eight years (2002-2010).

The Massachusetts Sharps Injury Surveillance System

MDPH regulations, mirroring the federal Occupational Safety and Health Administration (OSHA) Bloodborne Pathogen Standard (29 CFR 19101.1030) revised in 2001, require that hospitals licensed by MDPH use devices with sharps injury prevention technology, develop exposure control plans, and maintain logs of worker injuries with contaminated sharps. MDPH also requires that hospitals submit the data from their sharps logs annually to the Department. Data are reported to the Sharps Injury Surveillance System electronically using the Annual Summary of Sharps Injury form. The data reported are compiled and published to guide state efforts to prevent sharps injuries and promote action at the local level. The surveillance system provides information about occupations at risk as well as devices,

procedures and departments associated with sharps injuries. It also serves as a vehicle for hospitals and health care workers in Massachusetts to share information about successful prevention strategies.

The Massachusetts Sharps Injury Surveillance System is intended to provide information that can assist Massachusetts hospitals and health care workers in targeting and evaluating efforts to reduce the incidence of sharps injuries and the associated human and economic costs. Comprehensive reports of surveillance findings for 2002, 2003 and 2004 have been produced, as well as annual surveillance updates for 2005 to 2009 respectively.[1] This brief report includes findings from the Massachusetts Sharps Injury Surveillance System for the 2010 data collection period. For the first time, information on mechanisms of the sharps injury prevention features is presented (see Figure 4). Findings are presented by hospital size categories, by teaching status as well as for all hospitals combined to allow hospitals to compare their individual experiences with those in similar facilities. Input from hospitals and health care workers regarding the surveillance activities and the content of this report is highly welcome. MDPH looks forward to continued collaboration in maintaining an effective sharps injury surveillance system to improve the health and safety of health care workers in Massachusetts.

Underreporting of Sharps Injuries

Underreporting of sharps injuries by employees is well documented in the literature with estimates ranging from 22% to 99%, and has been found to vary by occupation and by hospital (Perry, 2000; Avarado-Ramy et al., 2003; Kotelchuck et al., 2004; Sohn et al., 2004, Au et al., 2008; Nagao et al., 2009). There are many reasons why healthcare workers may not report sharps injuries: they may perceive that the injuries or the source patients are low risk; they may fear the diseases to which they have potentially been exposed; they may have concerns about job security or the extra paperwork and time involved in follow-up. In addition, they may lack information and training about appropriate reporting procedures or the reporting procedures themselves may be inadequate (Tandberg, Stewart & Doezema, 1991). Hospitals with well established sharps injury surveillance programs and strong safety cultures may identify and report more injuries than hospitals with less well developed programs. Underreporting must be taken into account in interpreting the findings presented in this report. Hospitals, in evaluating their own data, should do so within the context of their own sharps injury surveillance and prevention programs. Assessment of underreporting should be an integral part of sharps injury prevention activities.

METHODS

Population under surveillance

All health care workers in acute and non-acute care hospitals licensed by MDPH, as well as any satellite units (e.g., community health centers, ambulatory care centers) operating under a hospital license, are included in the population under surveillance.

Reportable exposure incident

A reportable exposure incident is defined as an exposure to blood or other potentially infectious materials as a result of an event that pierces the skin or mucous membranes during the performance of an employee's duties. A sharps injury is also considered an exposure incident if the worker is injured with a clean sharp or device (before use) through contaminated gloves or other contaminated mediums. An injury involving a clean device without any contact with infectious materials is not considered an exposure incident. See the MPDH report *Sharps Injuries among Hospital Workers in Massachusetts, 2004: Findings from the Massachusetts Sharps Injury Surveillance System* (www.mass.gov/Eeohhs2/docs/dph/occupational_health/injuries_hospital_2004.pdf) for a more detailed description of the surveillance system and methods.

[1] "Sharps Injuries among Hospital Workers in Massachusetts" for 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009 can be downloaded from www.mass.gov/dph/ohsp under "Needlesticks and Other Sharps Injuries" and "Data and Statistics".

Data presented

Frequencies (counts and percents) are presented for each of the data elements collected, with the exception of brand/model of device. Findings are presented for all hospitals combined (Appendix A) as well as by hospital size categories (defined by number of licensed beds) (Appendix B) and by teaching status (Appendix C) to allow hospitals to compare their individual experiences with those in similar facilities. Rates using the number of licensed beds as the denominator are presented by hospital size.

DATA HIGHLIGHTS

All 98 hospitals licensed by MDPH submitted Annual Sharps Injury Reports containing information about sharps injuries sustained by Massachusetts hospital workers in 2010. The number of sharps injuries reported by individual hospitals ranged from 0 to 339, with over half of the hospitals reporting fewer than 20 injuries. The extent to which a high number of reported injuries in a hospital reflects a true higher incidence of injuries or better sharps injury reporting practices is unknown.

The 22 Massachusetts teaching hospitals reported 67% (1,964) of all sharps injuries. Teaching status is strongly correlated with hospital size; nearly half of the teaching hospitals (41%, 9) have over 300 beds. Detailed findings for all hospitals are presented in Appendix A. Summary tables of findings by hospital size and teaching status are provided in Appendices B and C.

Overview

- A total of 2,947 sharps injuries among hospital-based health care workers in Massachusetts were reported for the surveillance period January 1 to December 31, 2010. This is similar to the annual number of sharps injuries reported in previous years.

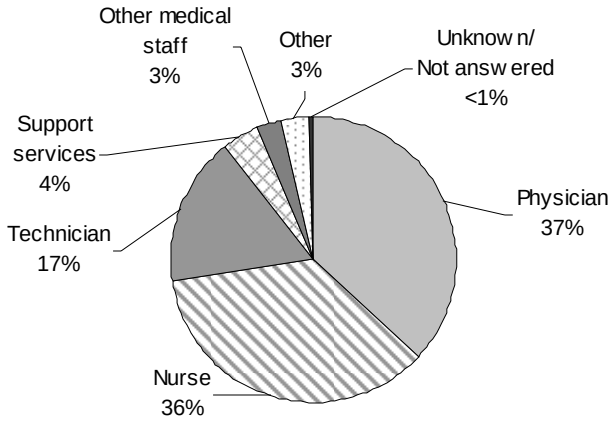
- Eighty-eight percent of the injured workers (2,596) were hospital employees, 8% (235) were non-employee practitioners, 3% (93) were students, and less than 1% (9) were temporary or contract employees.

Occupation and Department

- Physicians sustained more injuries (37%, 1,078) than any other occupational group, followed by nurses (36%, 1,060). Close to half of the injuries in the physician category were sustained by interns and residents. Physicians accounted for proportionately more injuries in large hospitals (> 300 licensed beds) (46%, 819).

- Technicians, such as surgical technicians and phlebotomists, sustained 17% (511) of the injuries. Four percent (119) of the injuries were sustained by support service workers, of whom over half (62) were housekeepers.

Figure 1. Sharps Injuries among Hospital Workers by Occupation, Massachusetts, 2010, N=2,947

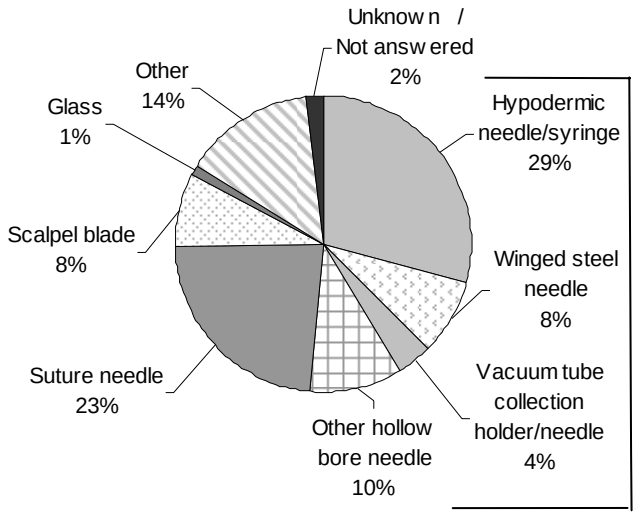


Data Source: Massachusetts Sharps Injuries Surveillance System, 2010

- Injuries occurred most frequently in operating rooms (32%, 948) followed by medical / surgical wards (16%, 465). Nine and eight percent of injuries occurred in intensive care units (277) and emergency departments (250) respectively.

Type of Device

Figure 2. Sharps Injuries among Hospital Workers by Device involved in the Injury, Massachusetts, 2010, N=2,947



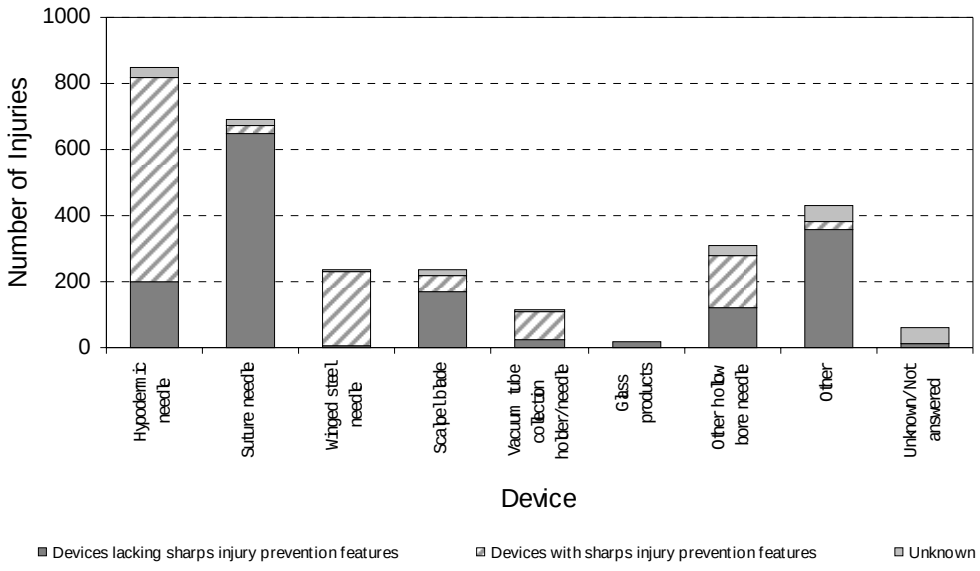
Data Source: Massachusetts Sharps Injuries Surveillance System, 2010

- Hollow bore needles, which include hypodermic needles/syringes, winged steel needles, vacuum tube collection devices and IV stylets, as a group accounted for 51% (1,507) of all injuries reported. Hypodermic needles/syringes accounted for more injuries (29%, 849) than any other type of device.
- Injuries involving solid sharp devices, including suture needles, scalpels and glass, accounted for 32% (947) of all injuries. Injuries involving suture needles accounted for 23% (690), followed by scalpel blades (8%, 238) and glass items (1%, 19).

Sharps Injury Prevention Features & Mechanisms

- Of the 2,753 (93%) injuries with devices for which information regarding the presence of engineered sharps injury prevention features was recorded, over half (57%, 1,558) involved devices without engineered sharps injury prevention features. Hypodermic needles/syringes lacked these features in 24% (201) of the injuries associated with these devices, even though hypodermic

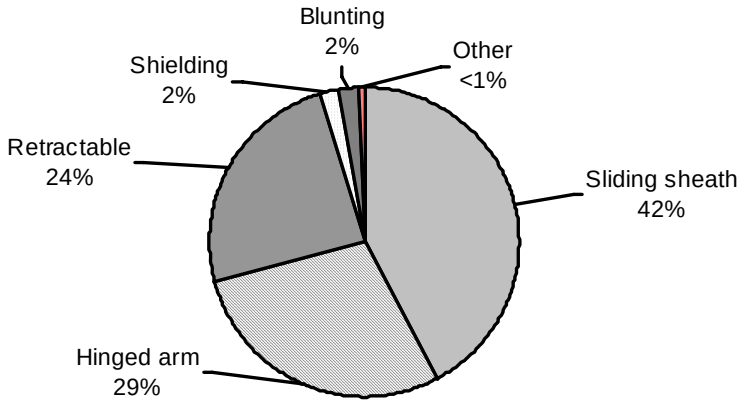
Figure 3. Sharps Injuries among Hospital Workers by Presence of Engineered Sharps Injury Prevention Feature, Massachusetts, 2010, N=2,947



Data Source: Massachusetts Sharps Injuries Surveillance System, 2010

needles/syringes with engineered sharps injury prevention features have been available on the market for the past 14 years. By contrast, only 4% (9) of winged steel needles and 22% (25) of vacuum tube collection holder/needles associated with injuries lacked these features.

Figure 4. Sharps Injuries among Hospital Workers by Mechanism of Sharps Injury Prevention Feature, Massachusetts, 2010, n=1,124



Data Source: Massachusetts Sharps Injuries Surveillance System, 2010

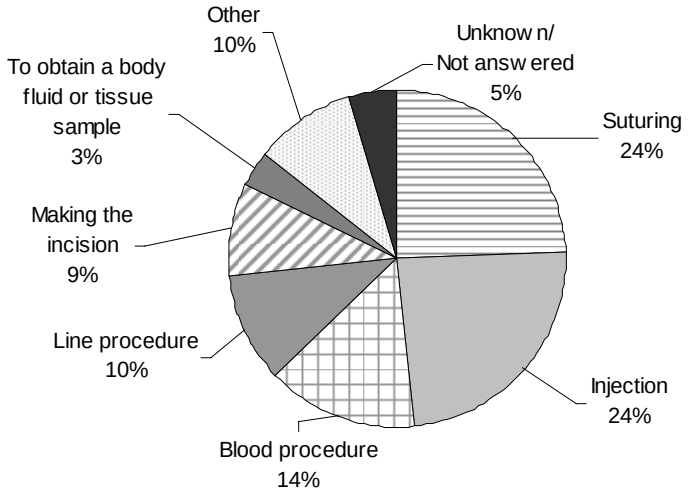
- Of the 1,124 (38%) injuries involving devices with sharps injury prevention features for which detailed information about the mechanism of the feature was provided, injuries occurred most often with devices with a sliding sheath (474, 42%). The hinged arm and retractable mechanisms accounted for 308 (38%) and 263 (24%) injuries respectively.

There are many different mechanisms of sharps injury prevention features along the continuum from active to passive technology. Active technology requires the user to complete additional steps to engage the sharps injury prevention feature (e.g., hinged arm). Passive technology, however, allows the sharps injury prevention feature to engage through the clinical use of the device, with no extra steps (e.g., retractable needles). Information presented here should not be interpreted as an assessment of efficacy of different mechanisms, as information about the number of devices purchased or used is not available. Examples of different types of sharps injury prevention features can be found on the OSHA web site under "safer needle devices" (http://www.osha.gov/SLTC/etools/hospital/hazards/sharps/sharps.html#safer).

Procedure for which the Device was Used and When the Injury Occurred

- Devices involved in injuries were most frequently used for suturing (24%, 722) and injections (24%, 706) followed by blood procedures (14%, 421). In medium sized hospitals injuries were most often related to injections (27%, 249), as was the case in small sized hospitals (26%, 57). Suturing accounted for 28% of injuries in large hospitals (508 injuries), in contrast to 18% and 21% in medium and small sized hospitals respectively.

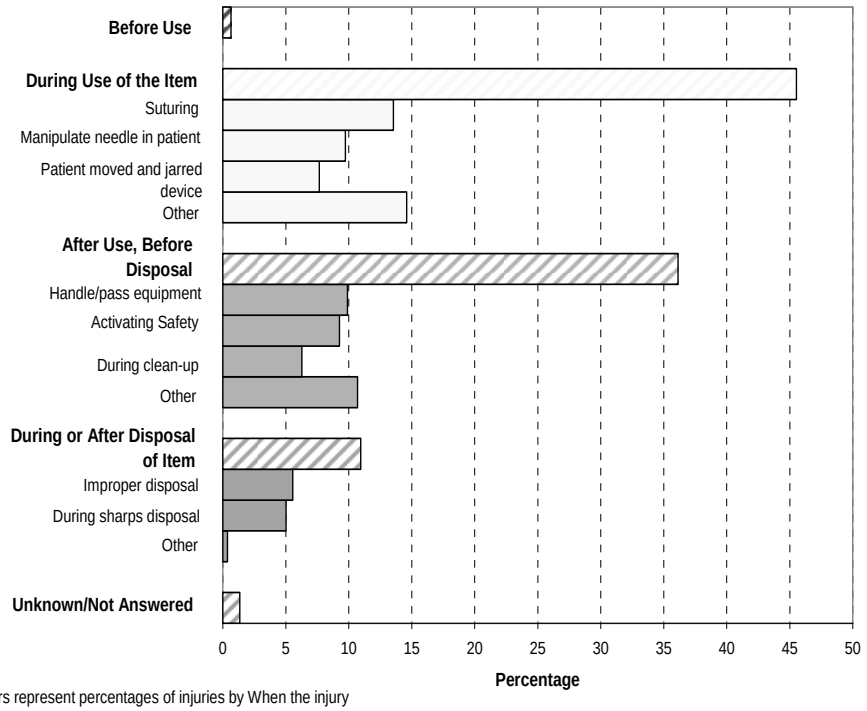
Figure 5. Sharps Injuries among Hospital Workers by Purpose or Procedure for which the Device was used, Massachusetts, 2010, N=2,947



Data Source: Masschusetts Sharps Injuries Surveillance System, 2010

- Injuries occurred during the use of devices in 46% (1,342) of the cases. After use of the device (47%, 1,388) was a more dangerous time to handle a device as compared with during use. These included injuries sustained after use but before disposal of devices (36%, 1,065) and injuries occurring during or after disposal (11%, 323).

Figure 6. Sharps Injuries among Hospital Workers by When and How the Injury Occured, Massachusetts, 2010, N=2,947



*Striped bars represent percentages of injuries by When the injury

Data Source: Massachusetts Sharps Injuries Surveillance System, 2010

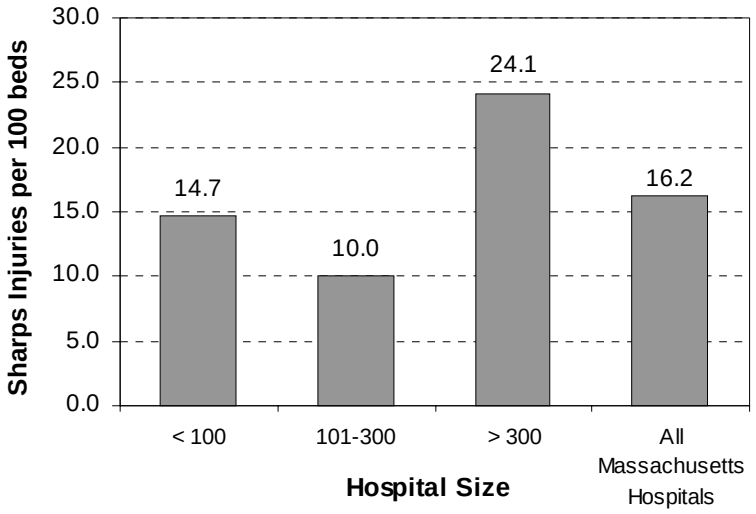
- Fourteen percent (399) of the cases occurred during the act of suturing. Handling and passing equipment (292) and activating sharps injury prevention features (273) accounted for 10% and 9% of the injuries occurring after use before disposal respectively.

- Collision with sharp accounted for 13% (379) of the reported cases. MDPH continues to work with hospitals to encourage greater detail in descriptions of the incident so that these cases can be more appropriately coded.

Rates

The statewide rate of sharps injuries among hospital workers for this twelve month surveillance period was 16.2 sharps injuries per 100 licensed beds. Annual rate of sharps injuries varied by hospital size (Figure 6). Injury rates which include all licensed hospitals underestimate the risk for acute care hospitals, because although acute care hospitals make up only 81% of all licensed hospital beds, injuries in acute care hospitals accounted for 97% of all reported injuries. The sharps injury rate among hospital workers in acute care hospitals in 2010 was 19.2

Figure 7. Sharps Injury Rates by Hospital Size Category, Massachusetts, 2010, N=2,947



Data Source: Massachusetts Sharps Injuries Surveillance System, 2010

injuries per 100 licensed beds. Large acute care hospitals had the highest annual rate of 28.6 injuries per 100 licensed beds, followed by small and medium sized acute care hospitals, which had annual sharps injury rates of 16.9 and 11.6 sharps injuries per 100 licensed hospital beds, respectively.

Given the limitations presented below of using the number of hospital beds as a denominator for assessing risks, sharps injury rates should be interpreted with caution. In comparing experience among hospitals, underreporting must be taken into consideration. The extent to which high rates of reported injuries in some hospitals reflect a true higher incidence of injuries in these hospitals or better sharps injury reporting practices compared to those with low rates is not known. Hospitals evaluating there own rates should do so within the context of their own sharps injury surveillance and prevention programs.

LIMITATIONS

There are a number of limitations to be considered in interpreting the findings presented in this report. In order for an injury to be included on the Annual Sharps Summary, hospitals rely on health care workers to report sharps injuries. As discussed previously, there are many reasons why health care workers may choose not to report sharps injuries, and underreporting by health care workers has been well documented. Also, there is evidence that the likelihood of reporting varies by occupation and completeness of reporting varies by hospital (CDC, 2008). The surveillance findings presented in this report should be considered conservative estimates of the burden of sharps injuries among hospital workers in Massachusetts.

The rates for hospitals in Massachusetts are somewhat lower than rates reported by EPINet, which are based on occupied beds (Perry et al., 2008 & 2009a-b). In Massachusetts, the number of occupied beds and the number of licensed beds are highly correlated, and this difference in denominators does not explain the difference in Massachusetts and EPINet rates. Rates using number of beds whether licensed or occupied in the denominator have several limitations. The number of licensed beds is not an accurate reflection of patients treated nor does it provide a measure of the number of inpatient or outpatient procedures performed or devices used, or workers at risk. For example, rates based on licensed beds may overestimate the risks of sharps injuries in facilities where a large number of outpatient procedures are performed.

For more than 90% of the records, the information about each reported injury provided by hospitals was complete. However, there was some missing information, which has been coded as “not answered”. There was also some confusion in several data elements (such as department where injury occurred and brand of device) about the type of information that should be provided. MDPH has worked collaboratively with hospitals to improve data collection and to clarify any questions about information to be reported. This has resulted in more complete and comprehensive data. MDPH will continue to work with hospitals to clarify outstanding issues.

DISCUSSION

Recently published findings from the Massachusetts Sharps Injury Surveillance System suggest that there has been a significant decline in sharps injury rate among Massachusetts hospital workers since 2001 when the MDPH regulations were implemented (Laramie, et al., 2011). This is important progress. However, the data for 2010 presented in this report indicate that much remains to be done. There were 2,964 injuries reported in 2010 and an unacceptably high proportion (53%) was associated with devices without sharps injury prevention features. Many of these were with devices, such as hypodermic needles, for which alternatives have been on the market for decades.

Previous studies have shown that implementation of devices with sharps injury prevention features can reduce injuries related to those device types by as much as 86% (Adams & Elliot, 2006; Muntz & Hultburg, 2004). Hospitals are reminded that MDPH regulations require that sharps injury prevention technology must be used in the provision of care to patients, an inventory of devices lacking sharps injury prevention features that are still in use must be developed and justification of the continued use of devices lacking sharps injury prevention features must be documented. The requirement to maintain an inventory is intended to provide a way for hospitals to document devices in need of conversion and serve as a useful tool in developing a plan for implementing devices with sharps injury prevention features (SESIPs). Many hospitals have found it useful to enlist unit and department managers as well as procurement staff in this process, rather than ask one individual (generally employee health or infection control) to develop the entire list. Hospitals should use their Annual Summary data along with the inventory of devices lacking sharps injury prevention features to establish priorities for device conversion. They should proceed with evaluating devices with sharps injury prevention features and implementing the most effective where clinically appropriate. As mandated by MDPH and OSHA, clinical staff should be involved in the selection of new devices.

The mechanism of the sharps injury prevention feature is an important consideration in selection of devices. As described, there are many different sharps injury prevention mechanisms along the continuum from active to passive technology. Active technology requires the user to complete additional steps to engage the sharp injury prevention features (e.g. hinged arm). Passive technology, however, allows the sharps injury prevention of features to engage during the clinical use of the device, with no extra steps (e.g. retractable needles). While more research of the efficacy of different types of mechanisms in needed, results from a recent study suggest that devices with passive sharps injury prevention features are more protective than those with active features (Tosini, et al., 2010)

This annual report for the first time includes information about the mechanism of the sharps injury prevention features for those injuries involving SESIPS. Among these injuries, the majority involved devices with active sharps injury prevention features. As noted previously, this information alone cannot be used to assess efficacy of the different mechanisms because information about the number of devices used or purchased is not collected. It does however indicate that many devices with active features are in use. As hospitals continue to evaluate devices as part of continuous quality improvement, consideration of devices with passive sharps injury prevention features is strongly encouraged.

While use of SESIPs is critical to preventing sharps injuries, the devices are not fail safe. Hospitals should provide training on the use of devices and should implement safe work practices as part of a comprehensive sharps injury prevention program. Training should be provided not only to employees, but also to contract staff, per diem staff, interns, residents and students.

Close to a quarter of the injuries reported occurred with devices used for injection procedures. More than 75% of injuries during injections were performed with devices with sharps injury prevention features, highlighting the need to implement work practice controls. Factors such as position of the healthcare worker relative to the patient and injection site along with disposal practices, in addition to engineering controls and the selection of devices should be considered. Devices with mechanisms which require an extra step to activate, or with mechanisms that can be removed or disengaged should be closely evaluated to see if there are more effective passive alternatives available for use.

Injuries in operating and procedure rooms constitute 45% of all reported injuries. Work-practice controls are particularly important in operating and procedure rooms because some devices have fewer alternatives with sharps injury prevention features. These measures include use of neutral zones for hands free passing and increased verbal communications regarding the transfer of devices among staff. Evaluation of devices used, and consideration of those with safety features, such as scalpel blades and blunt suture needles, is also needed. Together with OSHA, NIOSH issued a safety and health information bulletin (SHIB) regarding the implementation of blunt suture needles in 2007. Prior to the

NIOSH SHIB, the American College of Surgeons issued a statement at the 2005 Annual Meeting supporting “the universal adoption of blunt suture needles as the first choice for fascial suturing to minimize or eliminate needle-stick injuries from surgical needles”. In addition to suture needles, evaluation of the practice of multi-dose administration of various medications via injection should also be reviewed and alternative practices evaluated, as this practice does not allow for the use of hypodermic needles / syringes with safety features and helps to prevent the risk of cross-contamination and transmission of infections to patients (MMWR, 2008).

The Massachusetts Sharps Injury Surveillance System is a collaborative effort between the MDPH and hospitals, professional associations and community advocates. The success of the program in collecting data is a result of this collaboration. MDPH will continue to work with these groups to conduct surveillance, review exposure control activities in hospitals, and facilitate the exchange of information among hospitals about successful prevention strategies.

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APPENDIX A

Sharps Injuries among Hospital Workers in Massachusetts, 2010

STATE TOTAL	**2,947**	**100%**
WORK STATUS OF INJURED WORKER	**N**	**%**
Employee	2,596	88
Non-employee practitioner	235	8
Student	93	3
Temporary / Contract worker	9	<1
Other	11	<1
Unknown	3	<1

OCCUPATION OF INJURED WORKER	**N**	**%**
Physician	**1,078**	**37%**
Intern / Resident	435	15
MD	290	10
Fellow	122	4
Surgeon	84	3
Physician assistant	64	2
Medical student	58	2
Anesthesiologist	17	1
Radiologist	8	<1
Nurse	**1,060**	**36%**
RN or LPN	949	32
Nursing assistant	43	1
Patient care technician	24	1
Nurse practitioner	20	1
Nurse anesthetist	12	<1
Nursing student	6	<1
Nurse midwife	6	<1
Technician	**511**	**17%**
OR / Surgical technician	217	7
Phlebotomist	104	4
Clinical lab technician	54	2
Radiologic technician	29	1
Respiratory therapist / Tech	19	1
Hemodialysis Technician	5	<1
Other technician	83	3
Support Services	**119**	**4%**
Housekeeper	62	2
Central supply	42	1
Maintenance	4	<1
Safety / Security	4	<1
Attendant / Orderly	3	<1
Food service	3	<1
Other ancillary staff	1	<1
Other Medical Staff	**95**	**3%**
Medical assistant	88	3
Physical Therapist	1	<1
Other medical staff	6	<1

APPENDIX A

Sharps Injuries among Hospital Workers in Massachusetts, 2010

OCCUPATION OF INJURED WORKER	N	%
Dental Staff	**14**	**<1%**
Dental student	5	<1
Dental Assistant / Tech	4	<1
Dentist	3	<1
Other dental worker	2	<1
Other	**60**	**2%**
Researcher	19	1
EMT / Paramedic	4	<1
Pharmacist	4	<1
Clerical / Administrative	3	<1
Counselor / social worker	2	<1
Other student	11	<1
Other	17	1
Unknown / Not Answered	**10**	**<1%**

DEPARTMENT WHERE INCIDENT OCCURRED	N	%
Operating and Procedure Rooms	**1,332**	**45%**
Operating room	948	32
Labor and delivery	101	3
Radiology	91	3
Cardiac catheterization laboratory	65	2
Phlebotomy room	38	1
Hematology / Oncology	26	1
Endoscopy / Bronchoscopy / Cytoscopy	23	1
Dialysis	17	1
Other procedure room	15	1
Procedure room, unspecified	8	<1
Inpatient Units	**570**	**19%**
Medical / Surgical ward	465	16
Obstetrics / Gynecology	37	1
Pediatrics	22	1
Psychiatry ward	21	1
Nursery	6	<1
Patient room, ward unspecified	19	1
Intensive Care Units	**277**	**9%**
Intensive care unit	206	7
Post anesthesia care unit	71	2
Emergency Department	**250**	**8%**
Outpatient Areas	**162**	**5%**
Ambulatory care clinic	65	2
Dental clinic	19	1
Home health visit	12	<1
Community health center	5	<1
Other outpatient areas	61	2

APPENDIX A
Sharps Injuries among Hospital Workers in Massachusetts, 2010

DEPARTMENT WHERE INCIDENT OCCURRED	N	%
Laboratory	**126**	**4%**
Histology / Pathology	37	1
Blood bank	6	<1
Microbiology	5	<1
Clinical chemistry	2	<1
Morgue / Autopsy room	2	<1
Other laboratory	30	1
Laboratory, unspecified	44	1
Other Areas	**211**	**7%**
Central sterile supply	46	1
Dermatology	39	1
Rehabilitation unit	39	1
Exam room	13	<1
Pain clinic	9	<1
Long term care	8	<1
Hospital grounds	6	<1
Central trash area	6	<1
Employee health / Infection control	2	<1
Pharmacy	2	<1
Anesthesia	2	<1
Other location	39	1
Unknown / Not Answered	**19**	**1%**

PROCEDURE FOR WHICH DEVICE WAS USED	N	%
Suturing	**722**	**24%**
Suturing	704	24
Suture removal	18	1
Injection	**706**	**24%**
Subcutaneous injection	535	18
Intramuscular injection	107	4
Epidural / Spinal anesthesia	8	<1
Other injection	9	<1
Injection, unspecified	47	2
Blood Procedures	**421**	**14%**
Percutaneous venous puncture	284	10
Percutaneous arterial puncture	48	2
Finger stick / Heel stick	48	2
Dialysis / AV fistula site	16	1
Draw blood from umbilical vessel	12	<1
Blood procedure, unspecified	10	<1
Other blood procedure	3	<1
Line Procedures	**309**	**10%**
To insert a peripheral IV line or set up a heparin lock	113	4
To insert a central IV line	43	1
Draw blood from central or peripheral IV line or port	33	1
Other injection into IV site / port	28	1
To insert an arterial line	18	1
To flush heparin / saline	10	<1

APPENDIX A
Sharps Injuries among Hospital Workers in Massachusetts, 2010

PROCEDURE FOR WHICH DEVICE WAS USED	N	%
Draw blood from arterial line	10	<1
To connect IV line	9	<1
Other line procedure	29	1
Line procedure, unspecified	16	1
Making the incision	**262**	**9%**
Making the incision	203	7
Other surgical procedure	21	1
Surgical procedure, unspecified	38	1
To Obtain Body Fluid or Tissue sample	**100**	**3%**
Dental Procedures	**14**	**<1%**
Oral surgery	8	<1
Dental drilling	1	<1
Restorative	1	<1
Dental procedure, unspecified	3	<1
Other dental	1	<1
Other	**272**	**9%**
To obtain lab specimens	34	1
Transferring blood / body fluid to another container	23	1
Drilling	13	<1
During disposal	3	<1
Shaving	7	<1
Other procedure	180	6
Procedure, unspecified	12	<1
Unknown / Not answered	**141**	**5%**

DEVICE INVOLVED IN THE INJURY	N	%
Hypodermic needles / syringe (hollow bore)	**849**	**29%**
Hypodermic needle attached to a disposable syringe	746	25
Unattached hypodermic needle	33	1
Prefilled cartridge syringe	28	1
Hypodermic needle attached to a non-disposable syringe	26	1
Hypodermic needle attached to IV tubing	10	<1
Hypodermic needle, unspecified	6	1
Suture Needle	**690**	**23%**
Curved suture needle	459	16
Straight suture needle	26	1
Suture needle, unspecified	205	7
Other Hollow Bore Needle	**307**	**10%**
IV stylet	139	5
Huber needle	46	2
Biopsy needle	34	1
Spinal or epidural needle	19	1
Other type of hollow bore needle	34	1
Hollow bore needle, unspecified	35	1

APPENDIX A
Sharps Injuries among Hospital Workers in Massachusetts, 2010

DEVICE INVOLVED IN THE INJURY	N	%
Scalpel Blade	**238**	**8%**
Winged Steel Needle (hollow bore)	**236**	**8%**
Winged steel needle attached to a vacuum tube collection holder	143	5
Winged steel needle	84	3
Winged steel needle attached to IV tubing	9	<1
Vacuum Tube Collection Holder / Needle (hollow bore)	**115**	**4%**
Vacuum tube collection holder / needle	78	3
Phlebotomy needle (other than winged steel needle)	37	1
Glass	**19**	**1%**
Specimen / Test / Vacuum tube	5	<1
Pipette	4	<1
Medication ampule / Vial / IV bottle	3	<1
Slide	2	<1
Capillary tube	2	<1
Other glass item	3	<1
Dental Device or Item	**9**	**<1%**
Dental bur	3	<1
Scaler / curette	2	<1
Other dental device or item	4	<1
Other	**422**	**14%**
Lancet	47	2
Wire	43	1
Scissors	34	1
Retractor	29	1
Electrode	28	1
Pin	23	1
Razor	19	1
Forceps	16	1
Bovie electrocautery device	12	1
Trocar	12	<1
Drill bit	12	<1
Staple	9	<1
Bone cutter	7	<1
Tenaculum	6	<1
Bone chip / chipped tooth	5	<1
Histology cutting blade	2	<1
Rod	1	<1
Other needle	27	1
Needle, unspecified	11	<1
Other type of sharp object	79	3
Unknown / Not answered	**62**	**2%**

SHARPS INJURY PREVENTION FEATURES	N	%
No	1,558	53
Yes	1,195	41
Unknown / Not answered	194	7

APPENDIX A
Sharps Injuries among Hospital Workers in Massachusetts, 2010

MECHANISMS OF SHARPS INJURY PREVENTION FEATURE	N	%
No mechanism / No sharps injury prevention feature	1,318	45
Sliding sheath	474	16
Hinged arm	321	11
Retractable	275	9
Blunting	24	4
Shielding	24	1
Other mechanisms	6	<1
Unknown / Not answered	505	17

WHEN THE INJURY OCCURRED	N	%
During use of the item	1,342	46
After use and before disposal	1,065	36
During or after disposal of the item	323	11
Before use of the item **	19	1
Unknown / Not answered	198	7

HOW THE INJURY OCCURRED	N	%
Suturing	**399**	**14%**
Suturing	319	11
Manipulating suture needle in holder	51	2
Tying suture	29	1
Collision with Worker or Sharp	**379**	**13%**
Collided with sharp	139	5
Collided with coworker or other person	134	5
Collided with sharp after procedure	106	4
Handle / Pass Equipment	**300**	**10%**
Passing / Receiving / Transferring equipment	132	4
Handling equipment on tray or stand	94	3
Disassembling device or equipment	66	2
Opening / breaking glass containers	8	<1
Manipulate Needle in Patient	**287**	**10%**
While withdrawing needle from patient	155	5
While manipulating needle in patient	67	2
While inserting needle in patient	65	2
Activating Sharps Injury Prevention Feature	**274**	**9%**
Activating sharps injury prevention feature	233	8
Incomplete activation	41	1
Patient Moved and Jarred Device	**226**	**8%**
During Clean-up	**185**	**6%**
During clean-up	136	5
Decontamination / Processing of used equipment	47	2
Disassembling device or equipment during clean-up	2	<1

APPENDIX A

Sharps Injuries among Hospital Workers in Massachusetts, 2010

HOW THE INJURY OCCURRED	N	%
During Sharps Disposal	**179**	**6%**
While placing sharp in container, injured by sharp being disposed	45	2
In transit to disposal	31	1
Collided with sharp during / after disposal	24	1
Protruding from opened container	19	1
Overfilled sharps container	18	1
While placing sharp in container, injured by sharp (unclear if sharp in container or being disposed)	14	<1
While placing sharp in container, injured by sharp already in container	12	<1
While manipulating container	11	<1
Struck by detached IV line needle during / after disposal	1	<1
Punctured sharps container	2	<1
Sharp object dropped during / after disposal	2	<1
Improper Disposal	**164**	**6%**
Left on table / tray	45	2
In trash	45	2
On floor	16	1
Left in bed / mattress	14	<1
In linen / laundry	13	<1
In pocket / clothing	5	<1
Other improper disposal	26	1
Recap Needle	**61**	**2%**
Recapping	51	2
Cap fell off after recapping	5	<1
Removing cap after recapping	5	<1
Failure to Activate Safety Device	**73**	**2%**
Device Malfunction	**56**	**2%**
Access IV Line	**39**	**1%**
While withdrawing needle from line	23	1
While inserting needle in line	9	<1
While manipulating needle in line	5	<1
Struck by detached IV line needle	2	<1
Before Use of the Item	**18**	**1%**
Other	**262**	**9%**
Sharp object dropped	65	2
Incising	56	2
Transferring blood / bodily fluids into specimen container	22	1
Processing specimens	21	1
Sharp object dropped after procedure	11	<1
Palpating / Exploring	5	<1
Other	82	3
Unknown / Not answered	**45**	**2%**
STATE TOTAL	**2,947**	**100%**

** Sharps injury is considered an exposure incident if the worker is injured with a clean sharp or device (before use) through contaminated gloves or other contaminated mediums.

APPENDIX A

Sharps Injuries among Hospital Workers in Massachusetts, 2010

Sharps Injuries among Hospital Workers by Device and Presence of Sharps Injury Prevention Features

Device	No Sharps Injury Prevention Features		Sharps Injury Prevention Features		Unknown		Total	
	N	%	N	%	N	%	N	%
Hypodermic Needle / syringe	201	24	620	73	28	3	849	100%
Suture Needle	651	94	19	3	20	3	690	100%
Scalpel Blade	167	70	54	23	17	7	238	100%
Winged Steel Needle	9	4	224	95	3	1	236	100%
Vacuum tube collection holder / needle	25	22	86	75	4	3	115	100%
Other Hollow bore needle	121	39	160	52	26	8	307	100%
Other	384	75	32	6	96	19	512	100%
Total	1,558	53	1,195	41	194	7	2,947	100%

Sharps Injuries among Hospital workers by Procedure and Presence of Sharps Injury Prevention Features

Procedure	No Sharps Injury Prevention Features		Sharps Injury Prevention Features		Unknown		Total	
	N	%	N	%	N	%	N	%
Injection Procedures								
Subcutaneous Injection	105	20	419	78	11	2	535	100%
Intramuscular Injection	19	18	86	80	2	2	107	100%
Other Injections	33	52	28	44	3	5	64	100%
Blood Procedures								
Percutaneous venous puncture	20	7	258	91	6	2	284	100%
Finger stick / Heel stick	33	69	11	23	4	8	48	100%
Percutaneous arterial puncture	9	19	35	73	4	8	48	100%
Other blood procedures	8	20	28	68	5	12	41	100%
Line Procedures								
To insert peripheral IV or set up heparin lock	18	16	91	81	4	4	113	100%
To insert central line	21	49	21	49	1	2	43	100%
Other line procedures	57	37	89	58	7	5	153	100%
Other procedures	1,235	82	129	9	147	10	1,511	100%
Total	1,558	53	1,195	41	194	7	2,947	100%

APPENDIX B

Sharps Injuries among Hospital Workers by Number of Licensed Hospital Beds, Massachusetts, 2010

	Hospital size^							
	<100 beds		**101-300 Beds**		**> 300 beds**		**All Hospitals**	
	28 hospitals		54 hospitals		16 hospitals		98 hospitals	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
STATE TOTAL	**221**	**100 %**	**927**	**100 %**	**1,799**	**100 %**	**2,947**	**100 %**
WORK STATUS OF INJURED WORKER								
Employee	196	90	791	85	1,609	89	2,596	88 %
Non-Employee Practitioner	15	7	108	12	112	6	235	8
Student	2	1	18	2	73	4	93	3
Temporary / Contract Worker	6	3	3	<1	0	0	9	<1
Other	0	0	7	1	3	<1	10	<1
Unknown / Not answered / Nonclassifiable	0	0	3	<1	1	<1	4	<1
OCCUPATION								
Physician	67	31	192	21	819	46	1,078	37 %
Nurse	97	44	391	42	574	32	1,060	36
Technician	39	18	234	25	238	13	511	17
Support Services	4	2	44	5	71	4	119	4
Other Medical Staff	7	3	43	5	45	3	95	3
Dental Staff	0	0	3	<1	11	1	14	<1
Other	7	3	22	2	31	2	60	2
Unknown / Not answered / Nonclassifiable	0	0	1	<1	9	1	10	<1
DEPARTMENT WHERE INJURY OCCURRED								
Operating and Procedure Rooms	99	45	370	40	863	48	1,332	45 %
Inpatient Units	35	16	249	27	286	16	570	19
Intensive Care Units	5	2	54	6	218	12	277	9
Emergency Department	29	13	97	10	124	7	250	8
Outpatient areas	18	8	51	5	93	5	162	5
Laboratories	16	7	38	4	72	4	126	4
Other areas	16	7	67	7	128	7	211	7
Unknown / Not answered / Nonclassifiable	1	<1	4	<1	14	1	19	1
PROCEDURE FOR WHICH DEVICE WAS USED								
Suturing	47	21	167	18	508	28	722	24 %
Injection	57	26	249	27	400	22	706	24
Blood Procedures	29	13	192	21	200	11	421	14
Line Procedures	27	12	87	9	195	11	309	10
Making the Incision	23	11	66	7	173	10	262	9
To Obtain Body Fluid or Tissue Sample	4	2	25	3	71	4	100	3
Dental Procedures	0	0	1	<1	13	1	14	<1
Other	22	10	87	9	163	9	272	9
Unknown / Not answered / Nonclassifiable	10	5	56	6	75	4	141	5

^ Information on the number of licensed beds is obtained from the MDPH Division of Health Care Quality.

APPENDIX B

Sharps Injuries among Hospital Workers by Number of Licensed Hospital Beds, Massachusetts, 2010

	Hospital size^							
	<100 beds		**101-300 Beds**		**> 300 beds**		**All Hospitals**	
	28 hospitals		54 hospitals		16 hospitals		98 hospitals	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
STATE TOTAL	**221**	**100 %**	**927**	**100 %**	**1,799**	**100 %**	**2,947**	**100 %**
DEVICE INVOLVED IN THE INJURY								
Hypodermic needles / syringe	61	28	299	32	489	27	849	29 %
Suture Needle	43	20	166	18	481	27	690	23
Scalpel Blade	21	10	55	6	162	9	238	8
Winged Steel Needle	13	6	121	13	102	6	236	8
Vacuum Tube Collection Holder / Needle	13	6	50	5	52	3	115	4
Glass	3	1	7	1	8	<1	19	1
Dental Device or Item	0	0	1	<1	8	<1	9	<1
Other Hollow Bore Needle	31	14	77	8	199	11	307	10
Other	30	14	129	14	263	15	422	14
Unknown / Not answered / Nonclassifiable	4	2	25	3	33	2	62	2
SHARPS INJURY PREVENTION FEATURE								
No	118	53	382	41	1,058	59	1,558	53 %
Yes	92	42	485	52	618	34	1,195	41
Unknown / Not answered	11	5	60	6	123	7	194	7
MECHANISMS OF SHARPS INJURY PREVENTION FEATURE								
No mechanism / No sharps injury prev fea.	115	52	327	35	894	50	1336	45 %
Sliding sheath	52	24	217	23	205	11	474	16
Hinged arm	17	8	127	14	177	10	321	11
Retractable	18	8	95	10	162	9	275	9
Blunting	0	0	17	2	7	<1	24	1
Shielding	1	<1	22	2	1	<1	24	1
Other mechanisms	2	1	2	<1	2	<1	6	<1
Unknown / Not answered	16	7	116	13	317	18	449	15
WHEN THE INJURY OCCURRED								
During Use of the Item	103	47	389	42	850	47	1,342	46 %
After Use / Before Disposal	80	36	360	39	625	35	1,065	36
During or After Disposal of the Item	20	10	119	13	184	10	323	11
Before Use of the Item	2	<1	5	<1	12	1	19	1
Unknown / Not answered / Nonclassifiable	16	7	120	13	351	7	198	7
HOW THE INJURY OCCURRED								
Suturing	30	14	81	9	288	16	399	14 %
Collision with Worker or Sharp	38	17	100	11	241	13	379	13
Handle / Pass Equipment	19	9	87	9	194	11	300	10
Manipulate Needle in Patient	14	6	112	12	161	9	287	10
Activate Safety Device	19	9	124	13	131	7	274	9
Patient Moved / Jarred Device	19	9	85	9	122	7	226	8
During Clean-up	15	7	59	6	111	6	185	6
During Sharps Disposal	14	6	56	6	109	6	179	6
Improper Disposal	7	3	64	7	92	5	164	6
Failure to Activate Safety Device	7	3	30	3	36	2	73	2
Recap Needle	5	2	17	2	39	2	61	2
Device Malfunction	5	2	30	3	21	1	56	2
Access IV Line	1	<1	5	1	33	2	39	1
Before Use of Item	2	1	5	1	11	1	18	1
Other	21	10	60	6	182	10	262	9
Unknown / Not answered / Nonclassifiable	3	1	14	2	28	2	45	2

^ Information on the number of licensed beds is obtained from the MDPH Division of Health Care Quality.

APPENDIX C

Sharps Injuries among Hospital Workers by Hospital Teaching Status, Massachusetts, 2010

	Teaching Status^					
	Teaching		**Non-teaching**		**All Hospitals**	
	21 hospitals		77 hospitals		98 hospitals	
	N	**%**	**N**	**%**	**N**	**%**
STATE TOTAL	**1,927**	**100%**	**1,020**	**100%**	**2,947**	**100 %**
WORK STATUS OF INJURED WORKER						
Employee	1,749	91	847	83	2,596	88 %
Non-Employee Practitioner	91	5	144	14	235	8
Student	75	4	18	2	93	3
Temp / Contract	1	<1	8	1	9	<1
Other	9	<1	1	<1	10	<1
Unknown / Not answered / Nonclassifiable	2	<1	2	<1	4	<1
OCCUPATION						
Physician	864	45	214	21	1,078	37 %
Nurse	611	32	449	44	1,060	36
Technician	273	14	238	24	511	17
Support Services	67	3	52	5	119	4
Other Medical Staff	53	3	42	4	95	3
Dental Staff	13	1	1	<1	14	<1
Other	38	2	22	2	60	2
Unknown / Not answered / Nonclassifiable	8	<1	2	<1	10	<1
DEPARTMENT WHERE INJURY OCCURRED						
Operating and Procedure Rooms	949	49	383	38	1,332	45%
Inpatient Units	313	16	257	25	570	19
Intensive Care Units	217	11	60	6	277	9
Emergency Department	131	7	119	12	250	8
Outpatient areas	98	5	64	6	162	5
Laboratories	84	4	42	4	126	4
Other areas	119	6	92	9	211	7
Unknown / Not answered / Nonclassifiable	16	1	3	<1	19	1
PROCEDURE FOR WHICH DEVICE WAS USED						
Suturing	544	28	178	17	722	24%
Injection	392	20	314	31	706	24
Blood Procedures	230	12	191	19	421	14
Line Procedures	202	10	107	10	309	10
Making the Incision	186	10	76	7	262	9
To Obtain Body Fluid or Tissue Sample	73	4	27	3	100	3
Dental Procedures	13	1	1	<1	14	<1
Other	199	10	73	7	272	9
Unknown / Not answered / Nonclassifiable	88	5	53	5	141	5

^ Information on hospitals' teaching status is obtained from the Massachusetts Division of Health Care Finance and Policy.

APPENDIX C

Sharps Injuries among Hospital Workers by Hospital Teaching Status, Massachusetts, 2010

	Teaching Status^					
	Teaching		**Non-teaching**		**All Hospitals**	
	21 hospitals		77 hospitals		98 hospitals	
	N	**%**	**N**	**%**	**N**	**%**
STATE TOTAL	**1,927,**	**100%**	**1,020**	**100%**	**2,947**	**100%**
DEVICE INVOLVED IN THE INJURY						
Hypodermic needles / syringe	488	25	361	35	849	29%
Suture Needle	517	27	173	17	690	23
Scalpel Blade	173	9	65	6	238	8
Winged Steel Needle	127	7	109	11	236	8
Vacuum Tube Collection Holder / Needle	52	3	63	6	115	4
Glass	8	<1	11	1	19	1
Dental Device or Item	8	<1	1	<1	9	<1
Other Hollow Bore Needle	212	11	95	9	307	10
Other	306	16	116	11	422	14
Unknown / Not answered / Nonclassifiable	36	2	26	3	62	2
SHARPS INJURY PREVENTION FEATURE						
No	1,135	59	423	41	1,558	53%
Yes	642	33	553	54	1,195	41
Unknown / Not answered	150	8	44	4	194	7
MECHANISMS OF SHARPS INJURY PREVENTION FEATURE						
No mechanism / No sharps injury prevention feature	980	51	394	39	1,374	47 %
Sliding sheath	201	10	273	27	474	16
Hinged arm	207	11	114	11	321	11
Retractable	152	8	123	12	275	9
Blunting	14	1	10	1	24	1
Shielding	6	<1	18	2	24	1
Other mechanisms	1	<1	5	<1	6	<1
Unknown / Not answered	366	19	83	8	449	15
WHEN THE INJURY OCCURRED						
During Use of the Item	907	47	435	43	1,342	46%
After Use / Before Disposal	678	35	387	38	1,065	36
During or After Disposal of the Item	185	10	138	14	323	11
Before Use of the Item	11	1	8	1	19	1
Unknown / Not answered / Nonclassifiable	146	8	52	5	198	7
HOW THE INJURY OCCURRED						
Suturing	301	16	98	10	399	14%
Collision with Worker or Sharp	268	14	111	11	379	13
Activate Safety Device	148	8	126	12	274	9
Handle / Pass Equipment	215	11	85	8	300	10
Manipulate Needle in Patient	183	9	104	10	287	10
Patient Moved / Jarred Device	115	6	111	11	226	8
During Clean-up	131	7	54	5	185	6
During Sharps Disposal	116	6	63	6	179	6
Improper Disposal	93	5	71	7	164	6
Failure to Activate Safety Device	32	2	41	4	73	2
Recap Needle	36	2	25	2	61	2
Device Malfunctioned	22	1	34	3	56	2
Access IV Line	32	2	7	1	39	1
Before Use of Item	10	1	8	1	18	1
Other	194	10	68	7	262	9
Unknown / Not answered / Nonclassifiable	31	2	14	1	45	1

^ Information on hospitals' teaching status is obtained from the Massachusetts Division of Health Care Finance and Policy.

APPENDIX D
Resources
Sharps Injury Surveillance and Prevention

MDPH Occupational Health Surveillance Program
http://www.mass.gov/dph/ohsp
Sharps Injury Surveillance and Prevention Project - e-mail: Sharps.Injury@state.ma.us

OSHA Subject Page for Needle Sticks
Includes Bloodborne Pathogens Standard and compliance directive
http://www.osha.gov/SLTC/bloodbornepathogens/index.html

CDC-MMWR September 30, 2005 / Vol. 54 / RR-9
Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HIV and Recommendations for Post Exposure Prophylaxis
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm

CDC-MMWR June 29, 2001 / Vol. 50 / RR-11
Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV and HIV and Recommendations for Post Exposure Prophylaxis
http://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf

CDC Division of Healthcare Quality Promotion
Workbook for Designing, Implementing, and Evaluating a Sharps Injury Prevention Program
http://www.cdc.gov/sharpssafety/pdf/sharpsworkbook_2008.pdf

CDC National Institute for Occupational Safety and Health, Workplace Safety and Health Topics
Information related to bloodborne pathogens
http://www.cdc.gov/niosh/topics/bbp/

CDC Division of Healthcare Quality Promotion, National Surveillance System for Health care Workers
http://www.cdc.gov/HAI/surveillance/monitorHAI.html

National Surveillance System for Health care Workers,
Summary report for data collected from June 1995 through December 2007
http://www.cdc.gov/nhsn/PDFs/NaSH/NaSH-Report-6-2011.pdf

NIOSH Alert – Preventing Needlestick Injuries in Health care settings
http://www.cdc.gov/niosh/docs/2000-108/

JCAHO Sentinel Event Alert, Issue 22 August 2001
Preventing Needlestick and Sharps Injuries
http://www.jointcommission.org/sentinel_event_alert_issue_22_preventing_needlestick_and_sharps_injuries/

EPINet, International Health Care Worker Safety Center, University of Virginia
http://www.healthsystem.virginia.edu/internet/epinet/about_epinet.cfm

Training for Development of Innovative Control Technologies (TDICT) Project, San Francisco General Hospital
http://www.tdict.org/

Sustainable Hospitals Project, Lowell Center for Sustainable Production, University of Massachusetts Lowell
http://sustainablehospitals.org