

Field Study

## Incidence and characteristics of needlestick injuries among medical trainees at a community teaching hospital: A cross-sectional study

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**Abstract: Objectives:** This field study aimed to determine the incidence and distribution of needlestick injuries among medical trainees at a community teaching hospital in Toronto, Canada. **Methods:** The study was performed during the 2013-2015 academic years at Toronto East General Hospital (TEGH), a University of Toronto-affiliated community-teaching hospital during the 2013-2015 academic years. Eight-hundred and forty trainees, including medical students, residents, and post-graduate fellows, were identified and invited via email to participate in an anonymous online fluidsurveys.com survey of 16 qualitative and quantitative questions. **Results:** Three-hundred and fifty trainees responded (42% response rate). Eighty-eight (25%) respondents reported experiencing at least one injury at TEGH. In total, our survey identified 195 total injuries. Surgical trainees were significantly more likely to incur injuries than non-surgical trainees (IRR = 3.03, 95% CI 1.80-5.10). Orthopaedic surgery trainees had the highest risk of a needlestick injury, being over 12 times more likely to be injured than emergency medicine trainees (IRR = 12.4, 95% CI 2.11-72.32). Only 28 of the 88 most recent needlestick injuries were reported to occupational health. Trainees reported a perception of insignificant risk, lack of resources and support for reporting, and injury stigmatization as reasons for not reporting needlestick injuries. **Conclusions:** Needlestick injuries were a common underreported risk to medical trainees at TEGH. Future research should investigate strategies to reduce injury and improve report-

ing among the high-risk and reporting-averse trainees. (J Occup Health 2017; 59: 63-73)  
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### Introduction

Needlestick and sharps injuries pose a significant occupational health risk to healthcare workers. Approximately 69,000 needlestick injuries were reported in Canada in 2006<sup>1</sup>. Makary *et al.* found that 99% of surveyed general surgical residents sustained a needlestick injury by their final year of training, and accumulated 7.7 needlestick injuries on average<sup>2</sup>. These injuries could result in serious health consequences as they potentially expose workers to bloodborne pathogens. In 2012, the Ontario Hospital Association/Ontario Medical Association estimated that the chance of infection after injury from a contaminated needle was between 6-30% for hepatitis B virus, 2% for hepatitis C virus, and 0.3% for human immunodeficiency virus (HIV)<sup>3</sup>.

Needlestick injuries also present an additional challenge of being underreported to occupational health services. An epidemiological study of medical students and residents by McGeer *et al.* found that less than 5% of needlestick injuries were reported<sup>5</sup>. Past studies identified reasons for not reporting, which included “not worth it,” “too time-consuming,” “didn’t know the procedure,” “little perception of risk,” and “shame”<sup>6,7</sup>. Some trainees also feared that reporting an injury would negatively impact their training evaluations and acceptance to programs in

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the future<sup>8)</sup>.

Toronto East General Hospital (TEGH) is a 500-bed community teaching hospital affiliated with the University of Toronto. Each year, 400 medical trainees rotate through clinical appointments at TEGH. This trainee population allowed for comparison of needlestick injury incidence among different medical specialties. The primary aim of this survey study was to determine the incidence and characteristics of needlestick injuries among medical specialties at TEGH. The secondary aim of this study was to investigate injury reporting rates and plausible contributing factors to non-reporting.

### Subjects and Methods

The study population consisted of 840 medical students, residents, and postgraduate fellows who trained at TEGH between the 2013-2015 academic years. Specialties at TEGH included anesthesiology, emergency medicine, family medicine, general surgery, internal medicine, neurology, obstetrics and gynecology, ophthalmology, orthopedic surgery, otolaryngology, pediatrics, plastic surgery, psychiatry, and urology.

The survey was piloted in a cohort of 8 medical students and 6 residents. Minor revisions to the questionnaire were made following the pilot survey. Study participants were contacted in the winter of 2015. We distributed a 16-item quantitative/qualitative anonymous survey questionnaire using FluidSurveys.com and asked participants to recall their lifetime TEGH training history, which extended past the 2013-2015 academic years and dated as far back as 2003. The survey assessed for demographics (gender, level of training, specialty, medical school alma mater), needle handling training (perception of needle handling training at TEGH, previous needle handling training, perception on best time to introduce training programs), needlestick injury incidence and characteristics (number of injuries in medical school, residency, and fellowship, number of injuries in each specialty rotation, number of injuries by different types of instruments and types of procedures, and number of injuries from other people), and post-exposure actions taken (immediate actions taken, persons reported to, reasons for not reporting to occupational health, and HIV/Hep C prophylaxis) (Appendix A). We defined a needlestick injury to be “injuries with a device contaminated with blood or bodily fluids, which penetrates the skin or mucosa.”<sup>9)</sup> We invited trainees to report only injuries sustained at TEGH. To encourage participation, two weekly reminders were delivered to those who had not responded; three months later, two more weekly reminders were sent. All respondents were eligible for a raffle prize of an Apple Watch as a reward for completing the survey.

We obtained approval for the study from the Toronto Academic Health Sciences Network’s Research Ethics

Board. Participation was voluntary. Responses were kept anonymous and confidential. Survey completion implied consent for study participation.

We performed multivariate analysis using negative binomial regression with the SPSS software package (IBM) to model the over-dispersed count data of needlestick injuries and obtain the associated incidence rate ratios (IRR). We also performed non-parametric tests, such as Chi-square and Mann-Whitney U to study differences between groups. Results were considered statistically significant if  $p < 0.05$ .

### Results

Of the 840 TEGH medical trainees invited to participate, a total of 350 (42%) completed the online survey. Study population demographics, including gender, medical school attended, medical specialty, and year of study, are displayed in Table 1. We found no statistically significant differences between gender subgroups and medical school subgroups in either the number of injuries or the number of respondents injured, using a negative binomial regression ( $p > 0.05$ ).

Eighty-eight of 350 (25%) trainees reported being injured at least once during their lifetime training at TEGH. In total, respondents reported 195 lifetime incidences of needlestick injuries at TEGH; most occurred during residency (136 of 195; 70%) (Table 2).

Eighty-four of 88 injured respondents elaborated on the activity causing injury; 44 (52%) were injured during suturing and 14 (17%) were injured during surgical assisting (Table 2). Sixty-nine of the 88 injured respondents elaborated on the instrument causing injury; 48 (70%) were injured by solid needles. Sixty-one of the 88 injured respondents elaborated on who caused the injury; 42 (69%) injuries were self-inflicted (42 of 61; 69%), and 19 (31%) were inflicted by a colleague (Table 2).

Surgical trainees were 3 times more likely to incur injuries than non-surgical trainees at TEGH (IRR = 3.030, 95% CI 1.80-5.10). Of the specialties surveyed, orthopedic surgery trainees had the highest likelihood of sustaining injuries and were 12 times more likely to be injured than the safest specialty, emergency medicine (IRR = 12.354, 95% CI 2.110-72.316) (Fig. 1). Psychiatry had only 1 respondent who was excluded from the analysis.

The number of years spent in training was significantly proportional to the number of injuries at TEGH. The training years spanned over 10 years, with medical school classified as years 1-4, residency classified as years 5-9, and fellowship classified as year 10. Each additional year of training was associated with a 30% increase in risk of incurring an injury (IRR = 1.305, 95% CI 1.165-1.579).

We investigated the impact of safety education on reducing needlestick injuries at TEGH. One-hundred and eighty-eight (54%) respondents reported that they had in-

**Table 1.** Demographics of respondents and number of respondents with injuries.

Demographics (Total=350)	Respondents (% total)	Number Injured (% respondents)
<b>Gender</b>		
Male	159 (46)	37 (23)
Female	189 (54)	50 (26)
Undisclosed	2 (0)	1 (5)
<b>School</b>		
McMaster University	17 (5)	4 (24)
Northern Ontario School of Medicine	2 (1)	1 (50)
University of Ottawa	10 (3)	2 (20)
Queen's University	17 (5)	3 (18)
University of Toronto	207 (59)	44 (21)
Western University	21 (6)	11 (52)
Out of Province	43 (12)	13 (30)
International	32 (9)	10 (31)
<b>Specialty</b>		
Anesthesiology	21 (6)	3 (14)
Emergency Medicine	12 (3)	2 (18)
Family Medicine	71 (21)	22 (32)
General Surgery	19 (6)	9 (50)
Internal Medicine	36 (10)	6 (17)
Medical Student	118 (34)	11 (9)
Neurology	3 (1)	1 (33)
Obstetrics and Gynaecology	13 (4)	3 (30)
Ophthalmology	6 (2)	3 (50)
Orthopedic Surgery	23 (7)	11 (48)
Otolaryngology	11 (3)	4 (36)
Pediatrics	4 (1)	1 (25)
Plastic Surgery	4 (1)	3 (75)
Psychiatry	1 (0)	1 (100)
Urology	5 (1)	2 (40)
<b>Year</b>		
Medical School 1 (PreClerkship)	11 (3)	0 (0)
Medical School 2 (PreClerkship)	17 (5)	1 (6)
Medical School 3 (Clinical Clerkship)	30 (8)	4 (13)
Medical School 4 (Clinical Clerkship)	60 (17)	6 (11)
Residency 1	60 (17)	13 (23)
Residency 2	62 (18)	23 (38)
Residency 3	35 (10)	10 (30)
Residency 4	34 (10)	9 (26)
Residency 5	27 (8)	1 (41)
Fellowship	13 (4)	7 (54)

sufficient safety training on needle handling. Of these 188 who felt there was insufficient training, 45 (24%) were injured at least once at TEGH, and of 129 who felt there was sufficient training, 38 (29%) were injured at least once at TEGH (33 respondents elected to not answer this question). There was no correlation between this perception of insufficient safety training and having been in-

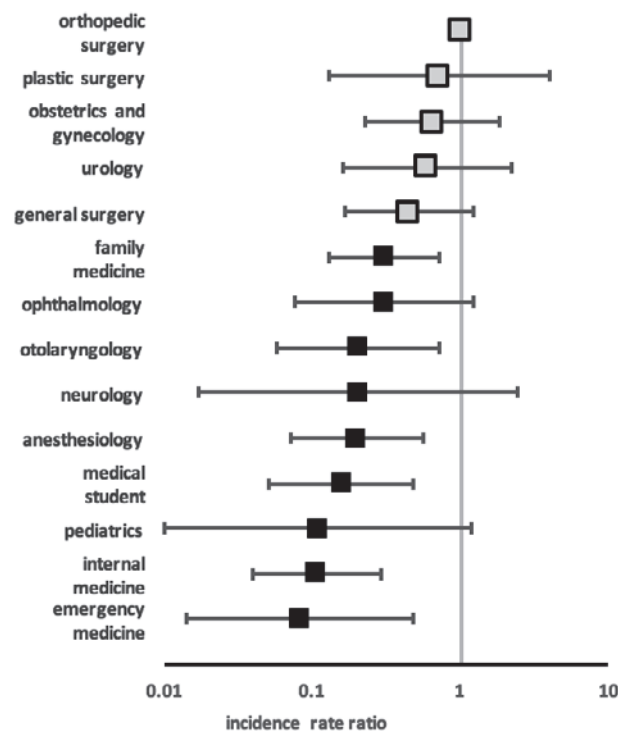
jured,  $\chi^2(1, N = 317) = 1.207, p = 0.299$ . One-hundred and ten (31%) respondents received safety training through e-modules, 90 (26%) through on-the-spot learning, 37 (10%) through lectures, 31 (9%) through readings, and 9 (2%) through other methods, including using models and participating in small group sessions. There was a slight positive correlation between number of training

**Table 2.** Distribution of injuries by period of training, activity, instrument, and injurer.

Circumstances of Injury at TEGH	Injuries (%) (n=88)
<b>Period of Training</b>	
PreClerkship	5 (3)   0.18 per person
Clerkship	54 (27)   0.60 per person
Residency	136 (70)   0.62 per person
<b>Activity</b>	
Suturing	44 (52)
Assisting	14 (17)
Injecting	10 (12)
Passing needle	5 (6)
Recapping needle	4 (5)
Cleaning up	3 (4)
Other	3 (4)
Venipuncture	1 (1)
Arterial puncture	0
<b>Instrument</b>	
Solid Needle	48 (69)
Hollow-Bore Needle	17 (25)
Cauterizer	2 (3)
Scalpel	2 (3)
<b>Injured By</b>	
Self	42 (69)
Staff	10 (16)
Resident	4 (7)
Nurse	4 (7)
Medical Student	1 (2)

modules received and number of injuries reported (Spearman  $\rho$ , 0.186,  $p < 0.001$ ). Two-hundred and twenty two (64%) respondents believed that the third year of medical school (the beginning of clinical clerkship) was the best time to implement a safety-training program.

We next investigated post-exposure actions among the 88 trainees who experienced a needlestick injury at TEGH. Respondents were able to choose more than one option for their actions taken post-injury. Among those who were injured, 51 (58%) washed the wound, and 36 (41%) continued working. Fifty-one (58%) reported their injury to a staff physician and only 28 (32%) reported to Occupational Health (Table 3). The Occupational Health Office recorded 61 official injuries in medical trainees between 2008-2014, equivalent to 0.02 injuries per trainee-year (400 trainees per year  $\times$  7 years = 2800 trainee-years). Our study captured 195 injuries, equivalent to 0.1 injuries per trainee-year (sum of the 350 trainees' combined years of study = 1960 trainee-years). We performed a Mann-Whitney U test, which showed that the number of injuries captured by our survey is significantly greater than the number of injuries captured by the Occupational



**Fig. 1.** Incidence rate ratios of needlestick injuries across specialties and normalized to orthopaedic surgery's incidence. The data were controlled for year, gender, and medical school alma mater. Gray boxes indicate surgical specialties. Error bars represent 95% confidence interval.

Health Office ( $U = 2526998$ ,  $p < 0.001$ ).

During a mid-study evaluation of the survey, the alarming number of underreported incidents compelled further investigation. We added a question to the survey asking respondents why they did not report to Occupational Health. Since this question was added after the survey had launched, only 65 (18%) of the 350 respondents were able to respond. Eleven of 65 sustained needlestick injuries, 9 of which failed to report to occupational health. Four of these 9 non-reporters indicated that they did not report to the Occupational Health Office for reasons including "it wasn't a big deal," "it takes too much time," and "the patient's HIV and Hep status was negative."

Among the 88 trainees who sustained needlestick injuries, 77 responded to the question concerning prophylaxis against HIV or hepatitis C. Only 8 of 77 completed prophylaxis treatment. Thirty-nine (56%) of the respondents who declined HIV/Hep C prophylaxis perceived the patient to be of low risk for transmitting bloodborne pathogens, and thus felt it was unnecessary to be treated. Two trainees elaborated on other reasons for non-reporting below:

Respondent #228: "Needlestick injuries are too common; and the prophylaxis too onerous; that most people won't use prophylaxis unless they: a) know the needle is

**Table 3.** Post-exposure actions of respondents. These actions are not mutually-exclusive; the percentages do not sum to 100% between groups.

Post-Exposure Actions	Respondents (%) (n=88)
<b>Action</b>	
Washed wound	51 (58)
Continued working	36 (41)
Consented patient to draw blood	28 (32)
Had patient's blood tested	27 (31)
Had own blood tested	26 (30)
Encouraged by witness to seek help	23 (26)
<b>Reporting</b>	
Staff	51 (58)
Colleague	40 (45)
Occupational Health	28 (32)
Other	27 (31)
Emergency Department	23 (26)
<b>HIV/Hepatitis C Prophylaxis (n=77)</b>	
Yes	8 (10)
No	69 (90)

contaminated with HIV/Hep C; or b) have reason to suspect that the patient may have HIV/Hep C.”

Respondent #39: “I have sustained so many needlestick injuries during my residency that I no longer pursue this. This is the case for many surgical residents I believe. Needlesticks are very commonplace especially at some other sites where retractors are used that expose their sharp tips in the operative field (i.e., lonestars turned upwards); when staff backhand scalpels while they work; or where the scrub nurse insists on keeping the sharp cautery always pointed right at your elbow. I get stabbed with that a lot. I can't be on prophylaxis all the time; and, as an R1, it was indicated to me that if you make a fuss over every needle poke you will be seen as a safety hazard so you should just accept that it is a risk of the job.”

## Discussion

### Incidence and Distribution

With 25% of trainees having sustained a needlestick injury during their rotations at TEGH, needlestick injuries posed a significant occupational safety issue. This is the first study of needlestick injuries at TEGH and the first published study to evaluate needlestick injuries by clinical specialty in the last 25 years, according to a MEDLINE search using the terms “needlestick injuries” AND “clinical clerkship/ or education, medical, graduate/ or education, medical, undergraduate/ or “internship and residency”/.” O'Neill *et al.* surveyed the difference in injuries between various medical and surgical specialties in

1992<sup>10</sup>. In our study, surgical trainees incurred 3 times more injuries than their non-surgical counterparts. Orthopaedic surgery trainees faced the highest risk overall, being 12 times more likely to be injured than emergency medicine trainees (Fig. 1). The risk of injury increased by 30% for each year of training since the start of medical school (Table 1).

The increased number of injuries for surgical trainees reported in our study concurred with previous studies<sup>10</sup>. Their greater exposure to needles, especially during suturing, was likely a contributing factor. Other factors that could increase risk include: exposure to sharp operating tools and broken bones, operations in deep-body cavities, reliance on tactile feedback, operator experience, long operating times, and fatigue. The 0.1 injuries per trainee-year reported in our study was greater than the 0.02 injuries per trainee-year officially reported to Occupational Health, in agreement with studies at other centers and at the University of Toronto<sup>5,9</sup>.

Needlestick safety legislation for hollow-bore needles was enacted in the U.S. in 2001<sup>12</sup> and in Ontario, Canada in 2008<sup>13</sup>. In our study, hollow-bore needles accounted for only 17 of 195 needlestick injuries. However, our observed total distribution and incidence of needlestick injuries remained alike to that observed in a study in 1992<sup>10</sup>. Suturing was the most common activity leading to needlestick injuries, and solid-bore needles were the most common instruments that caused injuries. Legislative changes developed for hollow-bore needles may not have been applicable to solid-bore needle use during suturing by physicians.

Despite the development of detachable or “pull-off” sutures that enable easy removal of the needle and safe handling after suturing, needlestick injuries still pose a risk while the needle is still attached during suturing. Implementing double-gloving and “no-touch” techniques<sup>14</sup> may decrease injury incidence among surgical trainees (especially orthopedic surgery trainees). In addition to the conventional needle handling techniques, needle driver innovations that enable the user to secure and guard the sharp tip end may be needed to prevent future needlestick injuries.

### Reporting

Underreporting of needlestick injuries occurred frequently and could have led to delayed or missed treatment for bloodborne pathogens. Lack of reporting and appropriate post-exposure actions deprive trainees of screening and prophylaxis for HIV and hepatitis B and C. Seroconversion to these bloodborne diseases could endanger patients<sup>2</sup>, impose restrictions on trainees' medical practices<sup>15</sup>, and render trainees ineligible for future disability insurance<sup>16</sup>. Moreover, those who sustained injuries could suffer from psychological stress or illness post-injury. Studies have found evidence of acute anxiety, tremor,

profound sleeplessness, adjustment disorder, post-traumatic stress disorder, and even severe depressive symptoms among health care workers awaiting post-exposure test results<sup>17,18</sup>.

Our study found a low rate of reporting, similar to findings from other needlestick injury studies<sup>5-8</sup>. Approximately one third of those who were injured in our study had reported their most recent injury to the TEGH Occupational Health Office. Compared to the official records from the Office, we found that only one fifth of injuries had actually been reported between 2008-2014. A lack of insight to recognize needlestick injuries as an occupational hazard may contribute to underreporting<sup>19</sup>. Other reporting deterrents may include: time required to file the official incidence report, a pre-existing negative HIV/Hepatitis B and C patient status, and/or a perception of a low risk of bloodborne pathogen transmission<sup>6,7,9</sup>. Qualitative quotes from our study supported these proposed deterrents. Additionally, respondents revealed that some trainees perceived HIV/Hep C prophylaxes as too burdensome, and that injuries occur too often to justify the inconvenience. Future initiatives to improve reporting rates should include streamlining procedures for easy access to reporting, reducing wait times for treatment, and educating trainees to recognize needlestick injuries as an occupational hazard. A top-down strategy must be established to encourage trainee supervisors and healthcare leaders to report injuries and build psychological safety among trainees<sup>4</sup>. Our results suggested that a close collaboration with the occupational health office to optimize the reporting protocols and minimize the burden of reporting for trainees would be necessary. Furthermore, given the higher rates of injury in specific subspecialties, it would be beneficial for occupational health offices to monitor and analyze injury reports by specialty to understand which specific groups would be best targeted to improve reporting rates.

Qualitative responses to our survey suggested an existing stigma surrounding needlestick injuries that inhibited incident reporting: "...and as a first-year resident it was indicated to me that if you make a fuss over every needle poke, you will be seen as a safety hazard so you should just accept that it is a risk of the job." Over the span of 25 years, reporting rates improved slightly at the University of Toronto compared to the studies by McGeer *et al.* in 1990 (<5%)<sup>5</sup> and Cervini *et al.* in 2005 (24%), but the 32% observed in our study suggested significant measures to increase reporting rates would be necessary to ensure the safety and wellbeing of all trainees. Changes in medical education to recognize needlestick injuries as occupational hazards in medical trainee cultures may lead to increased reporting and the development of prevention measures.

### Education

Among our trainees, there was no difference in needlestick injury incidences between those who received needlestick injury education versus those who did not. However, published studies suggested that proper training, intervention, and safety culture at an institution directly reduce needlestick injuries<sup>12-14,20</sup>. A recent study in Singapore showed decreased needlestick injuries among medical students after the implementation of preventative training (from 35% in 1993 to 3% in 2013)<sup>20</sup>. A meta-analysis found that various strategies, such as double-gloving or "no-touch" techniques, reduced perforations, and needlestick injuries among health care workers<sup>14</sup>. Injuries across the United States fell by 38% after the introduction of the Needlestick Safety and Prevention Act (NSPA), which mandated engineered safety hollow-bore needles and needlestick injury reporting<sup>12</sup>.

Respondents who believed they had undergone adequate needle handling safety training were not associated with a lowered rate of needlestick injuries. However, this may align with the observation that trainees' self-perceptions of competency do not correlate with actual competence<sup>21</sup>. Among our trainees, the number of types of safety training modules was associated with a slightly higher probability of being injured. This did not agree with previous studies that correlated more education with reduced injury incidence<sup>12,14,20</sup>. The lack of reduction in needlestick injuries post-education suggested a learning lag in needle safety education at TEGH. Future endeavors to study the education of needle handling would be required to develop effective training programs for preventing needlestick injuries.

We hypothesized that the more experienced trainees would be less likely to sustain needlestick injuries. Surprisingly, the risk of incurring an injury increased by 30% per year of training. This increased rate of injuries could be related to the cumulative exposure to needle handling. Increased complacency and carelessness over time may be another factor. These scenarios suggested that trainees either failed to develop effective needle handling safety habits or that they neglected their previously learned safety techniques over time. In either case, safety training programs should be implemented to provide official instruction to reduce injuries<sup>20</sup>. If lower rates of needlestick injuries implied a safer surgical training program, then needlestick injury rates might be considered as a metric for the quality of medical education. Surgical education curricula should emphasize the importance of needlestick injury prevention and implement mandatory reporting of these injuries.

The respondents felt that the best time to implement needlestick prevention training would be before clinical exposure. For the University of Toronto, this would be in Year 3 of the undergraduate medical program, prior to the start of clinical clerkship rotations. Clinical clerks with

little clinical experience may be presented with risky situations involving needle handling. Mandatory measures must be developed to ensure that these new trainees receive proper education on safe needle handling to prevent future injuries. Furthermore, all learners must familiarize themselves with the post-injury protocol for mandatory reporting to minimize the possibility of bloodborne pathogen transmission. The earlier these measures are introduced to the medical trainees in their careers, the easier it would be to establish a strong culture for safe needle handling and reporting of needlestick injuries in the future.

### Limitations

Our study's conclusions may have been affected by two main limitations: recall bias and the 42% response rate. Considering the pain and anxiety inflicted upon injury, needlestick injuries would have been memorable to the learners injured. Recall bias and inaccurate recollections would be unlikely and thus would have had minimal impact on the survey result. The relatively low response rate could have been a feature of online survey-based studies and may have introduced non-response bias: subjects were presumably more likely to respond to our survey if they had experienced a needlestick injury. As such, the 498 non-responders in our study population could have never sustained a needlestick injury. In this extreme case, the overall incidence rate may be as low as 88 out of 840 (10%). Therefore, our observed incidence rate of injured medical trainees may range between 10% to 25%.

### Conclusion

Our study established that, among all medical specialties, surgical trainees at TEGH were the most susceptible to needlestick injuries. Needlestick injuries accumulated with each year of training. Injuries were underreported compared to official occupational health reports. Reasons for non-reporting included excessive time required to follow protocol, negative stigmatization, and perception of a low risk for bloodborne pathogen infections. Trainees conveyed limited education on needlestick injury prevention and reporting. We plan to conduct further qualitative studies, including structured interviews with medical trainees, to better understand the contributors to needlestick injuries and the measures to improve injury reporting, with the ultimate goal of reducing the overall numbers of needlestick injuries among medical trainees at TEGH.

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*Conflicts of interest:* There are no conflicts of interest declare.

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**Appendix A.**

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## Demographics

1. Please indicate your gender.

Male

Female

Prefer not to identify

Other. Please specify: \_\_\_\_\_

2. What's your current level of training?

Medical School 1 (PreClerkship)

Medical School 2 (PreClerkship)

Medical School 3 (Clinical Clerk)

Medical School 4 (Clinical Clerk)

Residency 1

Residency 2

Residency 3

Residency 4

Residency 5

Fellowship

3. Which specialty are you training in? (Indicate Medical Student if in preclerkship.)

Medical Student

Anesthesiology

Emergency Medicine

Family Medicine

General Surgery

Internal Medicine

Neurology

Obstetrics &amp; Gynecology

Ophthalmology

Orthopedic Surgery

Otolaryngology

Pediatrics

Plastic Surgery

Psychiatry

Urology

4. Which medical school did you attend?

McMaster University

Northern Ontario School of Medicine

University of Ottawa

Queen's University

University of Toronto

Western University

Out of Province: \_\_\_\_\_

International: \_\_\_\_\_

## Needlestick Handling Training

5. How did you feel about your needle handling safety training during your rotations at TEGH?

Not applicable

Didn't get any training

Not enough training

Just enough training

Too much training

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(continued)

**Appendix A.** (continued)

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6. If you got training, was it offered in the form of (select all that apply):

Lectures

E-modules

Readings

On-the-spot

Other. Please specify: \_\_\_\_\_

7. When do you think will be the best opportunity to introduce needle and sharp instruments handling?

Medical School 1 (PreClerkship)

Medical School 2 (PreClerkship)

Medical School 3 (Clinical Clerk)

Medical School 4 (Clinical Clerk)

Residency 1

Residency 2

Residency 3 or beyond

Other. Please specify: \_\_\_\_\_

Characteristics of Needlestick Injuries

8. To the best of your ability, please indicate how many times you've experienced a needlestick injury in each period of training at TEGH. If "0" is inputted for all three choices, please go to the end of the survey and click "Submit".

PreClerkship: \_\_\_\_\_

Clerkship: \_\_\_\_\_

Residency: \_\_\_\_\_

9. How many times were you injured during each rotation at TEGH? (Leave fields blank if 0.)

Medical Student: \_\_\_\_\_

Anesthesiology: \_\_\_\_\_

Emergency Medicine: \_\_\_\_\_

Family Medicine: \_\_\_\_\_

General Surgery: \_\_\_\_\_

Internal Medicine: \_\_\_\_\_

Neurology: \_\_\_\_\_

Obstetrics & Gynaecology: \_\_\_\_\_

Ophthalmology: \_\_\_\_\_

Orthopedic Surgery: \_\_\_\_\_

Otolaryngology: \_\_\_\_\_

Pediatrics: \_\_\_\_\_

Plastic Surgery: \_\_\_\_\_

Psychiatry: \_\_\_\_\_

Urology: \_\_\_\_\_

10. Please indicate the number of times you've been injured at TEGH by each instrument. (Leave field blank if 0.)

Solid Needle: \_\_\_\_\_

Cauterizer: \_\_\_\_\_

Hollow-Bore Needle: \_\_\_\_\_

Scalpel: \_\_\_\_\_

Other: \_\_\_\_\_

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(continued)

**Appendix A.** (continued)

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11. How many times have you been injured while performing each procedure at TEGH? (Leave field blank if 0.)
- Suturing: \_\_\_\_\_
- Assisting: \_\_\_\_\_
- Injecting: \_\_\_\_\_
- Cleaning up: \_\_\_\_\_
- Venipuncture: \_\_\_\_\_
- Arterial puncture: \_\_\_\_\_
- Passing needle: \_\_\_\_\_
- Recapping needle: \_\_\_\_\_
- Other: \_\_\_\_\_
12. How many times have you been injured by each healthcare worker at TEGH? (Leave field blank if 0.)
- Self: \_\_\_\_\_
- Resident: \_\_\_\_\_
- Staff: \_\_\_\_\_
- Nurse: \_\_\_\_\_
- Medical student: \_\_\_\_\_
- Post-exposure actions
13. What immediate action(s) did you take when the most recent needlestick injury occurred at TEGH? Select all that apply.
- Continued working
- Reported to someone
- Washed wound
- Were encouraged by witness to seek help
- Consented patient to draw blood
- Had patient's blood tested
- Had own blood tested
14. Who did you report to when the most recent needlestick injury occurred at TEGH? Select all that apply.
- Didn't report to anybody
- Colleague
- Staff
- Emergency Department
- Occupational Health
- Other: \_\_\_\_\_
15. If you didn't report to TEGH Occupational Health, why not? (Skip if you reported to Occupational Health.)
- Office was closed
- Didn't think it was a big deal
- Was told by staff/colleague that it wasn't a big deal
- Stigma of having had a needlestick injury
- Takes too much time
- Didn't want to know results
16. Did you take any HIV and/or hepatitis C prophylaxis when the most recent needlestick injury occurred at TEGH?
- Yes
- No. Please indicate why not: \_\_\_\_\_
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