Sharps Injuries among Hospital Workers in Massachusetts, 2007

Findings from the Massachusetts Sharps Injury Surveillance System

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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 US hospitals (Panlillio, Cardo, Campbell, Srivastava, Jagger, Orelien, et al., 2000). While injuries occur most frequently among nurses as well as 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, frequent events with a rare but negative outcome, have been associations with occupational transmission of hepattis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV) as well as over 20 other pathogens (OHSA, 2001). U.S. Public Health Service guidelines provide recommendations for post-exposure management of all workers who have sustained occupational exposure to bloodborne pathogens (MMWR, 2001; MMWR, 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 human immunodeficiency virus (HIV) and hepatitis B virus (HBV) (Cardo, Culver, Ciesielski, Srivastava, Marcus, Abiteboul, et al., 1997; MMWR, 2001). Costs of all post-exposure management, including costs of testing source patients and employees, labor costs associated with testing and counseling, loss of productivity, and cost of treating infection are estimated to be as high as $4,838 (O'Malley, Scott, Gayle, Dekutoski, Foltzer, Lundstrom, et al., 2007). These do not include the social impact on workers and their families, which are difficult to quantify.

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, 2000). 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 (safety devices), 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 seven years (2002-2008).

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 surveillance updates for 2005 and 2006.[1] This brief report includes findings from the Massachusetts Sharps Injury Surveillance System for the 2007 data collection period. Findings are presented by hospital bed-size categories and by teaching status as well as for all hospital 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 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, and varies by occupation and by hospital. Underreporting has been estimated by the CDC to be in excess of 50% (Perry, 2000). 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 (Tandberg, Stewart & Doezema, 1991). In addition, they may lack information and training about appropriate reporting procedures or the reporting procedures themselves may be inadequate. 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. Psychiatric hospitals are licensed by another agency and are not included.

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

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

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.

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 99 hospitals licensed by MDPH submitted Annual Sharps Injury Reports containing information about sharps injuries sustained by Massachusetts hospital workers in 2007. 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 65% (1,984) of all sharps injuries. Teaching status is strongly correlated with hospital size; close to half of the teaching hospitals (45%, 10) have over 300 beds.

Overview

- A total of 3,068 sharps injuries among hospital health care workers in Massachusetts were reported for the surveillance period January 1 to December 31, 2007. This is similar to the annual number of sharps injuries reported in previous years.

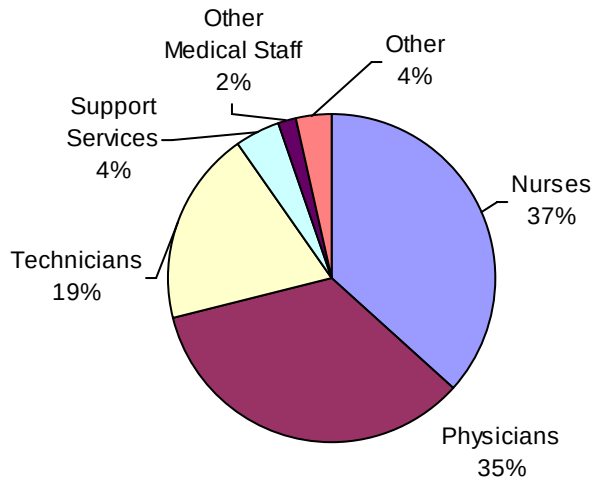
- Eighty-seven percent of the injured workers (2,678) were hospital employees, 9% (269) were non-employee practitioners, 3% (79) were students, and 1% (32) were temporary or contract employees.

Occupation and Department

- Nurses sustained more injuries (37%, 1,125) than any other occupational group, followed by physicians (35%, 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) (45%, 789).

- Technicians, such as surgical technicians and phlebotomists, sustained 19% (586) of the injuries. Four percent (133) of

Figure 1. Sharps Injuries among Hospital Workers by Occupation, Massachusetts, 2007, N=3,068



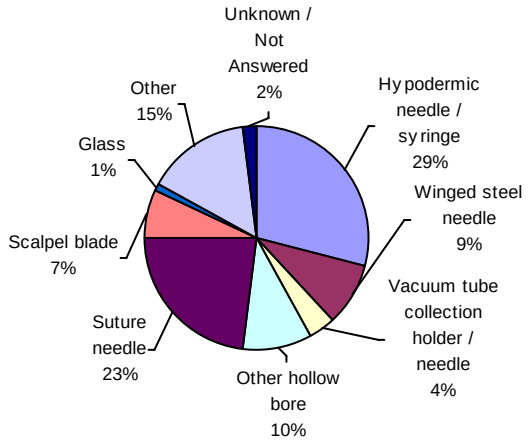
Data Source: Annual Summary of Sharps Injuries, 2007

the injuries were sustained by support service workers of whom 70 were housekeepers.

- Injuries occurred most frequently in operating rooms (34%, 1,031) followed by medical surgical wards (17%, 533). More injuries occurred in emergency departments (10%, 311) than on intensive care units (8%, 249).

Type of Device

Figure 2. Sharps Injuries among Hospital Workers by Device involved in the Injury, Massachusetts, 2007, N=3,068



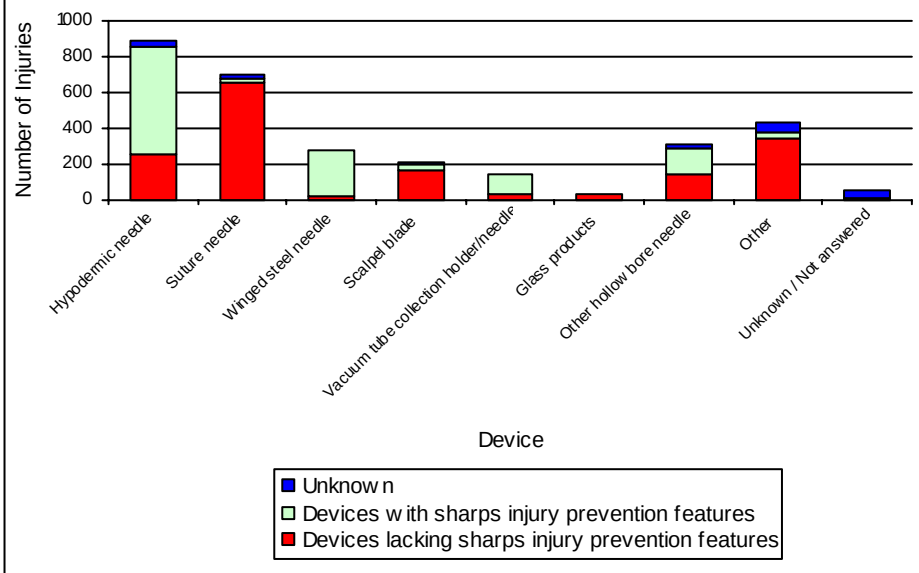
Data Source: Annual Summary of Sharps Injuries, 2007

- Hollow bore needles, which include hypodermic needles / syringes, winged steel needles, vacuum tube collection devices and IV stylets, as a group accounted for 52% (1,628) of all injuries reported. Hypodermic needles / syringes (29%, 887) accounted for more injuries than any other type of device. While most frequent, injuries with hypodermic needles / syringes generally involve less direct blood exposure and thus present less risk than injuries involving vacuum tube collection devices and winged steel needles. Injuries with these two types of devices accounted for 4% (150) and 9% (278) of all injuries, respectively.

- Injuries involving solid sharp devices, including suture needles, scalpels and glass, accounted for 31% (960) of all injuries. Injuries involving suture needles accounted for 23% (701) of the injuries, followed by scalpel blades (7%, 214) and glass items (1%, 38).

- Of the 2,866 injuries with devices for which information regarding the presence of engineered sharps injury prevention features was recorded (2,866), over half (57%, 1,655) involved devices without engineered sharps injury prevention features. However 29% (257) of the injuries associated hypodermic needles / syringes lacked sharps injury prevention features, even though hypodermic needles / syringes with safety features have been available on the market for the past 12 years. By contrast, only 8% (21) of winged steel needles and 19% (28) of vacuum tube collection holder / needles associated with injuries lacked safety features.

Figure 3. Sharps Injuries among Hospital Workers by Presence of Engineered Sharps Injury Prevention Feature, Massachusetts, 2007, N=3,068

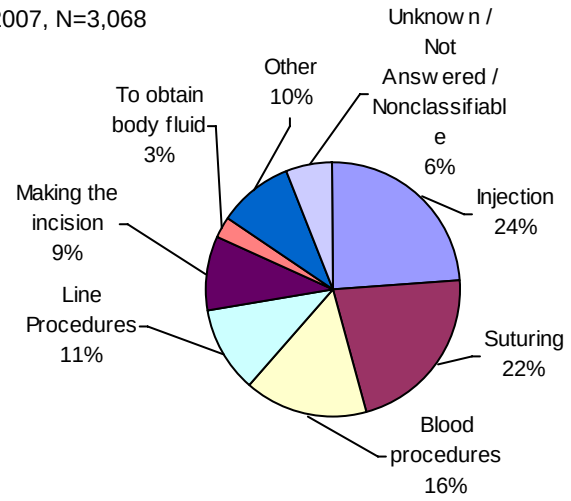


Data Source: Annual Summary of Sharps Injuries, 2007

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

- Devices involved in injuries were most frequently used for injections (24%, 730) and suturing (22%, 670) followed by blood procedures (16%, 482). In medium size hospitals injuries were most often related to injections (27%, 293), as was the case in small sized hospitals (21%, 50). Suturing accounted for 26% (447) of injuries in large hospitals, in contrast to 17% and 18% in medium and small sized hospitals respectively.

Figure 4. Sharps Injuries among Hospital Workers by Purpose or Procedure for which the Device was used Massachusetts, 2007, N=3,068



Data Source: Annual Summary of Sharps Injuries, 2007

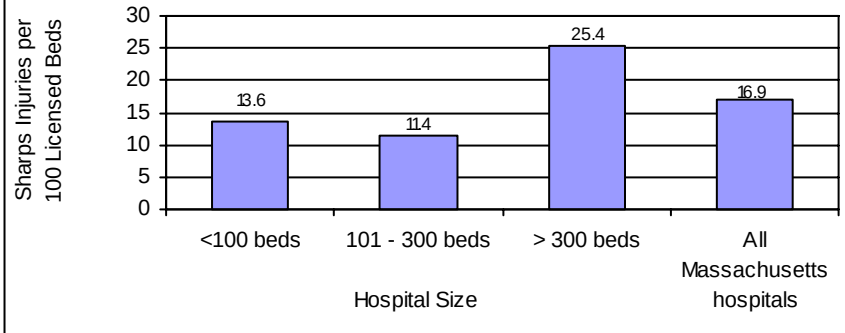
- Injuries occurred during the use of devices in 45% (1,386) of the cases. After use of the device was an equally dangerous time to handle a device as compared with during use. About half (47%, 1,463) of the injuries occurred after use of the device. These included injuries sustained after use but before disposal of devices (35%, 1,084) and injuries occurring during or after disposal (12%, 379).

- Collision with sharp accounted for 17% (520) 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. An additional 13% (408) of the cases occurred during the act of suturing.

RATES

The statewide rate for sharps injuries among hospital workers for this twelve month surveillance period was 16.9 sharps injuries per 100 licensed beds. The annual rate of sharps injuries varied by hospital size. Given the limitations presented below of using the number of hospital beds as a denominator for assessing risks, these rates should be interpreted with caution. In comparing experience among hospitals, underreporting must also 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 their own rates should do so within the context of their own sharps injury surveillance and prevention programs.

Figure 5. Sharps Injury Rates by Hospital Size Category, Massachusetts, 2007, N=3,068



Data Source: Annual Summary of Sharps Injuries, 2007

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 (EPINet, 2007, 2008 & 2009). 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 SIs in facilities where a large number of outpatient procedures are performed.

DISCUSSION:

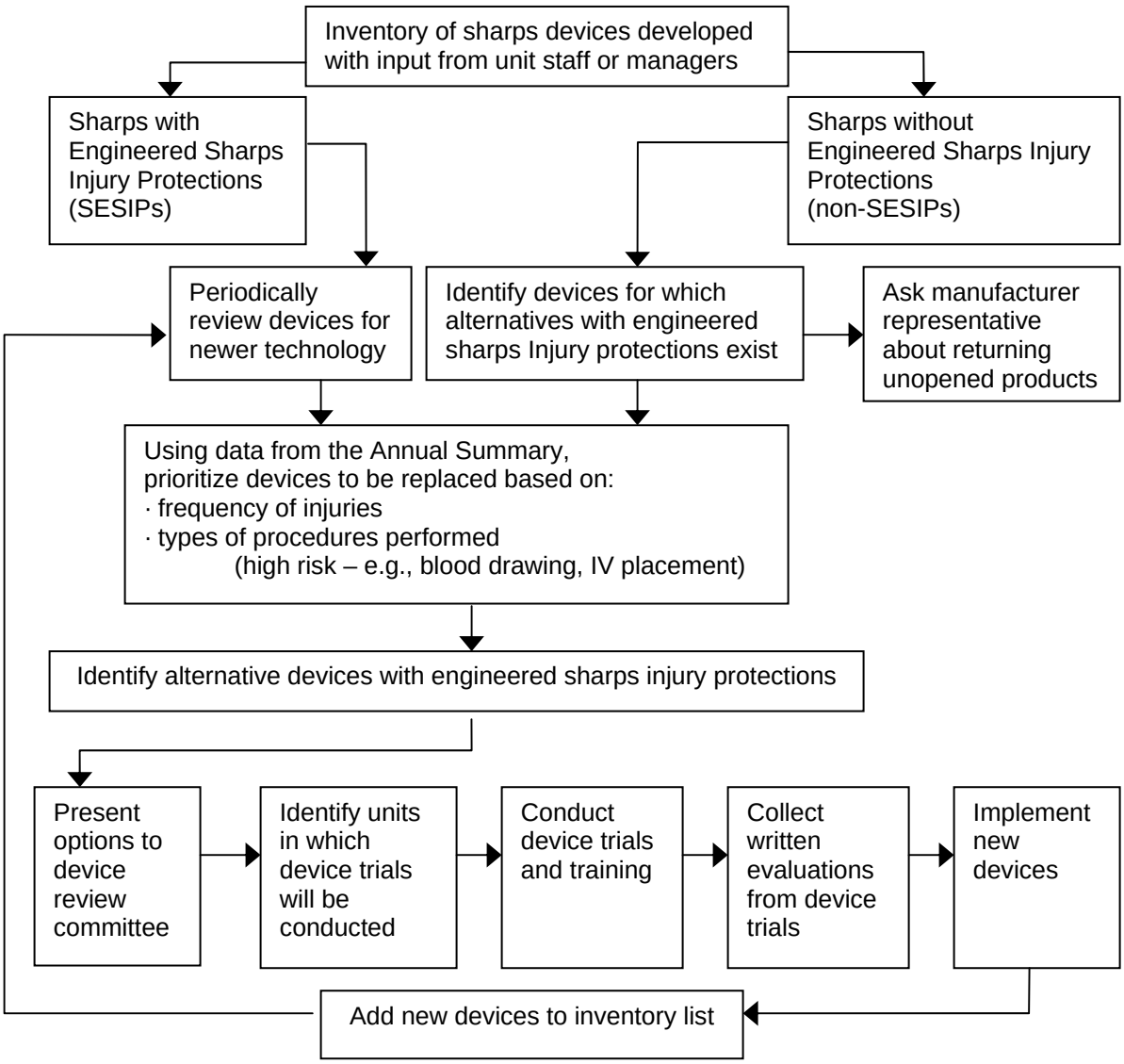
More than 3,000 sharps injuries were reported by Massachusetts hospitals in 2007, underscoring the need for continued efforts to reduce the incidence of these injuries. Findings highlight a number of specific issues that still need to be addressed in Massachusetts: the unacceptably high number of injuries with devices lacking sharps injury prevention features, most notably hypodermic needles/syringes, for which alternatives with sharps injury prevention features are available; the need for improved disposal practices to reduce the large number of injuries that occur after devices are used; and the need to implement safe work practices and alternative methods for suturing to reduce the high number of SIs in operating rooms. In addition, prevention measures need to be focused on high risk procedures such as blood drawing procedures.

The fact that injuries are also associated with devices with engineered sharps injury prevention features raises critical questions about the extent to which these injuries are due to lack of experience and training in using these newer devices or to flaws in product design, specifically the mechanism of the SI prevention feature (e.g., retracting, blunting, sheathing). In 2010 OHSP will add a data element to the *Annual Summary* to collect this information. Future analysis of these data will generate hypotheses that will move the research beyond determining efficacy of devices with sharps injury prevention features versus those without, to examining various generations of sharps injury prevention technology.

In order to continue to replace existing devices to those with engineered sharps injury prevention features in an efficient manner, it is necessary to know which devices without such injury protections are still in use. MDPH has issued guidance to hospitals for creating such an inventory, including a template of data elements to be included in the inventory list. A flow chart outlining the process for maintaining such an inventory as well as identifying and implementing new devices is shown below. (Figure 6.) Each clinical unit in the hospital should be involved in creating the inventory of devices. Data from the Annual Summary of Sharps Injuries should be used to prioritize the order in which devices will be converted to those with sharps injury prevention features. It is important to remember that staff who will be using the devices must be involved in the selection and evaluation of new devices (OSHA, 2001). The device inventory should be reviewed regularly to identify devices lacking

sharps injury prevention features that should be replaced, as well as to identify devices with sharps injury prevention features for which more effective alternatives exist. Device evaluation is a continuous process which requires the participation of staff in various clinical departments as well as materials management and purchasing, along with the use of data on sharps injuries.

Figure 6. Flow chart regarding Device Selection, Evaluation and Implementation



The Massachusetts Sharps Injury Surveillance System is a collaborative effort between the MDPH, 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, 2007

STATE TOTAL	**3,068**	**100%**

WORK STATUS OF INJURED WORKER	**N**	**%**
Employee	2,678	87
Non-employee practitioner	269	9
Student	79	3
Temporary / Contract worker	32	1
Other	1	<1
Nonclassifiable	7	<1
Not answered	2	<1

OCCUPATION OF INJURED WORKER	**N**	**%**
Nurse	**1,125**	**37%**
RN or LPN	995	32
Nursing assistant	47	2
Patient care technician	28	1
Nurse practitioner	24	1
Nurse anesthetist	11	<1
Nursing student	10	<1
Home health aide	9	<1
Nurse midwife	1	<1
Physician	**1,060**	**35%**
Intern / Resident	503	16
MD	273	9
Medical student	70	2
Fellow	69	2
Physician assistant	64	2
Surgeon	62	2
Anesthesiologist	14	<1
Radiologist	5	<1
Technician	**586**	**19%**
OR / Surgical technician	241	8
Phlebotomist	141	5
Clinical lab technician	52	2
Respiratory therapist / Tech	26	1
Radiologic technician	23	1
Morgue Technician	1	<1
Hemodialysis Technician	1	<1
Other technician	101	3
Support Services	**133**	**4%**
Housekeeper	70	2
Central supply	52	2
Maintenance	5	<1
Attendant / Orderly	4	<1
Food Service	1	<1
Laundry staff	1	<1
Other Medical Staff	**45**	**1%**
Medical assistant	43	1

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Sharps Injuries among Hospital Workers in Massachusetts, 2007

OCCUPATION OF INJURED WORKER	N	%
Physical Therapist	1	<1
Other medical staff	1	<1
Dental Staff	**9**	**<1%**
Dentist	6	<1
Dental Assistant / Tech	3	<1
Other	**106**	**3%**
Researcher	12	<1
EMT / Paramedic	11	<1
Clerical / Administrative	6	<1
Pharmacist	2	<1
Dietician	2	<1
Other student	21	1
Other	52	2
Unknown / Not Answered	**3**	**<1%**
Nonclassifiable	**1**	**<1%**

DEPARTMENT WHERE INCIDENT OCCURRED	N	%
Operating and Procedure Rooms	**1,339**	**44%**
Operating room	1,031	34
Labor and delivery	98	3
Radiology	68	2
Hematology / Oncology	32	1
Phlebotomy room	28	1
Cardiac catheterization laboratory	23	1
Dialysis	15	<1
Endoscopy / Bronchoscopy / Cytoscopy	14	<1
Other procedure room	10	<1
Procedure room, unspecified	20	1
Inpatient Units	**647**	**21%**
Medical / Surgical ward	533	17
Obstetrics / Gynecology	26	1
Psychiatry ward	19	1
Nursery	14	<1
Pediatrics	13	<1
Specific ward, type unknown**	1	<1
Patient room, ward unspecified	41	1
Emergency Department	**311**	**10%**
Intensive Care Units	**249**	**8%**
Intensive care unit	234	8
Post anesthesia care unit	15	<1
Outpatient Areas	**176**	**6%**
Ambulatory care clinic	101	3
Home health visit	15	<1
Dental clinic	7	<1
Community health center	5	<1
Other outpatient areas	48	2

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DEPARTMENT WHERE INCIDENT OCCURRED	N	%
Laboratory	**149**	**5%**
Histology / Pathology	23	1
Blood bank	17	1
Clinical chemistry	16	1
Morgue / Autopsy room	15	<1
Microbiology	3	<1
Other laboratory	26	1
Laboratory, unspecified	49	2
Other Areas	**188**	**6%**
Central sterile supply	41	1
Rehabilitation unit	35	1
Dermatology	19	1
Long term care	8	<1
Hospital grounds	8	<1
Ambulance	7	<1
Central trash area	6	<1
Exam room	5	<1
Pharmacy	5	<1
Employee health / Infection control	4	<1
Pain clinic	3	<1
Detox unit	1	<1
Jail unit	1	<1
Laundry room	1	<1
Other location	44	1
Unknown / Not answered	**5**	**<1%**
Non-classifiable	**4**	**<1**

PROCEDURE FOR WHICH DEVICE WAS USED	N	%
Injection	**730**	**24%**
Subcutaneous injection	469	15
Intramuscular injection	83	3
Epidural / Spinal anesthesia	14	<1
Other injection	1	<1
Injection, unspecified	163	5
Suturing	**670**	**22%**
Suturing	667	22
Suture removal	3	<1
Blood Procedures	**482**	**16%**
Percutaneous venous puncture	369	12
Finger stick / Heel stick	46	1
Percutaneous arterial puncture	44	1
Draw blood from umbilical vessel	8	<1
Dialysis / AV fistula site	5	<1
Blood procedure, unspecified	10	<1
Line Procedures	**335**	**11%**
To insert a peripheral IV line or set up a heparin lock	119	4
To insert a central IV line	51	2
To insert an arterial line	33	1
Other injection into IV site / port	28	1

APPENDIX A
Sharps Injuries among Hospital Workers in Massachusetts, 2007

PROCEDURE FOR WHICH DEVICE WAS USED	N	%
Draw blood from central or peripheral IV line or port	24	1
To flush heparin / saline	18	1
Draw blood from arterial line	9	<1
To connect IV line	8	<1
Other line procedure	34	1
Line procedure, unspecified	11	<1
Making the incision	**288**	**9%**
To Obtain Body Fluid or Tissue sample	**87**	**3%**
Dental Procedures	**10**	**<1%**
Dental drilling	4	<1
Oral surgery	4	<1
Restorative	1	<1
Other dental procedure	1	<1
Other	**290**	**9%**
To obtain lab specimens	40	1
Transferring blood / body fluid to another container	25	1
Drilling	15	<1
During disposal	14	<1
Shaving	8	<1
Other procedure	164	5
Procedure, unspecified	24	1
Unknown / Not answered	**159**	**5%**
Nonclassifiable	**17**	**1%**

DEVICE INVOLVED IN THE INJURY	N	%
Hypodermic needles / syringe (hollow bore)	**887**	**29%**
Hypodermic needle attached to a disposable syringe	774	25
Prefilled cartridge syringe	35	1
Hypodermic needle attached to a non-disposable syringe	29	1
Unattached hypodermic needle	28	1
Hypodermic needle attached to IV tubing	6	<1
Hypodermic needle, unspecified	15	<1
Suture Needle	**701**	**23%**
Curved suture needle	201	7
Straight suture needle	30	1
Suture needle, unspecified	470	15
Other Hollow Bore Needle	**313**	**10%**
IV stylet	164	5
Huber needle	34	1
Spinal or epidural needle	20	1
Biopsy needle	16	1
Other type of hollow bore needle	16	1
Hollow bore needle, unspecified	63	2
Winged Steel Needle (hollow bore)	**278**	**9%**
Winged steel needle	167	5

APPENDIX A
Sharps Injuries among Hospital Workers in Massachusetts, 2007

DEVICE INVOLVED IN THE INJURY	N	%
Winged steel needle attached to a vacuum tube collection holder	106	3
Winged steel needle attached to IV tubing	5	<1
Scalpel Blade	**214**	**7%**
Vacuum Tube Collection Holder / Needle (hollow bore)	**150**	**4%**
Vacuum tube collection holder / needle	101	3
Phlebotomy needle (other than winged steel needle)	49	2
Glass	**38**	**1%**
Medication ampule / Vial / IV bottle	10	<1
Specimen / Test / Vacuum tube	9	<1
Slide	7	<1
Pipette	4	<1
Other glass item	8	<1
Dental Device or Item	**7**	**<1%**
Dental bur	3	<1
Dental explorer	2	<1
Other dental device or item	1	<1
Scaler / curette	1	<1
Other	**427**	**14%**
Lancet	49	2
Wire	38	1
Scissors	36	1
Retractor	36	1
Pin	19	1
Forceps	17	1
Razor	13	<1
Trocar	12	<1
Bovie electrocautery device	11	<1
Drill bit	10	<1
Bone cutter	8	<1
Tenaculum	4	<1
Bone chip / chipped tooth	3	<1
Elevator	1	<1
Rod	1	<1
Other needle	49	2
Needle, Unspecified	40	1
Other type of sharp object	87	3
Unknown / Not answered	**52**	**2%**

SAFETY DEVICE	N	%
No	1,655	54
Yes	1,211	39
Unknown / Not answered	202	7

WHEN THE INJURY OCCURRED	N	%
Before use of the item	44	1
During use of the item	1,386	45
After use and before disposal	1,084	35

During or after disposal of the item	379	12
Unknown / Not answered	42	2
Nonclassifiable	133	4

HOW THE INJURY OCCURRED	**N**	**%**
Collision with Worker or Sharp	**520**	**17%**
Collided with sharp	255	8
Collided with sharp after procedure	139	5
Collided with coworker or other person	126	4
Suturing	**408**	**13%**
Suturing	347	11
Manipulating suture needle in holder	45	1
Tying suture	16	1
During Clean-up	**151**	**5%**
During clean-up	105	3
Decontamination / Processing of used equipment	45	1
Disassembling device or equipment	1	<1
Handle / Pass Equipment	**259**	**8%**
Receiving / Passing / Transferring equipment	137	4
Handling equipment on tray or stand	56	2
Disassembling device or equipment	53	2
Opening / breaking glass containers	13	<1
Patient Moved and Jarred Device	**248**	**8%**
Activating Safety Device	**257**	**8%**
Activating safety device	217	7
Incomplete activation	40	1
Improper Disposal	**206**	**7%**
Left on table / tray	64	2
In trash	43	1
Left in bed / mattress	21	1
On floor	20	1
In linen / laundry	10	<1
In pocket / clothing	6	<1
Other improper disposal	37	1
Improper disposal, unspecified	5	<1
During Sharps Disposal	**189**	**6%**
While placing sharp in container, injured by sharp being disposed	54	2
While placing sharp in container, injured by sharp (unclear if sharp in container or being disposed)	29	1
Collided with sharp during / after disposal	23	1
In transit to disposal	19	1
While placing sharp in container, injured by sharp already in container	15	<1
Protruding from opened container	12	<1
While manipulating container	9	<1
Overfilled sharps container	9	<1
Sharp object dropped during / after disposal	4	<1
Punctured sharps container	2	<1

APPENDIX A

Sharps Injuries among Hospital Workers in Massachusetts, 2007

HOW THE INJURY OCCURRED	N	%
Struck by detached IV line needle during / after disposal	1	<1
During sharps disposal, unspecified	12	<1
Manipulate Needle in Patient	**256**	8%
While withdrawing needle from patient	148	5
While inserting needle in patient	62	2
While manipulating needle in patient	46	1
Recap Needle	**87**	**3%**
Recapping	73	2
Cap fell off after recapping	10	<1
Removing cap after recapping	4	<1
Access IV Line	**43**	**1%**
While withdrawing needle from line	27	1
While inserting needle in line	8	<1
While manipulating needle in line	6	<1
Struck by detached IV line needle	2	<1
Failure to Activate Safety Device	**118**	**4%**
Device Malfunction	**58**	**2%**
Before Use of the Item	**37**	**1%**
Other	**184**	**6%**
Incising	48	2
Sharp object dropped	40	1
Transferring blood / bodily fluids into specimen container	22	1
Processing specimens	16	1
Palpating / Exploring	15	<1
Sharp object dropped after procedure	14	<1
Other	29	1
Unknown / Not answered	**41**	**1%**
Nonclassifiable	**6**	**<1%**
STATE TOTAL	**3,068**	**100%**

** Hospital specific nomenclature provided, without specifying department

Percentages for frequencies less than 5 were not calculated; Percentages calculated are column percents.

APPENDIX A

Sharps Injuries among Hospital Workers in Massachusetts, 2007

Sharps Injuries among Hospital Workers by Device and Presence of Safety Features

Device	No Safety Features		Safety Features		Unknown		Total	
	N	%	N	%	N	%	N	%
Hypodermic Needle / syringe	257	29	598	67	32	4	887	100%
Suture Needle	657	94	18	3	26	4	701	100%
Winged Steel Needle	21	8	252	91	5	2	278	100%
Scalpel Blade	171	80	33	15	10	5	214	100%
Vacuum tube collection holder / needle	28	19	118	79	4	3	150	100%
Other Hollow bore needle	139	44	153	49	21	7	313	100%
Other	382	73	39	7	104	20	525	100%
Total	1,655	54	1,211	39	202	7	3,068	100%

Sharps Injuries among Hospital workers by Procedure and Devices With and Without Safety Features

Procedure	No Safety Features		Safety Features		Unknown		Total	
	N	%	N	%	N	%	N	%
Injection Procedures								
Subcutaneous Injection	112	24	346	74	11	2	469	100%
Intramuscular Injection	13	16	67	81	3	4	83	100%
Other Injections	76	43	99	56	3	2	178	100%
Blood Procedures								
Percutaneous venous puncture	36	10	326	88	7	2	369	100%
Finger stick / Heel stick	23	50	11	24	12	26	46	100%
Percutaneous arterial puncture	6	14	37	84	1	2	44	100%
Other blood procedures	10	43	12	52	1	4	23	100%
Line Procedures								
To insert peripheral IV or set up heparin lock	32	27	84	71	3	3	119	100%
To insert central line	34	67	11	22	6	12	51	100%
Other line procedures	71	43	89	54	5	3	165	100%
Other procedures	1,242	82	139	8	150	10	1,521	100%
Total								100%

APPENDIX B

Sharps Injuries among Hospital Workers by Number of Licensed Hospital Beds, Massachusetts, 2007

	Hospital size							
	<100 beds		101-300 Beds		> 300 beds		All Hospitals	
	31 hospitals		54 hospitals		14 hospitals		99 hospitals	
	N	%*	N	%*	N	%*	N	%*
STATE TOTAL	**237**	**100%**	**1,086**	**100%**	**1,745**	**100%**	**3,068**	**100%**
WORK STATUS OF INJURED WORKER								
Employee	212	89	929	86	1,537	88	2,678	87 %
Non-Employee Practitioner	16	7	123	11	130	7	269	9
Student	4	2	13	1	62	4	79	3
Temporary / Contract Worker	4	2	13	1	15	1	32	1
Other	1	<1	0	0	0	0	1	<1
Unknown / Not answered / Nonclassifiable	0	0	8	<1	1	<1	9	<1
OCCUPATION								
Nurse	92	39	471	43	562	32	1,125	37 %
Physician	44	19	227	21	789	45	1,060	35
Technician	68	29	284	26	234	13	586	19
Support Services	17	7	60	6	56	3	133	4
Other Medical Staff	4	2	23	2	18	1	45	1
Dental Staff	0	0	2	<1	7	<1	9	<1
Other	12	5	17	2	77	4	106	3
Unknown / Not answered / Nonclassifiable	0	0	2	<1	2	<1	4	<1
DEPARTMENT WHERE INJURY OCCURRED								
Operating and Procedure Rooms	93	40	448	41	798	46	1,339	44 %
Inpatient Units	46	19	285	26	316	18	647	21
Emergency Department	35	15	130	12	146	8	311	10
Intensive Care Units	14	6	74	7	161	9	249	8
Outpatient areas	6	3	40	4	130	7	176	6
Laboratories	7	3	42	4	100	6	149	5
Other areas	36	15	65	6	87	5	188	6
Unknown / Not answered / Nonclassifiable	0	0	2	<1	7	<1	9	<1
PROCEDURE FOR WHICH DEVICE WAS USED								
Injection	51	21	296	27	383	22	730	24 %
Suturing	43	18	180	17	447	26	670	22
Blood Procedures	44	19	243	22	195	11	482	16
Line Procedures	24	10	108	10	203	12	335	11
Making the Incision	31	13	89	8	168	10	288	9
To Obtain Body Fluid or Tissue Sample	5	2	26	2	56	3	87	3
Dental Procedures	1	<1	2	<1	7	<1	10	<1
Other	23	10	83	8	184	11	290	9
Unknown / Not answered / Nonclassifiable	13	6	59	5	102	6	176	6

Percentages calculated are column percents; Percentages for frequencies less than 5 were not calculated.

APPENDIX B

Sharps Injuries among Hospital Workers by Number of Licensed Hospital Beds, Massachusetts, 2007

	Hospital size							
	<100 beds		101-300 Beds		> 300 beds		All Hospitals	
	31 hospitals		54 hospitals		14 hospitals		99 hospitals	
	N	%*	N	%*	N	%*	N	%*
STATE TOTAL	**237**	**100%**	**1,086**	**100%**	**1,745**	**100%**	**3,068**	**100%**
DEVICE INVOLVED IN THE INJURY								
Hypodermic needles / syringe	61	26	358	33	468	27	887	29 %
Suture Needle	48	21	191	18	462	26	701	23
Winged Steel Needle	22	9	135	12	121	7	278	9
Scalpel Blade	16	7	68	6	130	7	214	7
Vacuum Tube Collection Holder / Needle	23	10	63	6	64	4	150	5
Glass	4	2	10	1	24	1	38	1
Dental Device or Item	0	0	1	<1	6	<1	7	<1
Other Hollow Bore Needle	25	11	119	11	169	10	313	10
Other	35	14	120	11	272	16	427	14
Unknown / Not answered / Nonclassifiable	3	1	21	2	29	2	53	2
SAFETY DEVICE								
No	126	53	449	41	1,080	62	1,655	54 %
Yes	99	42	547	50	565	32	1,211	39
Unknown / Not answered	12	5	90	8	100	6	202	7
WHEN THE INJURY OCCURRED								
During Use of the Item	86	36	457	42	843	48	1,386	45 %
After Use / Before Disposal	92	39	411	38	581	33	1,084	35
During or After Disposal of the Item	41	17	153	14	185	11	379	12
Before Use of the Item	6	3	10	1	28	2	44	1
Unknown / Not answered / Nonclassifiable	12	5	55	5	108	6	175	6
HOW THE INJURY OCCURRED								
Collision with Worker or Sharp	43	18	162	15	315	18	520	17 %
Suturing	18	8	108	10	282	16	408	13
Handle / Pass Equipment	24	10	74	7	161	9	259	8
Activate Safety Device	25	11	113	10	119	7	257	8
Manipulate Needle in Patient	12	5	81	7	163	9	256	8
Patient Moved / Jarred Device	21	9	102	9	125	7	248	8
Improper Disposal	21	9	83	8	102	6	206	7
During Sharps Disposal	23	10	78	7	88	5	189	6
During Clean-up	14	6	70	6	67	4	151	5
Failure to Activate Safety Device	7	3	67	6	44	3	118	4
Recap Needle	4	2	26	2	57	3	87	3
Device Malfunctioned	4	2	26	2	27	2	58	2
Access IV Line	4	2	12	1	27	2	43	1
Before Use of Item	6	3	9	1	22	1	37	1
Other	6	3	60	6	118	7	184	6
Unknown / Not answered / Nonclassifiable	4	2	15	1	28	2	47	2

Percentages calculated are column percents; Percentages for frequencies less than 5 were not calculated.

APPENDIX C

Sharps Injuries among Hospital Workers by Hospital Teaching Status, Massachusetts, 2007

	Teaching Status					
	Teaching		**Non-teaching**		**All Hospitals**	
	19 hospitals		80 hospitals		99 hospitals	
	N	**%***	**N**	**%***	**N**	**%***
STATE TOTAL	**1,944**	**100%**	**1,124**	**100%**	**3,068**	**100%**
WORK STATUS OF INJURED WORKER						
Employee	1,726	89	952	85	2,678	87 %
Non-Employee Practitioner	131	7	138	12	269	9
Student	64	3	15	1	79	3
Temp / Contract	21	1	11	1	32	1
Other	0	0	1	<1	1	<1
Unknown / Not answered / Nonclassifiable	2	<1	7	1	9	1
OCCUPATION						
Nurse	616	32	509	45	1,125	37 %
Physician	863	44	197	18	1,060	35
Technician	284	15	302	27	586	19
Support Services	59	3	74	7	133	4
Other Medical Staff	30	2	15	1	45	1
Dental Staff	8	<1	1	<1	9	<1
Other	81	4	25	2	106	3
Unknown / Not answered / Nonclassifiable	3	<1	1	<1	4	<1
DEPARTMENT WHERE INJURY OCCURRED						
Operating and Procedure Rooms	908	47	431	38	1,339	44%
Inpatient Units	357	18	290	26	647	21
Emergency Department	172	9	139	12	311	10
Intensive Care Units	183	9	66	6	249	8
Outpatient areas	142	7	34	3	176	6
Laboratories	104	5	45	4	149	5
Other areas	72	4	116	10	188	6
Unknown / Not answered / Nonclassifiable	6	<1	3	<1	9	<1
PROCEDURE FOR WHICH DEVICE WAS USED						
Injection	406	21	324	29	730	24%
Suturing	501	26	169	15	670	22
Blood Procedures	248	13	234	21	482	16
Line Procedures	216	11	119	11	335	11
Making the Incision	189	10	99	9	288	9
To Obtain Body Fluid or Tissue Sample	65	3	22	2	87	3
Dental Procedures	8	<1	2	<1	10	<1
Other	198	10	92	8	290	9
Unknown / Not answered / Nonclassifiable	113	6	63	6	176	6

Percentages calculated are column percents; Percentages for frequencies less than 5 were not calculated.

APPENDIX C

Sharps Injuries among Hospital Workers by Hospital Teaching Status, Massachusetts, 2007

	Teaching Status					
	Teaching		Non-teaching		All Hospitals	
	19 hospitals		80 hospitals		99 hospitals	
	N	%*	N	%*	N	%*
STATE TOTAL	**1,944**	**100%**	**1,124**	**100%**	**3,068**	**100%**
DEVICE INVOLVED IN THE INJURY						
Hypodermic needles / syringe	494	25	393	35	887	29
Suture Needle	514	26	187	17	701	23
Winged Steel Needle	164	8	114	10	278	9
Scalpel Blade	151	8	63	6	214	7
Vacuum Tube Collection Holder / Needle	64	3	86	8	150	5
Glass	29	1	9	1	38	1
Dental Device or Item	7	<1	0	0	7	<1
Other Hollow Bore Needle	194	10	119	11	313	10
Other	294	15	133	12	427	14
Unknown / Not answered / Nonclassifiable	33	2	20	2	53	2
SAFETY DEVICE						
No	1,165	60	490	44	1,655	54%
Yes	641	33	570	51	1,211	39
Unknown / Not answered	138	7	64	6	202	7
WHEN THE INJURY OCCURRED						
During Use of the Item	952	49	434	39	1,386	45%
After Use / Before Disposal	624	32	460	41	1,084	35
During or After Disposal of the Item	216	11	163	15	379	12
Before Use of the Item	31	2	13	1	44	1
Unknown / Not answered / Nonclassifiable	121	6	54	5	175	6
HOW THE INJURY OCCURRED						
Collision with Worker or Sharp	362	19	158	14	520	17%
Suturing	318	16	90	8	408	13
Activate Safety Device	125	6	132	12	257	8
Handle / Pass Equipment	169	9	90	8	259	8
Manipulate Needle in Patient	179	9	77	7	256	8
Patient Moved / Jarred Device	146	8	102	9	248	8
Improper Disposal	120	6	86	8	206	7
During Sharps Disposal	102	5	87	8	189	6
During Clean-up	80	4	71	6	151	5
Failure to Activate Safety Device	47	2	71	6	118	4
Recap Needle	57	3	30	3	87	3
Device Malfunctioned	26	1	32	3	58	2
Before Use of Item	25	1	12	1	37	1
Access IV Line	29	1	14	1	43	1
Other	133	7	51	5	184	6
Unknown / Not answered / Nonclassifiable	26	1	21	2	47	2

Percentages calculated are column percents; Percentages for frequencies less than 5 were not calculated.

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/

CDC Division of Healthcare Quality Promotion, Issues in Healthcare
Information related to bloodborne pathogens
http://www.cdc.gov/ncidod/hip/Blood/blood.htm

CDC Division of Healthcare Quality Promotion, National Surveillance System for Health care Workers
http://www.cdc.gov/ncidod/hip/SURVEILL/nash.HTM

National Surveillance System for Health care Workers,
Summary report for data collected from June 1995 through July 1999
http://www.cdc.gov/ncidod/hip/NASH/report99.PDF

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

JCAHO Sentinel Event Alert, Issue 22 August 2001
Preventing Needlestick and Sharps Injuries
http://www.jcaho.org/edu_pub/sealert/sea22.html

EPINet, International Health Care Worker Safety Center, University of Virginia
http://www.med.virginia.edu/medcntr/centers/epinet/

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