Sharps Injuries Among Medical Trainees and Attending Physicians

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Abstract

Purpose

Sharps injuries are a particularly concerning occupational hazard faced by physicians and are largely preventable. This study compared the proportion and rate of sharps injuries among medical trainees with those among attending physicians by sharps injury characteristics.

Method

The authors used data reported to the Massachusetts Sharps Injury Surveillance System from 2002–2018. Sharps injury characteristics examined were department where injury occurred, device, purpose or procedure for which device was used or intended, presence of sharps injury prevention feature, who was holding the device, and how and when the injury occurred. Global chi-square was used to assess differences in the percent distribution of sharps injury characteristics between physician groups. Joinpoint regression was used to evaluate trends in injury rates among trainees and attendings.

Results

From 2002–2018, 17,565 sharps injuries among physicians were reported to the surveillance system, 10,525 of which occurred among trainees. For attendings and trainees combined, sharps injuries occurred most in operating and procedure rooms and most often involved suture needles. Significant differences in sharps injuries were found between trainees and attendings with respect to department, device, and intended purpose or procedure. Sharps without engineered sharps injury protections accounted for approximately 4.4 times as many injuries (13,355, 76.0%) as those with protections (3,008, 17.1%). Among trainees, sharps injuries were highest in the first quarter of the academic year and decreased over time, while sharps injuries among attendings had a very slight, significant increase.

Conclusions

Sharps injuries are an ongoing occupational hazard faced by physicians, particularly during clinical training. Further research is needed to elucidate the etiology of the observed injury patterns during the academic year. Medical training programs need to implement a multipronged approach to prevent sharps injuries, including increased use of devices with sharps injury prevention features and robust training on safe handling of sharps.

Physicians are subject to myriad occupational hazards in the fulfillment of their professional duties. Sharps injuries, defined as percutaneous injuries from needlesticks and other sharp medical devices that can penetrate the skin or any part of the body, are particularly concerning as they may result in lifelong harm from bloodborne pathogens, such as human immunodeficiency virus, hepatitis B, and hepatitis C, and are largely preventable. Nationally, it has been estimated that 600,000–800,000 sharps injuries occur among health care workers each year, with 384,000 sharps injuries in hospital settings.[1] In Massachusetts, an average of 3,057 sharps injuries among hospital-based health care workers have occurred each year since 2002.[2] While many occupations are at risk of these injuries, a large portion of sharps injuries are experienced by physicians, especially during their clinical training programs.[3–10] Several studies have highlighted the risk of sharps injuries among surgical residents.[6,11] An orthopedic surgery program documented the cumulative rise in sharps injuries over the course of training, with 28% of medical students, 83% of residents, and 100% of attending physicians experiencing a sharps injury in their career.[10] Surveys have found the reporting of sharps injuries ranged from 39% to 44% for medical students, 49% to 69% for residents, and 62% to 64% for attendings.[10,11] Thus, while existing surveillance data is likely an underestimate of the number of injuries, given documented underreporting of sharps injuries,[3,5,10–15] surveillance of sharps injuries is still necessary to identify patterns in injury circumstances, as these findings can be used by training programs to implement targeted prevention measures and monitor progress.

In Massachusetts, regulations promulgated by the Massachusetts Department of Public Health (MDPH) in 2001, similar to the Occupational Safety and Health Administration Bloodborne Pathogens Standard, require all MDPH-licensed hospitals to develop and implement exposure control plans, use sharps with engineered sharps injury protections (SESIPs), and maintain detailed logs of sharps injuries.[16,17] Massachusetts also requires hospitals to submit their sharps injury logs to the MDPH annually.[17]

This study uses data reported to the MDPH from 2002 to 2018 to compare the proportion and rate of sharps injuries among medical trainees with the proportion and rate among attending physicians by sharps injury characteristics. These characteristics

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included the department where the injury occurred, device, purpose or procedure for which device was used or intended, and how and when the sharps injury occurred.

Method

The authors extracted the data used in this study from the MDPH Massachusetts Sharps Injury Surveillance System. From 2002 to 2018, all MDPH-licensed hospitals submitted an annual summary of sharps injuries to the Massachusetts Sharps Injury Surveillance System. A detailed description of the surveillance system and methods has been previously reported.[18]

This study limits analysis to sharps injuries occurring in acute care hospitals. Physicians were categorized as either medical trainees (i.e., medical students, interns, residents, and fellows) or attending physicians. The academic year was defined as July 1–June 30; thus, only sharps injuries occurring between July 1, 2002, and June 30, 2018, were included in the analysis of the academic year.

Annual sharps injury rates were calculated as the number of sharps injuries among trainees or attendings per 1,000 general full-time equivalents (FTEs) in acute care hospitals. Only sharps injuries among trainees and attendings identified as employees of acute care hospitals on the annual summaries were included in rate calculations. Data on the number of FTEs for attending physicians and medical trainees, provided by the Massachusetts Center for Health Information and Analysis, were used. Data were not available for 9 acute care hospitals; thus 6,054 sharps injuries were excluded when calculating rates (2,733 sharps injuries among attendings and 3,321 among trainees).

Descriptive analyses and global chi-square tests with Cramer's V effect sizes were used to compare differences in the percent distribution of sharps injury characteristics (i.e., department where injury occurred, device, purpose or procedure for which device was used or intended, presence of sharps injury prevention feature [also referred to as SESIP status], who was holding the device at the time of the injury, and how and when the injury occurred relative to use of the device) between physician groups. Differences were considered significant at $P \leq .05$.

Joinpoint regression was used to examine trends in injury rates among trainees and attendings.[19] A detailed methodology for joinpoint regression has been described previously.[20] Year was the independent variable, and sharps injury rates stratified by physician group were the primary outcomes. Data were log transformed, and Hudson's method for joinpoint regression was used. For each trend, a maximum of 3 joinpoints, providing 4 distinct trends, could be identified. Negative binomial regression was used to measure each trend's average annual percent change (AAPC). Trends and the difference between trends when more than one trend was identified were considered statistically significant at $P \leq .05$. All analyses were conducted using SAS 9.4 (SAS Institute, Cary, North Carolina).

This study was performed at the MDPH and was conducted within the scope of existing reviewed and approved surveillance activities. For this study, the MDPH was not engaged in human subjects research, and no additional institutional review board review was required.

Results

From 2002 to 2018, there were 51,973 sharps injuries reported among all hospital workers in MDPH-licensed acute care hospitals, including 10,525 among medical trainees and 7,040 among attending physicians (n = 17,565). The overall proportion among trainees and attendings held relatively steady over the study period; however, variations emerged in the sharps injury rate when stratified by trainees versus attendings. While the sharps injury rate declined overall from 2002 to 2018 for trainees, joinpoint regression identified 4 distinct trends in the sharps injury rate for trainees within that time frame (Figure 1). In the first 3 trends, injury rates either declined or plateaued. However, the most recent trend from 2015 to 2018 showed a significant increase in the sharps injury rate (AAPC = 6.4%, $P = .005$). Conversely, joinpoint regression identified one continuous increasing trend among attendings from 2002 to 2018 (AAPC = 4.1%, $P < .001$).

Sharps injuries by department

Overall, the greatest number of sharps injuries among all attendings and trainees occurred in operating and procedure rooms (11,182, 63.7%), followed by intensive care units (1,486, 8.5%), and emergency departments (1,484, 8.4%; Table 1). Sharps injuries among trainees by department followed a pattern similar to that of both physician groups combined. Among attendings, the greatest percentage of sharps injuries occurred in operating and procedure rooms (4,864, 69.1%), followed by emergency departments (554, 7.9%) and outpatient areas (429, 6.1%). Variations in the distribution of sharps injuries by department between physician groups were statistically significant for all locations ($P < .001$).

Sharps injuries by device

Three devices accounted for approximately three-quarters of sharps injuries among trainees and attendings—suture needles, hypodermic needles/syringes, and scalpel blades (Table 1). Suture needles accounted for the greatest number of sharps injuries among each physician group, with 4,683 (44.5%) among trainees and 2,574 (36.6%) among attendings. Hypodermic needles/syringes accounted for 2,145 (20.4%) sharps injuries among trainees and 1,612 (22.9%) among attendings, followed by scalpel blades (trainees: 1,158, 11.0% and attendings: 833, 11.8%). Variations in the distribution of sharps injuries by device were statistically significant between physician groups ($P < .001$).

Injuries by SESIP status

Table 1 shows that among all attendings and trainees, sharps without engineered sharps injury protections (non-SESIPs) accounted for approximately 4.4 times as many injuries (13,355, 76.0%) as SESIPs (3,008, 17.1%). Recognizing that suture needles account for a large percentage of sharps injuries, which may skew the analysis of injuries involving non-SESIPs, and that a blunt tip (the sharps injury prevention feature on suture needles) is appropriate for some but not all procedures, analysis was repeated excluding suture needles. After excluding suture needles, non-SESIPs accounted for approximately 2.3 times as many injuries (6,536/10,308, 63.4%) as SESIPs (2,902/10,308,

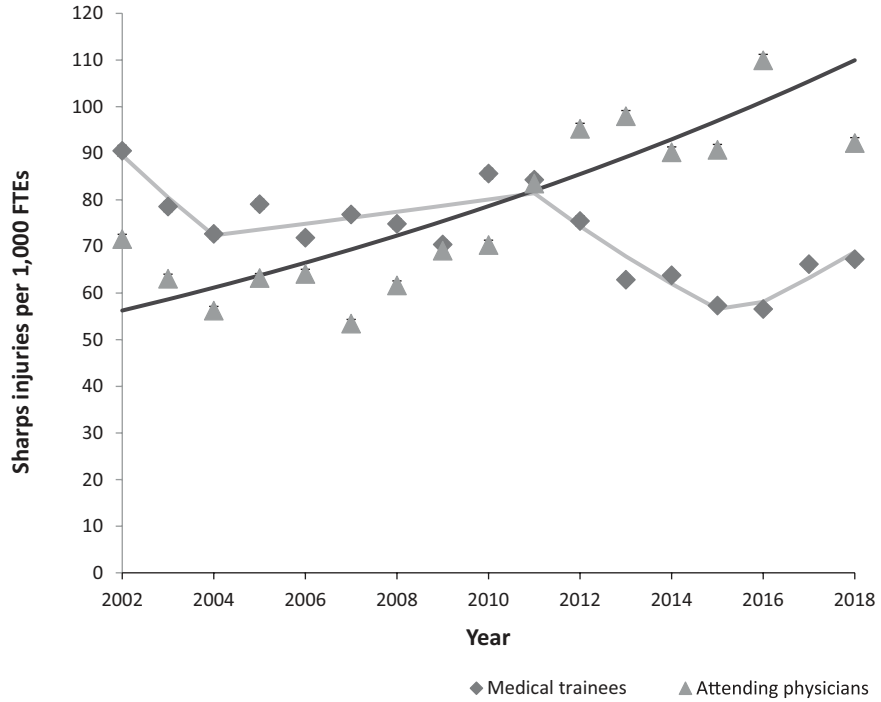

Figure 1 Sharps injury rates among medical trainees and attending physicians at Massachusetts Department of Public Health-licensed acute care hospitals, 2002–2018 (n = 11,511). Four trends were identified among medical trainees (2002–2004: AAPC = –11.0%, $P = .002$; 2004–2011: AAPC = 1.6%, $P = .06$; 2011–2015: AAPC = –9.5%, $P < .001$; 2015–2018: AAPC = 6.4%, $P = .005$). One trend was identified among attending physicians (2002–2018: AAPC = 4.1%, $P < .001$). Abbreviations: AAPC, average annual percent change; FTEs, full-time equivalents. *Source:* Massachusetts Sharps Injury Surveillance System.

28.2%). When comparing physician groups, non-SESIPs accounted for 8,062 (76.6%) and 5,293 (75.2%) sharps injuries among trainees and attendings, respectively. When considering all devices, there was no statistical difference between physician groups in the percentage of sharps injuries involving SESIPs versus non-SESIPs ($P = .06$). However, after excluding suture needles, the difference in the percentage of sharps injuries by SESIP status and physician group was statistically significant ($P = .007$).

Sharps injuries were further examined by SESIP status within device types for each physician group. Variations in the distribution of sharps injuries by device type with respect to SESIP status were not statistically different between physician groups ($P = .105$; Figure 2).

Sharps injuries by purpose or procedure for which the device was used or intended

Three procedures—suturing, injections, and making the incision—accounted for 7,552 (71.8%) and 5,056 (71.8%) sharps injuries among trainees and attendings, respectively (Table 1). While suturing procedures accounted for the greatest percentage of sharps injury among both groups, trainees experienced a greater proportion of these injuries (4,676, 44.4%) compared with attendings (2,583, 36.7%). Compared with trainees, however, attendings experienced a greater proportion of injuries during injection procedures (1,422, 20.2% vs 1,614, 15.3%) and making the incision (1,051, 14.9% vs 1,262, 12.0%). Variations in the distribution of sharps injuries by intended purpose or procedure between physician groups were statistically significant ($P < .001$).

Sharps injuries by who was holding the device at the time of injury

In 2006, the surveillance system began collecting information about who was holding the device at the time of the injury. In more than three-quarters of sharps injuries, the injured health care worker was holding the device (Table 1). However, in 1,120 (15.0%) sharps injuries among trainees and 608 (12.5%) among attendings, injuries occurred while someone other than the injured worker was holding the device. An additional 562 (7.5%) injuries among trainees and 367 (7.5%) among attendings occurred while no one was holding the device.

Sharps injuries by when and how the injury occurred relative to use of the device

Sharps injuries were evaluated by when and how they occurred relative to use of the device (Table 2). The majority of sharps injuries for both attendings and trainees occurred during use (11,272, 64.2%), followed by after use but before disposal (3,969, 22.6%) and during or after disposal (663, 3.8%). The distribution of when sharps injuries occurred among trainees and attendings followed similar patterns.

During use of the sharp, trainees experienced a higher proportion of sharps injuries while suturing compared with attendings. In the same time frame, compared with trainees, attendings experienced a higher proportion of sharps injuries due to a collision with a coworker or sharp and while manipulating the needle in the patient. Variations in the distribution of how sharps injuries occurred during use of the item between physician groups were statistically significant ($P < .001$).

After use but before disposal of the sharp, trainees experienced a higher proportion of sharps injuries during cleanup and while activating the sharps injury protection feature compared with attendings. In that same time frame, attendings experienced a higher proportion of sharps injuries due to collision with a coworker or sharp and while recapping the needle. Variations in the distribution of how sharps injuries occurred after use but before disposal of the device between physician groups were statistically significant ($P = .002$).

During or after disposal, more than 90% of sharps injuries among both trainees and attendings occurred during sharps disposal or by improper disposal, with the remaining occurring due to collision with a coworker or sharp. Variations in the distribution of how sharps injuries occurred during or after disposal of the device between physician groups were not statistically significant ($P = .50$).

Table 1

Sharps Injuries Among Attending Physicians and Medical Trainees by Select Injury Characteristics, Massachusetts Department of Public Health-Licensed Acute Care Hospitals, 2002–2018 (n = 17,565)[a]

Characteristic	Medical trainees (n = 10,525), no. (%)	Attending physicians (n = 7,040), no. (%)	Global *P* value (Cramer's V effect size)
Department where injury occurred			< .001 (0.18)
Operating and procedure rooms	6,318 (60.0)	4,864 (69.1)	
Intensive care units (ICUs)	1,164 (11.1)	322 (4.6)	
Emergency departments	930 (8.8)	554 (7.9)	
Inpatient units, excluding ICUs	898 (8.5)	319 (4.5)	
Laboratories	456 (4.3)	140 (2.0)	
Outpatient areas	298 (2.8)	429 (6.1)	
Other areas[b]	427 (4.1)	383 (5.4)	
Unknown/not answered	34 (0.3)	29 (0.4)	
Device involved in the injury			< .001 (0.10)
Suture needles	4,683 (44.5)	2,574 (36.6)	
Hypodermic needles/syringes	2,145 (20.4)	1,612 (22.9)	
Scalpel blades	1,158 (11.0)	833 (11.8)	
Other hollow bore needles	935 (8.9)	759 (10.8)	
Winged steel needles	159 (1.5)	50 (0.7)	
Vacuum tube collection holders/needles	55 (0.5)	24 (0.3)	
Other[c]	1,288 (12.2)	1,090 (15.5)	
Unknown/not answered	102 (1.0)	98 (1.4)	
Sharps with engineered sharps injury protection (SESIPs)			.06 (0.02)
No	8,062 (76.6)	5,293 (75.2)	
Yes	1,775 (16.9)	1,233 (17.5)	
Unknown/not applicable	688 (6.5)	514 (7.3)	
SESIPs, excluding suture needles[d]			.007 (0.03)
No	3,633 (62.2)	2,903 (65.0)	
Yes	1,714 (29.3)	1,188 (26.6)	
Unknown/not applicable	495 (8.5)	375 (8.4)	
Purpose or procedure for which the device was used or intended			< .001 (0.13)
Suturing	4,676 (44.4)	2,583 (36.7)	
Injection	1,614 (15.3)	1,422 (20.2)	
Making the incision	1,262 (12.0)	1,051 (14.9)	
Line procedure	923 (8.8)	504 (7.2)	
Blood procedure	505 (4.8)	158 (2.2)	
Obtaining a body fluid or tissue sample	302 (2.9)	321 (4.6)	
Other[e]	992 (9.4)	760 (10.8)	
Unknown/not answered	251 (2.4)	241 (3.4)	
Who was holding the device at time of injury[f]			< .001 (0.04)
Exposed health care worker	5,735 (76.7)	3,843 (78.8)	
Another person	1,120 (15.0)	608 (12.5)	
No one	562 (7.5)	367 (7.5)	
Unknown/nonclassifiable	64 (0.9)	58 (1.2)	

Source: Massachusetts Sharps Injury Surveillance System.
[a]Percentages may not add to 100% due to rounding.
[b]Other areas include but are not limited to exam rooms in an unspecified location, hospital grounds, laundry rooms, and rehabilitation units.
[c]Other devices include dental devices or items and glass.
[d]The denominator for this section of the table is 5,842 for trainees and 4,466 for attendings.
[e]Other purpose or procedure for which device was used or intended includes but is not limited to dental procedures and drilling.
[f]Information on who was holding the device was not collected until 2006. There were 4,876 injuries among attendings and 7,481 among trainees with information about who was holding the device at the time of the injury.

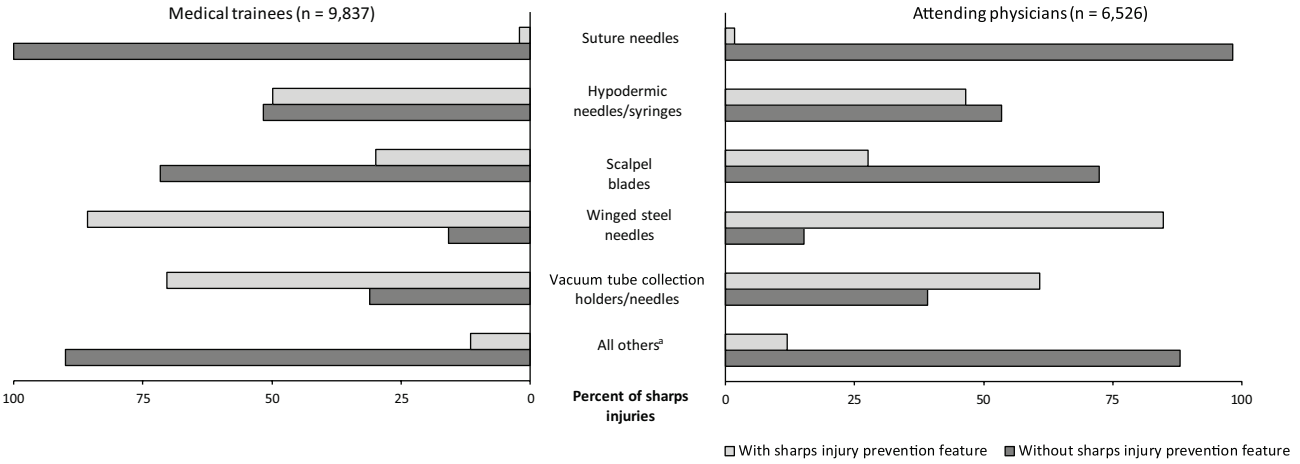

Figure 2 Device used during a sharps injury by presence of sharps injury prevention feature among medical trainees and attending physicians at Massachusetts Department of Public Health-licensed acute care hospitals, 2002–2018 (n = 16,363). Devices with unknown information on presence of sharps injury prevention features were not included here (attendings: 514 and trainees: 688). The distribution of sharps injuries by presence of sharps injury prevention feature varied across device used (global $P < .001$). *Source:* Massachusetts Sharps Injury Surveillance System.
[a]Includes other hollow bore needles, other (listed in Table 1), and unknown devices.

Table 2

Distribution of Sharps Injuries Among Attending Physicians and Medical Trainees by How and When the Injury Occurred Relative to Use of the Device, Massachusetts Department of Public Health-Licensed Acute Care Hospitals, 2002–2018 (n = 17,565)[a]

How and when injury occurred[b]	Medical trainees (n = 10,525), no. (%)	Attending physicians (n = 7,040), no. (%)	Global *P* value (Cramer's V effect size)
Before use of the device	124 (1.2)	66 (0.9)	.24 (0.20)
Injury occurred during use of the device	6,805 (64.7)	4,467 (63.5)	< .001 (0.08)
Suturing	3,041 (44.7)	1,735 (38.8)	
Collision with coworker or sharp	1,188 (17.5)	898 (20.1)	
Manipulating needle in patient	930 (13.7)	746 (16.7)	
Patient moved and jarred device	370 (5.4)	234 (5.2)	
Handling/passing equipment	199 (2.9)	120 (2.7)	
Injury occurred after use but before disposal of the device	2,387 (22.7)	1,582 (22.5)	.002 (0.10)
Handling/passing equipment	763 (32.0)	493 (31.2)	
Collision with coworker or sharp	556 (23.3)	412 (26.0)	
Recapping needle	285 (12.0)	208 (13.1)	
During cleanup	282 (11.8)	158 (10.0)	
While activating sharps injury protection feature	173 (7.3)	93 (5.9)	
Injury occurred during or after disposal of the device	374 (3.6)	289 (4.1)	.50 (0.12)
During sharps disposal	209 (55.9)	155 (53.6)	
Improper disposal	134 (35.8)	114 (39.5)	
Collision with coworker or sharp	23 (6.1)	13 (4.5)	
Other/unknown	835 (7.9)	636 (9.0)	

Source: Massachusetts Sharps Injury Surveillance System.
[a]Percentages may not add to 100% due to rounding.
[b]Only the top 5 or 3 (in the case of during or after disposal) descriptions of how the injury occurred within each time frame are presented. The denominators for how an injury occurred are the total injuries given for each time frame for each physician group (e.g., for injuries that occurred during use of the device the denominator is 6,805 for trainees and 4,467 for attendings).

Sharps injuries by academic quarter and postgraduate year (PGY) of training

Trainees reported the largest number of sharps injuries in the first quarter of the academic year (Figure 3). Among trainees, there was an overall decline throughout the year, with the greatest decrease occurring between the first and second quarters of the year. Among attending physicians, there was a very slight, but significant increase across academic quarters. Variations in the overall distribution of sharps injuries between

physician groups by academic quarter were statistically significant ($P < .001$).

Information on PGY of training was provided for 3,775/10,525 (35.9%) sharps injuries among trainees (data not shown). The sharps injuries for PGY-1 trainees showed a statistically significant decreasing trend across academic quarters ($P = .02$). There was variation in the number of sharps injuries reported each quarter by PGY-2 and PGY-3 trainees, with the fewest sharps injuries reported in the second quarter; however, there was no identifiable trend among PGY-2 or PGY-3 trainees.

Discussion

Our data illustrates that sharps injuries are an ongoing occupational hazard faced by physicians, particularly during their years in clinical training. A multipronged approach is required to mitigate this hazard. Surveillance data provides useful information in prioritizing prevention strategies.[21] Based on our findings, operating and procedure rooms, along with emergency departments, should be central to any efforts to reduce sharps injuries, as both trainees and attendings experienced a large proportion of sharps injuries in these settings.

Despite revision of the Occupational Safety and Health Administration Bloodborne Pathogens Standard in 2001 and promulgation of the Massachusetts regulations that same year, sharps injuries involving non-SESIPs remain common and were involved in 76.0% of all sharps injuries among physicians in our study (Table 1). Developing an inventory and conducting a systematic evaluation of device use within a facility are key steps hospitals can take to identify gaps in the purchase and use of SESIPs.[22] In our study, we found that among winged steel needles and vacuum tube collection holders/needles more injuries involved SESIPs than non-SESIPs (Figure 2). If this distribution is viewed as a proxy for the number of devices used, it may indicate that SESIPs have been adopted within certain device categories rather than indicating that SESIPs are not effective at preventing sharps injuries. Previous studies have also shown this inverse relationship where the overall sharps injury rate declined as the percentage of injuries with SESIPs increased.[23] However, using SESIPs is not the sole solution. In attempting to parse out modifiable risk factors, one study concluded that on average, over 15% of sharps injuries could be prevented by organizational measures, such as training in safe working routines and improved sharps disposal.[24]

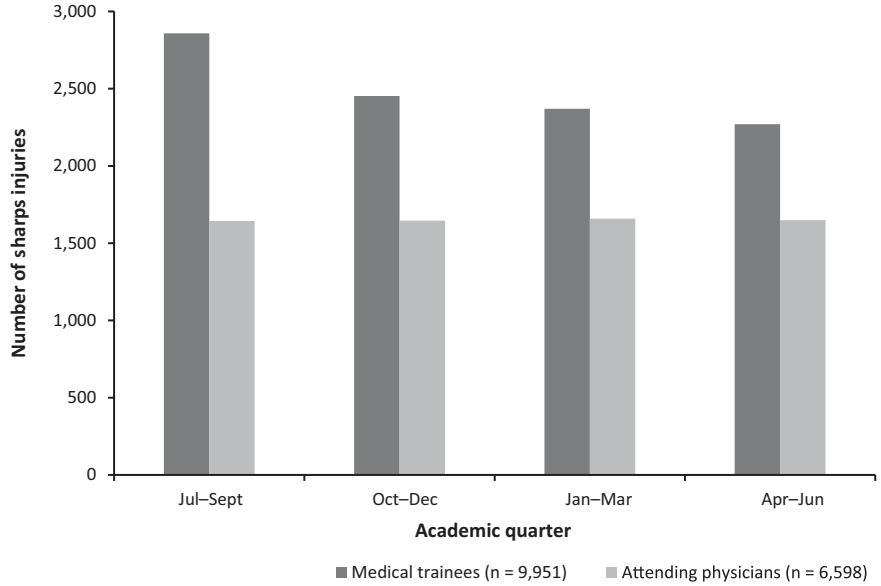

Figure 3 Sharps injuries among medical trainees and attending physicians at Massachusetts Department of Public Health-licensed acute care hospitals by academic quarter, 2002–2018 (n = 16,549). No information on the date of injury was available for 13 cases (5 trainee cases, 8 attending cases). Academic years beginning in July 2002 through June 2018 (a total of 16 academic years) are shown. Data from January to June 2018 (n = 497) and July to December 2002 (n = 506) are excluded. The distribution of sharps injuries by physician group varied across academic quarters (global $P < .001$). *Source:* Massachusetts Sharps Injury Surveillance System.

Key prevention measures include substitution, engineering controls, and work-practice controls. We found sharps injuries most often involved suture needles (Table 1), consistent with other studies.[4,25–27] Where possible, alternative methods of closure should be used that eliminate the risk of a sharps injury altogether (substitution). When sutures are necessary, suture needles remain a prime target for safety innovation. Blunt-tip suture needles—an engineering control recommended by the American College of Surgeons since 2007 for the closure of fascia and muscle—have proven effective at decreasing sharps injuries in randomized clinical trials, with 4 studies showing a 69% reduction in sharps injury risk.[28,29] Work-practice controls, such as hands-free passing, facilitate the safe transfer of sharps in the operating room and have reduced sharps injuries during certain surgeries from 10% to 4%.[30] In our study, such practices may have reduced the 15.0% and 12.5% of sharps injuries that occurred among trainees and attendings, respectively, when another individual was holding the device at the time of injury. Combining multiple prevention measures is essential to reducing sharps injuries.

Previous smaller studies have documented an increased incidence of reported sharps injuries and other potential bloodborne pathogen exposures in PGY-1 trainees.[31,32] Our study validates these findings on a state-wide scale. Additional analysis shows that the highest incidence of sharps injuries among trainees occurred during the first quarter of the academic year (Figure 3), driven largely by the experience of PGY-1 residents (data not shown). This suggests that reviewing sharps injury prevention measures and sharps injury reporting protocols when new resident physicians begin a training program and annually thereafter is essential. Further studies are needed to elucidate the underlying causes of higher incidence of sharps injuries in the first academic quarter. One possibility is that trainees become more proficient over time when performing procedures. Another possibility is that the large number of sharps injuries from suturing during PGY-1 represents a delayed learning curve or a bias in surgical training toward interns closing surgical wounds, which places new trainees at higher risk.[10] A third explanation is that residents gradually adopt a culture of not reporting sharps injuries when they

occur, though at least one study did not find significant differences in reporting behaviors across training years.[11]

Our data reflect the concerning commonality of sharps injuries among physicians in Massachusetts, but the true incidence is likely much higher than currently documented. As noted earlier, many studies have found that underreporting of sharps injuries is common, especially among trainees.[5,10,11,13] Reasons for not reporting sharps injuries include not being familiar with reporting protocols, the amount of time needed to report, perceived low-risk nature of the injury, and fear of embarrassment or punishment.[5,10,33] These factors are not experienced equally across physician groups. One study found that 69% of medical students and 53% of residents reported that fear of embarrassment or of a punitive response played a prominent role in their decision not to report their sharps injury, while only 24% of attendings felt similarly.[5] The high percentage of affected medical students may be due in part to a lack of training on sharps injury prevention and reporting procedures before starting clinical rotations, as has been found in other countries.[34,35] Aside from emphasizing the importance of reporting sharps injuries in annual training, it is crucial for senior residents and attendings to destigmatize sharps injuries by reporting their own injuries and encouraging others to do the same. Working with hospital safety and quality experts to foster a culture that encourages reporting of injuries and near misses will also enhance surveillance and prevention activities. Strategies such as implementing an on-call team to respond to the location of the injured worker to conduct the standard postexposure follow-up—which includes evaluating the situation, counseling, conducting baseline testing, and prescribing postexposure prophylaxis as needed—may address the perception that postexposure follow-up takes too much time.[9] Facilitating medical trainee and attending physician reporting of sharps injuries can also facilitate access to workers' compensation to cover medical expenses and lost wages for both postexposure protocols and treatment of seroconversion.

While our data represent a robust state-wide surveillance program, several limitations deserve consideration. Optimally, sharps injury rates would be calculated using information on the total number of hours worked, sharps devices used, or procedures performed as denominators; however, such information was not available. Detailed information on the number of hours worked per FTE was also not available. The surveillance system relies on self-reported sharps injuries. As noted previously, underreporting of sharps injuries, especially by trainees, is highly likely.[5,10,11,13] Finally, the data presented here are representative of Massachusetts acute care hospitals and may not be generalizable to other states or types of hospitals.

In conclusion, sharps injuries are a common occupational hazard for physicians, particularly during training. Our findings suggest that the risk of sharps injuries among medical trainees and attending physicians varies by department and device. Although reports of sharps injuries among attending physicians increased slightly across academic quarters, trainees reported more sharps injuries in the first quarter than in subsequent quarters. Further research is needed to elucidate the etiology of the observed injury patterns. Findings also demonstrate that additional work is needed to increase the use of devices with sharps injury prevention features. Additionally, medical training programs need to provide robust training on the safe handling of sharps as part of a multipronged approach to prevent sharps injuries during the provision of patient care. It remains the obligation of every employer to ensure a safe working environment for all.[36]

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