



Data Brief:

Sharps Injuries among Hospital Workers in Massachusetts: Findings from the Massachusetts Sharps Injury Surveillance System, 2019

Massachusetts Department of Public Health

JANUARY, 2021

Since 2001, hospitals licensed by the Massachusetts Department of Public Health (DPH) have been required to report data on sharps injuries among workers to the Department annually (MGL/Chapter 111 s 53D) and to use sharps with engineered sharps injury prevention features (SESIPs). Data have been collected from all DPH licensed hospitals since 2001. This report includes data on sharps injuries that occurred during 2019.

The Massachusetts Sharps Injury Surveillance System is intended to provide information to assist Massachusetts hospitals and hospital workers in targeting and evaluating efforts to reduce the incidence of sharps injuries and the associated human and economic costs. For a more comprehensive description of the system, please see: <http://www.mass.gov/eohhs/docs/dph/occupational-health/injuries/injuries-hospital-2004.pdf>.

Data Highlights and Prevention Measures

- 2,933 sharps injuries were reported in 2019. The sharps injury rate for workers in all Massachusetts Department of Public Health (DPH) licensed hospitals was 16.3 sharps injuries per 100 licensed beds, similar to the rates for the three previous years (Figure 1). Comparable findings were observed in rates for employees (per 1,000 full time employee equivalents) in acute care hospitals only (Figure 2). These findings show that in contrast to the earlier observed decline in rates from 2002-2010, rates are slowly increasing, underscoring the need for a continued commitment to preventing sharps injuries. Hospitals, in interpreting their own sharps injury rates, need to understand employee reporting practices in their facilities.
- Nurses reported more injuries than any other occupation group (Tables 2 and 10). Nurses in small and medium sized hospitals reported more injuries than physicians, while in large hospitals physicians account for the greatest number of sharps injuries. This difference by hospital size may reflect differences in types of procedures conducted in the hospital setting (e.g., more surgery in larger hospitals).
- Injuries involving injection procedures accounted for 31% of all sharps injuries, with subcutaneous injections accounting for the majority of those (78% of injection related injuries). Of all injection related injuries, 18% occurred with non-SESIPs. In accordance with 105 CMR 130.1001 *et seq*, hospitals are required to use devices with sharps injury prevention features as a means of minimizing the risk of injury to healthcare workers from needles and other sharps. The number of injuries involving non-SESIPs indicates that more work needs to be done to promote use of SESIPs. An additional 77% of all injection related injuries occurred with SESIPs. This high percentage of SESIPs likely reflects increased use of SESIPs as required. It also serves as a reminder that administrative and work-practice controls also need to be implemented in order to prevent sharps injuries. In addition, hospitals are encouraged to regularly evaluate SESIPs in order to select and implement devices that are most effective at preventing injuries.
- The presence of a sharps injury prevention feature is most crucial *after* the device is used. There were 247 sharps injuries due to non-SESIPs that involved common devices for which SESIPs are widely available. Hypodermic needles/syringes, most often used for injections, accounted for 182 of these injuries, and 66% (121) of the hypodermic needles/syringe injuries occurred after use. These 121 injuries after use could be thought of as “preventable adverse events” in that use of SESIPs may have prevented the injury.

Key Definitions and Methods

Sharps injury (also referred to as an exposure incident): An exposure to blood or other potentially infectious materials as a result of an incident involving a contaminated sharp device that pierces the skin or mucous membranes. An injury with a clean sharp or device (before use) through contaminated gloves or other contaminated mediums is also considered a sharps injury. An injury involving a clean device without any contact with infectious materials is not considered an exposure incident.

Sharps device: Any object that can penetrate the skin or any part of the body and result in an exposure incident, including but not limited to needle devices, scalpels, lancets, broken glass, and broken capillary tubes.

Population under surveillance: All health care workers in acute and non-acute care hospitals licensed by DPH, as well as any satellite units (e.g., ambulatory care centers) operating under a hospital license.

Surveillance Period: Calendar year 2019.

Sharps injury rates: Sharps injury rates indicate the probability or risk of a worker sustaining a sharps injury within the surveillance period. Numbers are the counts of sharps injuries. A large hospital may have many workers who sustain sharps injuries but the rate of injury may be low. Conversely, in a smaller hospital, relatively few workers may sustain sharps injuries but the risk may be high. Both rates and numbers of injuries must be considered when targeting and evaluating prevention efforts. The rates presented in this report were calculated by dividing the number of sharps injuries among all workers by the number of licensed beds. Confidence intervals (CI) are presented for each rate. Trends in annual rates were modeled using both negative binomial and joinpoint regressions. Negative binomial regression was used to model the overall trends of these rates from 2002 to 2019. Joinpoint regression was used to identify any changes in the trends over the same period.

Sharps with engineered sharps injury protections (SESIPs): Needle devices and non-needle sharps used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with built-in sharps injury prevention features or mechanisms that effectively reduce the risk of an exposure incident.

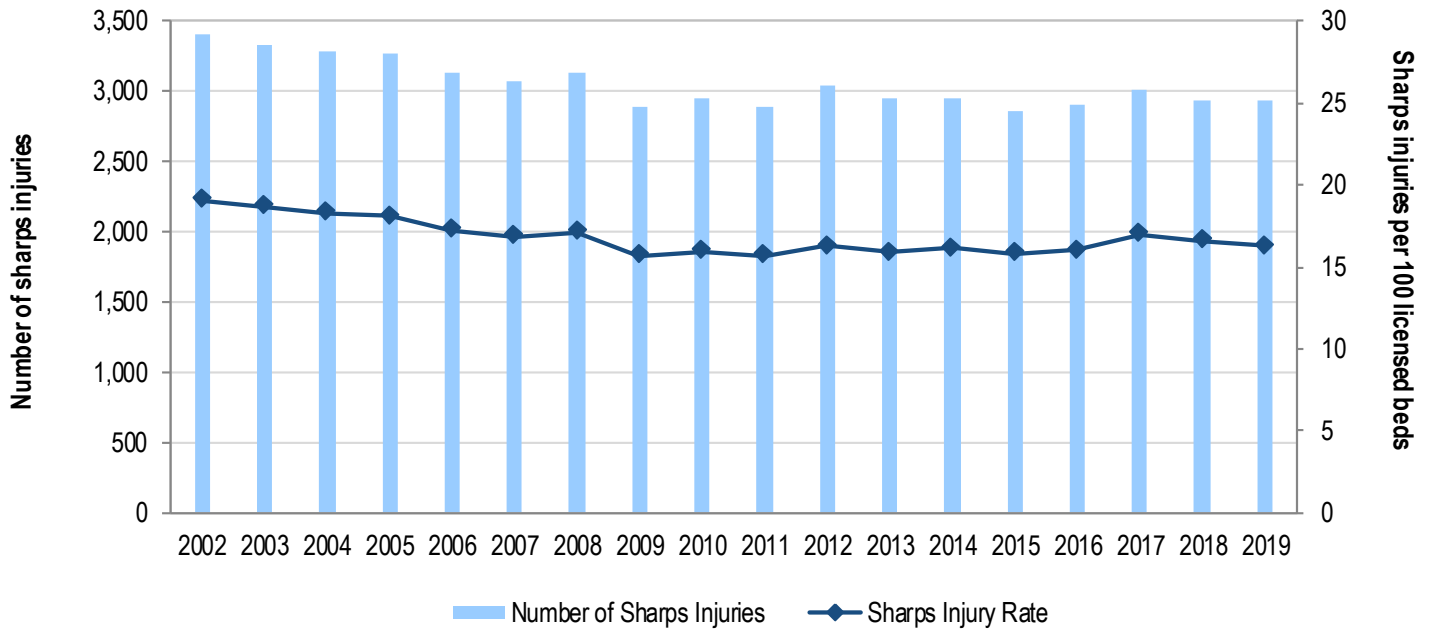
Findings

Table 1. Number and rate of sharps injuries among hospital workers by hospital characteristics, Massachusetts, 2019

	Number of Hospitals	Number of sharps injuries	Rate per 100 licensed beds	95% CI
Hospital size				
Small (< 100 licensed beds)	27	195	12.8	11.0-14.6
Medium (101-300 licensed beds)	49	899	10.0	9.3-10.6
Large (>300 licensed beds)	14	1,839	24.6	23.5-25.8
Service Type				
Acute care	72	2,869	19.1	18.4-19.8
Non-acute care*	18	64	2.2	1.6-2.7
Teaching Status				
Teaching	18	1,881	27.9	26.7-29.2
Non-teaching	72	1,052	9.4	8.8-9.9
Total	90	2,933	16.3	15.7-16.9

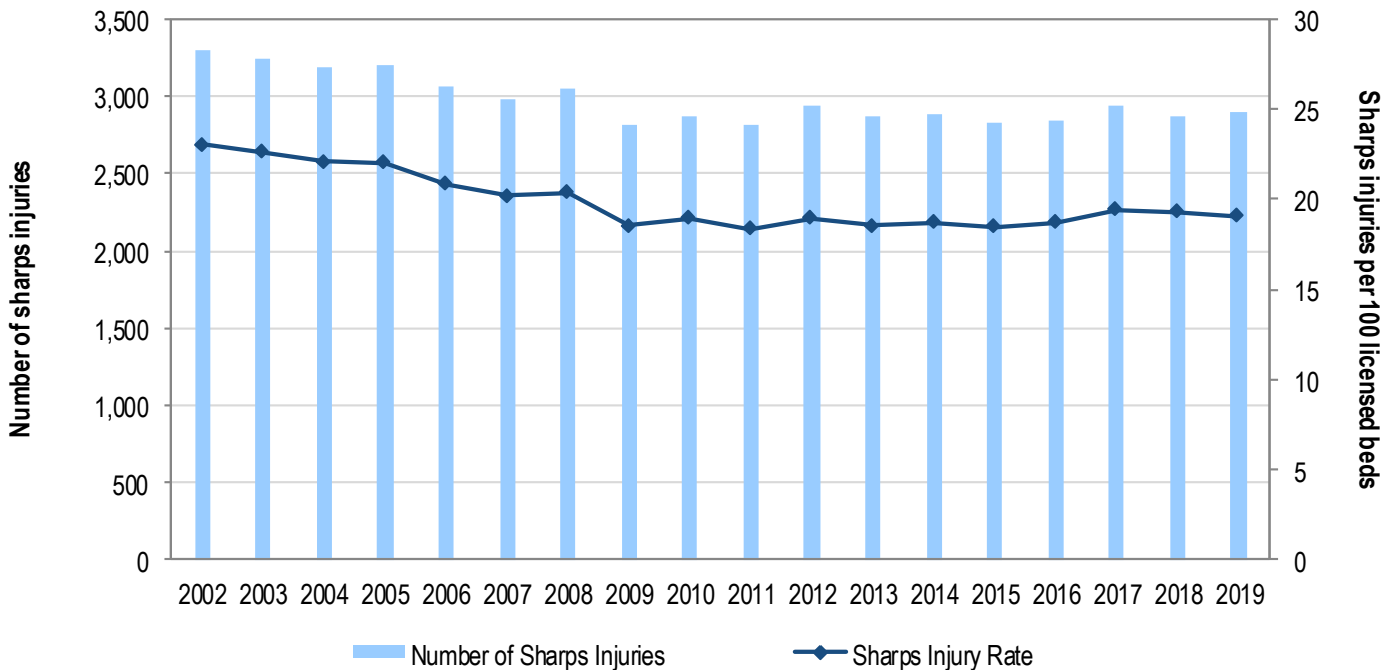
*Non-acute care hospitals include chronic care and rehabilitation facilities.

Figure 1. Number and rate of sharps injuries per licensed beds among all workers in acute and non-acute care hospitals, Massachusetts, 2002-2019



The sharps injury rate for all hospitals combined decreased significantly between 2002 and 2010. The average annual percent change in the sharps injury rate between 2002 and 2010 was -2.42 ($p < 0.01$). However, the average annual percent change from 2010 to 2019 was 0.49 ($p = 0.02$), indicating that the rate has a statistically significant increase over that time period.

Figure 2. Number and rate of sharps injuries per licensed beds among all workers in acute care hospitals only, Massachusetts, 2002-2019



The sharps injury rate for acute care hospitals decreased significantly between 2002 and 2010. The average annual percent change in the sharps injury rate between 2002 and 2011 was -2.67 ($p < 0.01$). However, the average annual percent change from 2011 to 2019 was 0.19 ($p = 0.47$), indicating that the rate remained relatively steady over that time period.

Table 2. Sharps injuries by worker and incident characteristics and hospital size, Massachusetts hospital workers, 2019

	All Hospitals 90 hospitals		Hospital Size					
			Small 27 hospitals		Medium 49 hospitals		Large 14 hospitals	
	N	%	N	%	N	%	N	%
Work status of injured worker	2,933	100	195	100	899	100	1,839	100
Employee	2,555	87	177	91	750	83	1,628	89
Non-Employee practitioner	271	9	6	3	100	11	165	9
Student	63	2	5	3	30	3	28	2
Temporary / Contract worker	44	2	7	4	19	2	18	1
Occupation	2,933	100	195	100	899	100	1,839	100
Physician	1,105	38	53	27	236	26	816	44
Nurse	1,124	38	91	47	374	42	659	36
Technician	456	16	34	17	204	23	218	12
Support Services	114	4	6	3	33	4	75	4
Dental staff	11	<1	0	0	<5	--	<15	--
Other medical staff	66	2	7	4	24	3	35	2
Other / Unknown / Not answered	57	2	4	2	<30	--	<30	--
Department where injury occurred	2,933	100	195	100	899	100	1,839	100
Operating and Procedure rooms	1,373	47	84	43	379	42	910	49
Inpatient units	628	21	48	25	235	26	345	19
Emergency Department	282	10	19	10	107	12	156	8
Intensive Care Units	205	7	4	2	48	5	153	8
Outpatient areas	182	6	19	10	43	5	120	7
Laboratories	75	3	6	3	21	2	48	3
Other / Unknown / Not answered	188	6	15	8	66	7	107	6
Device involved in the injury	2,933	100	195	100	899	100	1,839	100
Hypodermic needle/syringe	1,022	35	63	32	350	39	609	33
Suture needle	633	22	41	21	156	17	436	24
Scalpel blade	189	6	7	4	44	5	138	8
Winged-steel needle	213	7	25	13	93	10	95	5
Vacuum tube collection holder/needle	102	3	<5	--	<50	---	53	3
Glass	21	1	<5	--	<10	--	11	1
Dental device or item	13	<1	<5	--	<3	--	9	<1
Other hollow bore needle	306	10	19	10	72	8	215	12
Other / Unknown / Not answered	434	15	37	19	124	14	273	15
Procedure for which the device was	2,933	100	195	100	899	100	1,839	100
Injection	918	31	63	32	312	35	543	30
Suturing	653	22	44	23	158	18	451	25
Blood procedures	369	13	27	14	152	17	190	10
Making the incision	333	11	34	17	71	8	228	12
Line procedures	283	10	19	10	77	9	186	10
To obtain body fluid or tissue sample	64	2	<5	--	<25	--	39	2
Dental procedures	17	1	<5	--	<5	--	15	1
Other / Unknown / Not answered	296	10	6	3	104	12	187	10

Table 3. Sharps injuries involving hollow-bore devices by device type and occupation, Massachusetts hospital workers, 2019

Occupation	Total		Hollow Bore							
			Hypodermic Needle/Syringe		Winged-Steel Needle		Vacuum Tube Collection Set		Other Hollow Bore	
	N	%	N	%	N	%	N	%	N	%
Nurse	919	100	629	68	78	8	52	6	160	17
Physician	363	100	250	69	7	2	4	1	102	28
Technician	244	100	70	29	112	46	41	17	21	9
Support services	43	100	27	63	<5	--	<5	--	12	28
Dental staff	<5	100	<5	--	<5	--	<5	--	<5	--
Other medical staff	46	100	29	63	10	22	<5	--	<10	--
Other / Unknown / Not answered	<25	100	<15	--	5	21	<5	--	6	25
Total	1,643	100	1,022	62	213	13	102	6	306	19

Table 4. Sharps injuries involving solid-bore devices by device type and occupation, Massachusetts hospital workers, 2019

Occupation	Total		Suture Needle		Scalpel		Glass		Other/Unknown	
			N	%	N	%	N	%	N	%
	N	%	N	%	N	%	N	%	N	%
Physician	742	100	467	63	115	15	2	<1	158	21
Technician	212	100	70	33	34	16	12	6	96	45
Nurse	205	100	70	34	<25	--	<5	--	108	53
Support services	71	100	<5	--	5	7	<5	--	62	87
Dental staff	7	100	<5	--	<5	--	<5	--	6	86
Other medical staff	20	100	<5	--	7	35	<5	--	10	50
Other / Unknown / Not answered	33	100	20	60	--	--	<5	--	7	21
Total	1,290	100	633	49	189	15	21	2	447	35

Table 5. Sharps injuries by SESIP by hospital size: all devices and excluding suture needles, Massachusetts hospital workers, 2019

	All Hospitals 90 hospitals		Hospital Size [^]					
			Small 27 hospitals		Medium 49 hospitals		Large 14 hospitals	
Sharps Injury Protections	N	%	N	%	N	%	N	%
All devices	2,933	100	195	100	899	100	1,839	100
SESIP	1,328	45	99	51	482	54	747	41
Non-SESIP	1,416	48	90	46	382	42	944	51
Unknown/Not answered	189	7	6	3	35	4	148	8
Devices excluding suture needles	2,300	100	154	100	743	100	1,403	100
SESIP	1,327	58	99	64	482	65	746	53
Non-SESIP	802	35	49	32	226	30	527	38
Unknown/Not answered	171	7	6	4	35	5	130	9

[^]Hospital size: small= <100 licensed beds; medium=101-300 licensed beds; large=>300 licensed beds

Figure 3. Sharps injuries by device and SESIP, Massachusetts hospital workers, 2019

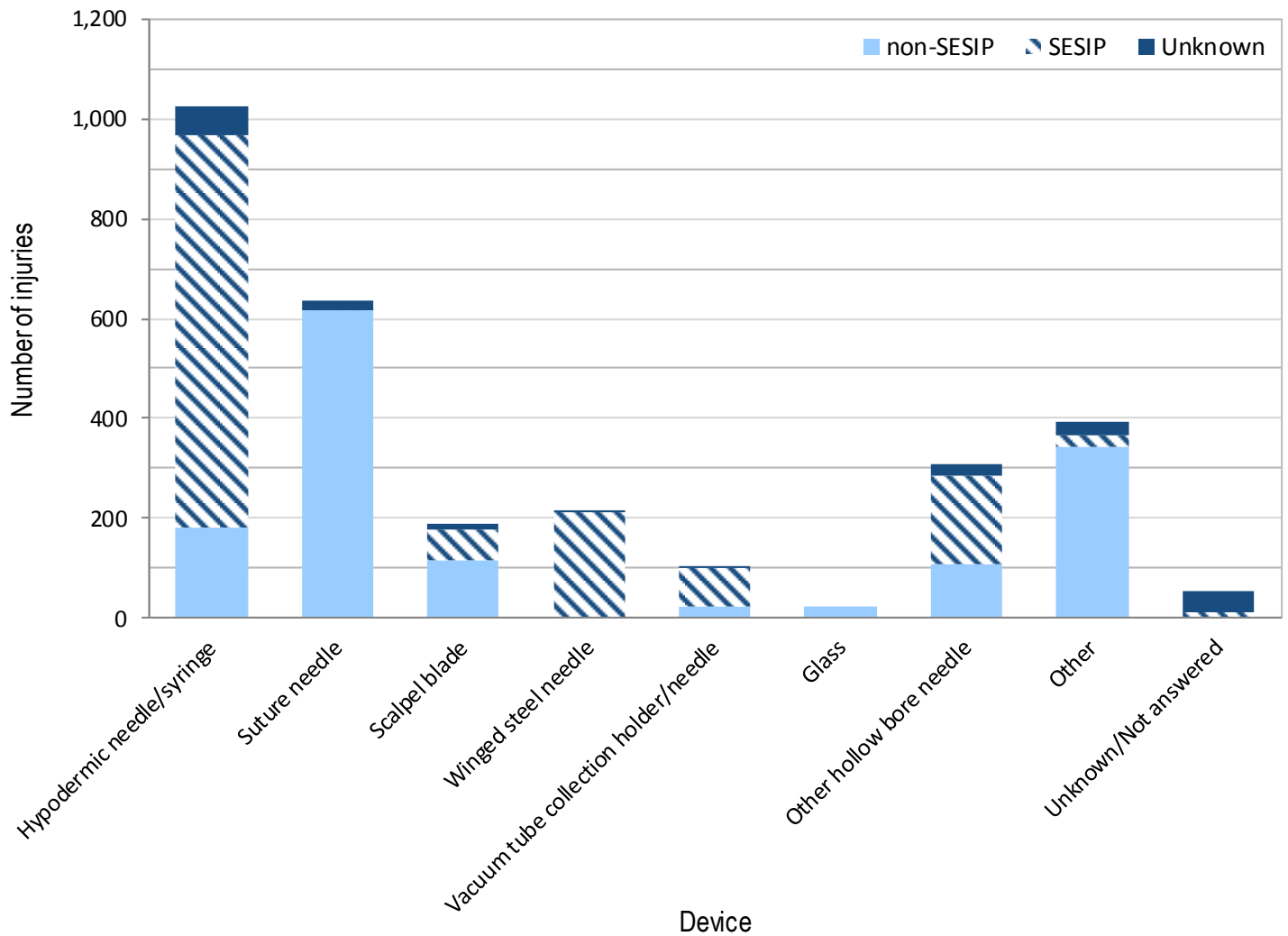


Table 6. Sharps injuries by procedure and SESIP, Massachusetts hospital workers, 2019

Procedure	Total		SESIP		Non-SESIP		Unknown	
	N	%	N	%	N	%	N	%
Injection procedures	918	100	706	77	169	18	43	7
Subcutaneous injection	717	100	576	80	110	15	31	4
Intramuscular injection	131	100	103	79	<25	--	<5	--
Other injections	70	100	27	39	<40	--	<10	--
Blood procedures	369	100	312	85	43	12	14	4
Percutaneous venous puncture	282	100	260	92	13	5	9	3
Percutaneous arterial puncture	32	100	28	88	<5	--	<5	--
Finger stick / Heel stick	38	100	14	37	<25	--	<5	--
Other blood procedures	17	100	10	59	7	41	0	0
Line procedures	282	100	200	71	72	26	10	4
To insert peripheral IV/set up heparin lock	113	100	105	93	<10	--	<5	--
To insert central line	41	100	18	44	<20	--	<5	--
Other line procedures	128	100	77	60	46	36	5	4
Other procedures	1,364	100	110	8	1,132	83	122	9
Total	2,933	100	1,328	45	1,416	48	190	6

Table 7. Sharps injuries by inclusion in prepackaged kit and hospital size, Massachusetts hospital workers, 2019

	All Hospitals 90 hospitals		Hospital Size [^]					
			Small 27 hospitals		Medium 49 hospitals		Large 14 hospitals	
	N	%	N	%	N	%	N	%
Device included in prepackaged kit								
Yes	544	19	41	21	180	20	323	18
No	2,159	74	145	74	660	73	1,354	74
Unknown/Not answered	230	8	9	5	59	7	162	8
Total	2,933	100	195	100	899	100	1,839	100

[^]Hospital size: small <101 licensed beds; medium =101-300 licensed beds; large >300 licensed beds

Figure 4. Sharps injuries involving devices from prepackaged kits by device and SESIP, Massachusetts hospital workers, 2019

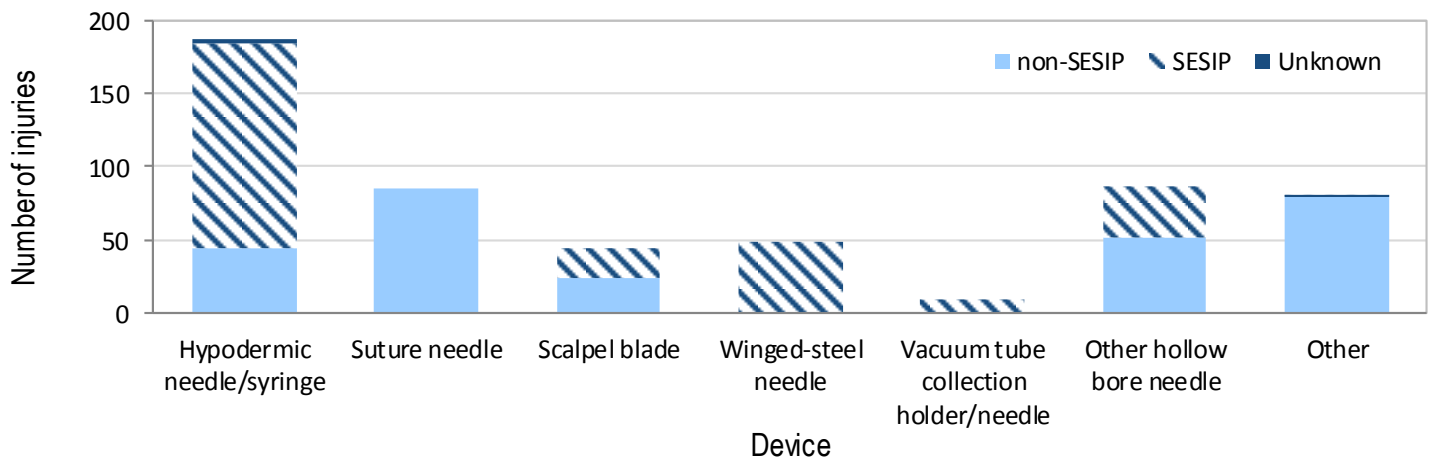


Table 8. Sharps injuries among hospital workers by when and how the injury occurred by hospital size, Massachusetts,

	All Hospitals 90 hospitals		Hospital Size [^]					
			Small 27 hospitals		Medium 49 hospitals		Large 14 hospitals	
	N	%	N	%	N	%	N	%
Before use of the item	38	1	<5	--	<5	--	24	1
During use of the item	1,357	46	83	43	414	46	860	47
Suturing	350	12	26	13	82	9	242	13
Manipulate needle in patient	330	11	16	8	125	14	189	10
Patient moved and jarred device	224	8	17	9	90	10	117	6
Collision with worker or sharp	195	7	9	5	57	6	129	7
Access IV line	23	1	<5	--	<10	--	16	1
Handle/pass equipment	95	3	<10	--	<25	--	66	4
Other / Unknown / Nonclassifiable	140	5	7	4	32	4	101	5
After use, before disposal	1,199	41	90	46	370	41	739	40
Activating injury protection mechanism	282	10	20	10	91	10	171	9
Handle/pass equipment	264	9	18	9	87	10	159	9
During clean-up	197	7	20	10	51	6	126	7
Collision with worker or sharp	104	4	<5	--	<20	--	84	5
Recap needle	77	3	<5	--	<25	--	51	3
Sharps injury prevention mechanism not activated	91	3	7	4	48	5	36	2
Device malfunction	44	2	<5	--	<20	--	25	1
Other / Unknown / Nonclassifiable	140	5	16	8	37	4	87	5
During or after disposal of item	264	9	18	9	80	9	166	9
During sharps disposal	105	4	7	4	28	3	70	4
Improper disposal	145	5	10	5	49	5	86	5
Collision with worker or sharp	7	<1	<5	--	<5	--	<5	--
Other / Unknown / Nonclassifiable	7	<1	<5	--	<5	--	<10	--
Unknown / Not answered / Nonclassifiable	113	4	<5	--	<40	--	74	4
Total	2,933	100	195	100	899	100	1,839	100

[^]Hospital size: small<100 licensed beds; medium 101-300 licensed beds; large >300 licensed beds

Table 9. Sharps injuries involving select devices without sharps injury prevention features but for which SESIPs are widely available, by when the injury occurred, Massachusetts hospital workers, 2019

Device	Total		When the Injury Occurred									
			Before use		During use		After use, Before Disposal*		During or after Disposal*		Unknown/ Non-classifiable	
			N	%	N	%	N	%	N	%	N	%
Hypodermic	182	100	<5	--	52	29	101	55	20	11	5	3
IV Stylet	38	100	<5	--	19	50	11	29	6	16	<5	-
Vacuum Tube	22	100	<5	--	<10	27	11	50	<5	--	<5	-
Collection Holder												
Winged-Steel Needle Holder	5	100	<5	--	<5	--	0	0	<5	--	0	0
Total	247	100	4	2	81	33	123	50	31	13	8	3

*SESIPs offer protection during the period after use. Injuries presented in this table that occurred after use (n=136) can be considered "preventable adverse events" – events that could have been prevented with the use of SESIPs.

Table 10. Sharps injuries by occupation (detailed), Massachusetts hospital workers, 2019

	N	%		N	%
Nurse	1,124	38	Support Services	114	4
RN or LPN	1,011	34	Housekeeper	62	2
Nurse assistant	27	1	Central supply	40	1
Nursing practitioner	26	1	Safety/security	8	<1
Patient care technician	29	1	Maintenance	<5	--
Nurse anesthetist	<10	--	Attendant/orderly	<5	--
Nurse midwife	11	<1			
Nursing student	10	<1	Other Medical Staff	66	2
Home health aide	<5	--	Medical assistant	61	2
			Physical Therapist	<5	--
Physician	1,105	38	Other medical staff	<5	--
Intern/Resident	465	16			
MD	263	9	Dental Staff	11	<1
Fellow	113	4	Dental assistant/tech	<15	--
Physician Assistant	91	3	Dentist hygienist	<5	--
Surgeon	91	3			
Medical student	36	1	Other	55	2
Anesthesiologist	39	1	Pharmacist	<5	--
Radiologist	7	<1	Counselor/social worker	<5	--
			EMT/paramedic	<5	--
Technician	456	16	Clerical/administrative	<5	--
OR/Surgical technician	199	7	Researcher	12	<1
Phlebotomist	137	5	Other student	29	1
Clinical lab technician	39	1	Other	<5	--
Radiologic technician	26	1			
Respiratory therapist/ Technician	21	1	Total	2,933	100
Morgue technician	1	<1			
Other technician	33	7			

Table 11. Sharps injuries by department (detailed), Massachusetts hospital workers, 2019

	N	%		N	%
Operating and Procedure Rooms	1,373	47	Laboratory	75	3
Operating room	1,015	35	Histology/pathology	33	1
Labor and delivery	101	3	Morgue/autopsy room	5	<1
Radiology	86	3	Clinical chemistry	<5	--
Cardiac catheterization laboratory	51	2	Blood bank	<5	--
Hematology/oncology	38	1	Microbiology	12	<1
Phlebotomy room	41	1	Hematology	<5	--
Endoscopy/bronchoscopy/cystoscopy	17	1	Other laboratory	11	<1
Dialysis	<10	--	Laboratory, unspecified	<5	--
Other procedure room	16	1	Other Areas	183	6
Procedure room, unspecified	<5	--	Central sterile supply	39	1
Inpatient Units, other than ICU	628	21	Dermatology	37	1
Medical/surgical ward	553	19	Exam room	12	<1
Obstetrics/gynecology	25	1	Long term care	13	<1
Psychiatry ward	24	1	Pain clinic	14	<1
Pediatrics	15	1	Anesthesia	12	<1
Nursery	11	<1	Central trash area	6	<1
Emergency Department	282	10	Rehabilitation unit	29	1
Intensive Care Units	205	7	Pharmacy	<5	--
Intensive care unit	191	7	Employee health / infection control	5	<1
Post anesthesia care unit	14	<1	Detox unit	<5	--
Outpatient Areas	182	6	Ambulance	<5	--
Ambulatory care clinic	107	4	Other Location	8	<1
Dental clinic	14	<1	Unknown/Not Answered	5	<1
Physician's office	44	1			
Home health visit	9	<1			
Other outpatient areas	7	<1			
			Total	2,933	100

Table 12. Sharps injuries by device (detailed), Massachusetts hospital workers, 2019

	N	%		N	%
Hypodermic needles/syringe	1,022	35	Glass	21	1
Hypodermic needle attached to a disposable syringe	905	31	Specimen / Test / Vacuum tube	7	<1
Prefilled cartridge syringe	68	2	Pipette	<5	--
Unattached hypodermic needle	29	1	Capillary tube	<5	--
Hypodermic needle attached to a non-disposable syringe	5	<1	Medication ampule / Vial / IV bottle	<5	--
Hypodermic needle attached to IV Tubing	9	<1	Slide	<5	--
			Other glass item	<5	--
Suture Needle	633	22	Dental Device or item	13	<1
Curved suture needle	599	20	Dental bur	<5	--
Straight suture needle	24	1	Scaler/curette	<5	--
Suture needle, unspecified	10	<1	Dental pick	<5	--
			Other dental device or item	<5	--
Other Hollow Bore Needles	306	10	Other	380	13
IV Stylet	155	5	Wire	42	1
Huber needle	57	2	Lancet	41	1
Spinal or epidural needle	23	1	Retractor	37	1
Biopsy needle	36	1	Electrode	33	1
Other type of hollow bore needle	19	1	Scissors	26	1
Hollow bore needle, unspecified	16	1	Cutting blade other than scalpel	17	1
			Pin	19	1
Scalpel Blade	189	6	Bovie electrocautery device	17	1
			Forceps	23	1
Winged Steel Needle	213	7	Bone cutter	6	<1
Winged steel needle attached to a vacuum tube collection holder	140	5	Drill bit	21	1
Winged steel needle	63	2	Staple	8	<1
Winged steel needle attached to IV tubing	10	<1	Trocar	10	<1
			Rod	<5	--
Vacuum Tube Collection Holder/Needle	102	3	Tenaculum	<5	--
Vacuum tube collection	69	2	Elevator	<5	--
Phlebotomy needle (other than steel needle)	33	1	Other needle	<5	--
			Other type of sharp object	63	2
			Needle, unspecified	7	<1
			Unknown/Not Answered	54	2
			Total	2,933	100

Table 13. Sharps injuries by procedure (detailed), Massachusetts hospital workers, 2019

	N	%		N	%
Injection	918	31	Line Procedures	282	10
Subcutaneous injection	717	24	To insert a peripheral IV line or set up a heparin lock	113	4
Intramuscular injection	131	4	To insert a central IV line	41	1
Epidural/spinal anesthesia	19	1	Draw blood from central or peripheral IV line or port	43	1
Other injection	11	<1	To insert an arterial line	28	1
Injection, unspecified	40	1	Other injection into IV site/port	30	1
Suturing	653	22	To flush heparin/saline	5	<1
Suturing	643	22	To connect IV line	5	<1
Suture removal	10	<1	Draw blood from arterial line	8	<1
Blood Procedures	369	13	Other line procedure	9	<1
Percutaneous venous puncture	282	10	To Obtain Body Fluid or Tissue Sample	64	2
Percutaneous arterial puncture	32	1	Dental Procedures	17	1
Finger stick / heel stick	38	1	Dental drilling	<5	--
Dialysis / AV fistula site	9	<1	Oral surgery	<1	--
Draw blood from umbilical vessel	<10	--	Hygiene	<5	--
Blood procedure, unspecified	<5	--	Restorative	<5	--
Making the Incision	333	11	Other dental	<5	--
Making the incision	195	7	Other	178	6
Cauterization	13	<1	To obtain lab specimens	57	2
Other surgical procedure	114	4	Transferring blood/body fluid to another container	14	<1
Surgical procedure, unspecified	11	<1	Drilling	32	1
			Shaving	<10	--
			Other procedure	65	2
			Procedure, unspecified	<5	--
			Unknown/Not answered	119	4
			Total	2,933	100

For all tables presented, percentages may not total 100% due to rounding.

Resources

MDPH OHSP www.mass.gov/eohhs/gov/departments/dph/programs/community-health/ohsp/sharps
 CDC Sharps Safety for Healthcare Settings: Workbook and Teaching Tools www.cdc.gov/sharpsafety
 NIOSH Preventing Needlesticks and Sharps Injuries www.cdc.gov/niosh/topics/bbp/sharps.html
 OSHA Bloodborne Pathogens and Needlestick Prevention www.osha.gov/SLTC/bloodbornepathogens