Original Article

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Anaesthesia Section

Characteristics of Sharp Injuries in Anaesthesia Providers in New York State: A Cross-sectional Study

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ABSTRACT

Introduction: Sharp instrument injury, defined as cuts, punches, scratches, nicks, or other injuries that break the skin and thus permit the entry of bacteria and viruses into the body, is the most common hazard faced by health care workers. Anaesthesiologists work in a rapid-paced environment, and are at high risk of injury from sterile sharps while preparing medication or dirty sharps that have been in contact with patients.

Aim: This field study aimed to determine the incidence and distribution of sharp injuries among anaesthesia providers in New York State.

Materials and Methods: The study was performed during year 2014 among the members of New York State Society of Anaesthesiologists (NYSSA). A total of 282 anaesthesia providers including anaesthesiology attendings, residents, fellow and interns participated in an anonymous online survey (Survey Monkey) of 18 questions.

Results: Of 2965 NYSSA members polled, 282 anaesthesia providers responded (9.51% response rate). A total of 248 (95.04%) respondents responded a prior needlestick injury. A total of 165 (59.14%) experienced dirty sharp injury (DSI) in the course of their practice, and the most common cause was hollow bore needles. The most common cause of DSI occurred while the provider was holding the sharp himself. A total of 117 (42.4%) respondents had injury even though safety mechanism was available and used.

Conclusion: Sharp injuries were a common risk to anaesthesia providers in New York State. Future research should investigate strategies to reduce injury and improve reporting among anaesthesia providers.

Keywords: Clinical hazard, Needlestick injury, Occupational health

INTRODUCTION

Sharp instrument injury is the most common hazard faced by health care workers. “Sharps” have been defined as any object in the health care setting that can puncture the skin and thus permit the entry of bacteria and viruses into the body. A “sharps injury” includes cuts, punches, scratches, nicks, or other injuries that break the skin [1]. These injuries occur during activities such as preparing medications, blood sampling, needle disposal, waste collections, transfusions, intravenous catheter placement, skin incision, cutting, suturing and other invasive procedures. These injuries predispose to more than 20 types of infections including Human Immunodeficiency Virus (HIV), hepatitis B (HBV) and hepatitis C (HCV) [2]. The number of infections with HCV, HBV, and HIV in health care workers, attributable to exposure to percutaneous injuries reaches 39%, 37%, and 4.4% respectively [3]. Although needlestick injuries among health care workers such as nurses or medical students have been well studied, its incidence and characteristics in anaesthesiology providers remains underreported [4]. Anaesthesiology providers work in a rapid-paced environment, and are at high risk of injury from sterile sharps while preparing medication or dirty sharps that have been in contact with patients (needlestick injuries in anaesthetists). A sterile sharp injury has been defined as an injury from a sharp that has had no contact with a patient. A dirty sharp is defined as one that has been in contact with a patient, either directly such as in a vein or artery, or indirectly, such as in an intravenous line that is connected to a patient, or one used after a patient’s blood entered a multi-dose vial or piggyback drip. Even if the sharp was connected to an IV line at a distance from a patient, it was still considered a dirty sharp [5].

We conducted an electronic survey on the occurrence of sharp injuries in anaesthesia providers, as well as circumstances surrounding the injury, mechanism of injury and measures taken afterwards. We hope that our study will make the readers aware of the sharp injuries and shed some light on the importance of the safety mechanism use and the proper procedure and management after the sharp injury has occurred.

MATERIALS AND METHODS

This study was performed during 2014 (September-December) in New York State. We sent an electronic survey to all the members of NYSSA. Responders were included in this study, others with no or incomplete responses were excluded. A total of 282 anaesthesia providers including anaesthesiology attendings, residents, fellow and interns participated in an anonymous online survey of 18 questions. After receiving an exemption from the Institutional Review Board of Albert Einstein College of Medicine, we sent an electronic survey to all the members of NYSSA in August 2014. A unique login was issued to each email address to prevent multiple responses. The survey was created by the Survey Monkey website (Survey Monkey, Inc. {US}) A validated questionnaire containing 18 questions targets sharp object injuries associated with anaesthesia-related activities.

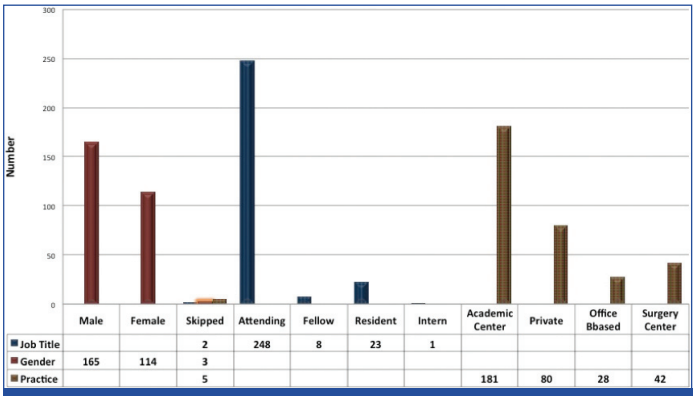
Correlations with gender, academic and private practice, years of experience, emergent and non-emergent situations, as well as the type of the procedures involved with sharp injuries were addressed [Appendix 1]. The survey was created by the Survey Monkey website (Survey Monkey, Inc. [US]) and sent to the NYSSA members electronically. A repeat survey was sent to non-responders three weeks later.

STATISTICAL ANALYSIS

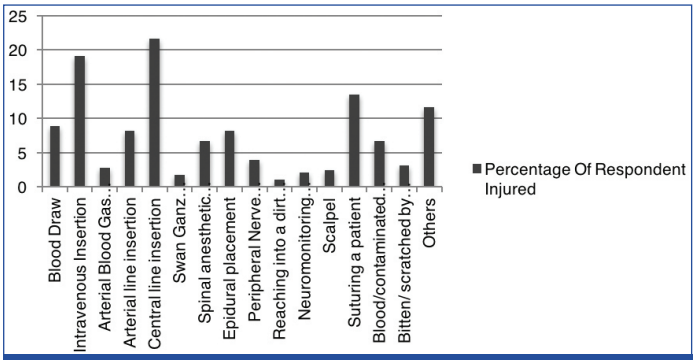
Data was collected and analysed using the statistical tools available on the Survey Monkey webpage. Data was expressed as means±SEM. A probability of $p<0.05$ was considered as statistically significant.

RESULTS

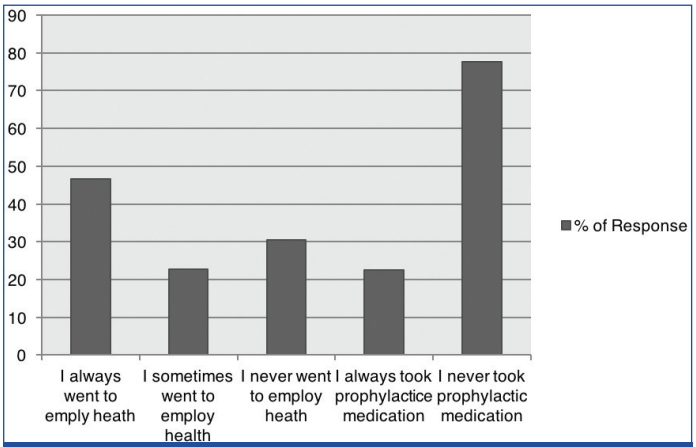
Of the 2965 NYSSA members polled, we received responses from 282 members-a 9.51% response rate [Table/Fig-1-3]. A total of 248 responses were anaesthesiology attendings, which constituted 87.94% of all responses. The remainder of the responses were from anaesthesiology residents 23 (8.16%), fellows 8 (2.84%), interns 1 (0.35%), 2 responders did not disclose their position. Of the responders, 114 (40.42%) were female, 165 (58.51%) were male, 3 responders did not disclose their gender. The majority of the survey respondents (53.87%) were in academic practice.



[Table/Fig-1]: Survey response.

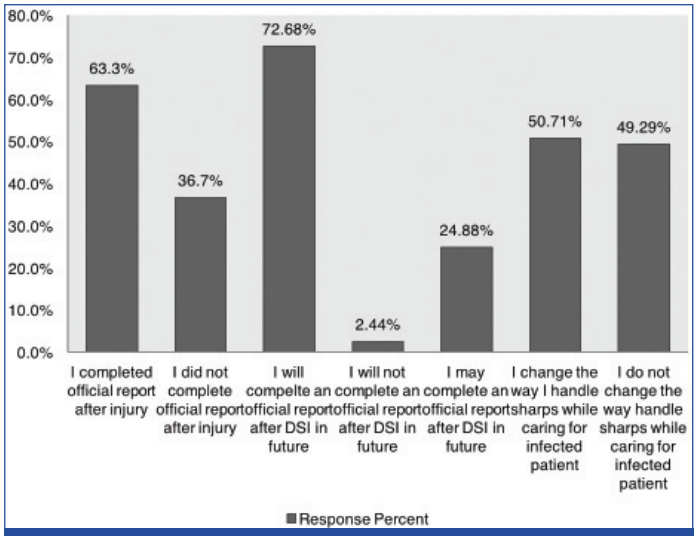


[Table/Fig-2]: Common mechanisms of dirty sharp injury.

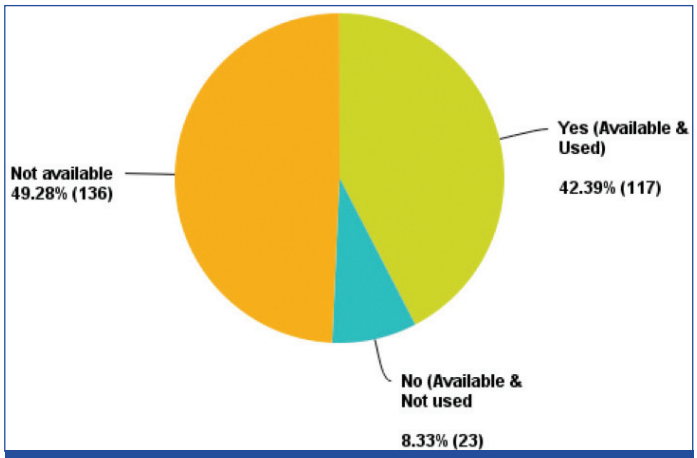


[Table/Fig-3]: Prophylaxis and employee health visit after DSI.

59.41% respondents experienced Dirty Sharp Injury (DSI) during their practice; see [Table/Fig-4]. One hundred seventeen (42.4%) respondents had injury even though safety mechanism was available and used [Table/Fig-5]. A 49.3% had injury with sharps where safety mechanisms were not available. Safety mechanisms were available but not used by 8.33% of the members at the time of the stick. A 95.04% anaesthesiology providers responded that they experienced sterile sharp injury in their practices [Table/Fig-6]. A 84.44% of respondents reported sterile injury with glass, while 95.51% anaesthesiology providers had sterile injury with needles [Table/Fig-7]. A total of 250 out of 282 responded for sterile glass injury and all responded



[Table/Fig-4]: Report after experiencing sharp injury.



[Table/Fig-5]: If there was a safety mechanism available for the sharp, did you use it.

Number of sharps injury	Response Percentage	Response Count
1	13.83%	39
2	17.73%	50
3	16.96%	45
4	8.87%	25
5	9.22%	26
6	5.67%	16
7	2.84%	8
8	1.06%	3
9	1.06%	3
10 and above	15.96%	45
Not Applicable	7.80%	22
Total	100	282

[Table/Fig-6]: Number of sharp injuries during anaesthesiology practice.

Answer Options	Response Percentage	Response Count
Yes	95.04%	268
No	3.90%	11
Not applicable	1.06%	3
Total	100%	282

[Table/Fig-7]: Sterile sharp injuries among anaesthesia providers.

for sterile needle injury [Table/Fig-8]. One hundred seven out of 207 respondents 52.7 (%) reported DSI due to hollow bore needles. Other frequent causes were angiocaths of different gauges 39.2 (%), suture needle 36.2 (%), solid needle 15.5 (%), scalpel 9.6 (%) and glass vial 9 (%) [Table/Fig-9].

Number / Type	None	1	2	3	4	5	6	7	8	9	10 and more	Total
Glass	15.66% (39)	26.91% (67)	20.88% (52)	8.84% (22)	4.02% (10)	8.84% (22)	2.41% (6)	1.20% (3)	1.20% (3)	0.00% (0)	10.44% (26)	250
Needle	4.49% (12)	21.72% (58)	24.72% (66)	13.48% (36)	5.24% (14)	10.11% (27)	4.12% (11)	1.50% (4)	1.50% (4)	1.12% (3)	12.73% (34)	268

[Table/Fig-8]: Incidence of sterile injury and type of injury.

Number of injuries	1	2	3	4	5	6	7	8	9	10 and above	N/A	Total
Gauge needle	22.04% 41	9.68% 18	2.69% 5	1.61% 3	0.54% 1	0.54% 1	0.54% 1	0.54% 1	0% 0	1.61% 3	60.22% 112	186
Hollow bore needle	28.99% 60	12.56% 26	4.35% 9	3.38% 7	0.00% 0	0.48% 1	0.97% 2	0.48% 1	0% 0	1.45% 3	47.34% 98	207
Solid needle	8.78% 13	4.05% 6	1.35% 2	0.68% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0% 0	0.68% 1	84.46% 125	148
Suture needle	20.90% 37	9.60% 17	1.69% 3	1.13% 2	1.69% 3	0.56% 1	0.0% 0	0.0% 0	0% 0	0.56% 1	63.84% 113	177
Glass vial	6.25% 9	1.39% 2	0.0% 0	0.0% 0	0.69% 1	0.0% 0	0.0% 0	0.0% 0	0% 0	0.69% 1	90.97% 131	144
Scalpel	7.53% 11	0.68% 1	0.0% 0	1.37% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0% 0	0.0% 0	90.41% 132	146

[Table/Fig-9]: Incidences of dirty sharp injury.

	1	2	3	4	5	6	7	8	9	10 and more	N/A	Total
Holding dirty sharp yourself	26.61% 58	16.97% 37	5.50% 12	5.05% 11	1.38% 3	0.92% 2	0.46% 1	0.46% 1	0.46% 1	1.38% 3	40.83% 89	218
Someone else holding dirty sharp	18.13% 29	3.75% 6	1.88% 3	1.88% 3	0.00% 0	0.00% 0	0.00% 0	0.63% 1	0.00% 0	0.00% 0	73.75% 118	160
Sharp lying on flat surface/tray	20.00% 34	7.65% 13	1.76% 3	1.76% 3	0.59% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	68.24% 116	170
Emergent situation	20.63% 33	3.13% 5	3.13% 5	3.13% 5	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1.88% 3	68.13% 109	160
Non-critical situation	26.36% 63	20.50% 49	7.11% 17	4.18% 10	2.09% 5	0.84% 2	0.84% 2	0.00% 0	0.42% 1	1.26% 3	36.40% 87	23

[Table/Fig-10]: Circumstances of dirty injury.

A 59.2% injuries occurred while the provider was holding the sharp himself. Injury occurred while someone else was holding the sharp in 26.25% members and while sharp lying on a surface in 31.66% members. When asked if the situation when injury occurred was emergent or not, majority (64.6%) of respondents said they received sharp injuries during a non-critical situation. Majority of the members answered that they had DSI while doing central venous catheterisation (21.63%), intravenous insertion (19.15%) and placement of sutures (13.47%) [Table/Fig-10].

As described in [Table/Fig-3], 46% of responders always went to employ health after needle stick injury, while 31% never did that. A 78% of respondents never took prophylactic medication after DSI. 63.30% respondents completed an incident report after sharp injury [Table/Fig-4]. A total of 72.68% respondents were willing to fill up an incident report after DSI. A total of 50.71% members will change their way of handling sharps when caring for patients known to have an infectious disease, such as hepatitis or AIDS. An 82.27% agreed that in case of a hospital worker getting a DSI, should a form that requests patient permission to perform HIV and/or hepatitis testing be added to paperwork at the time of admission [Table/Fig-6].

DISCUSSION

Our survey study was started with an intention to look at the various ways a health care provider could accidentally get a sharp injury while handling the sharps. A 95.04% anaesthesiology providers responded a prior needlestick injury, which is much higher than the study conducted by Motavaf M et al., with an incidence of 56.8% [6]. One possible reason for this may due to demographics. According to a study conducted by Rosenberg AD et al., the incidence of sharp injury among anaesthesiologists was 88% in the 1990s, which is similar to our current study [7]. Compared to other healthcare workers, our study shows that anaesthesiology providers have a similar incidence of sharp injury. More than 90% of surgeons in training have experienced sharp injury [8]. Deipolyi AR et al., reported that 91% of interventional radiologist experienced sharp injury in the past [9]. However, Balouchi A et al., study shows that 64% of nurses experienced at least one sharp injury during the past year [10]. The reason for high incidence of sharp injury among anaesthesiology providers may due to the rapid-paced work environment.

The report rate after sharp injury is 63.3%, which is much higher than Motavaf M et al., (32.2%) and Tait AR's et al., (31%) study [6,11]. However, additional measures to improve report rate such as increasing the awareness of outcomes or further education should be strengthened, since anaesthesiology providers are more prone to high-risk exposure in contrast with other healthcare staff [12].

Although safety mechanisms are important for preventing sharp injury [13], according to a study conducted by Wicker S et al., 59.3% of sharp injuries among anaesthesiology providers can be prevented by safety devices [14]. We suggest that educational programs for reducing sharp injuries should not be neglected and awareness of the risk of needle sticks might be helpful.

Our study reveals that the majority of respondents experienced sharp injuries during non-emergent situation. This phenomenon indicates that the providers should be careful during daily cases and not just in emergencies. But each provider most probably deals with less number of emergency cases compared to regular daily elective cases. So, the conclusion cannot be made that non-emergency situations have less incidence of sharp injuries.

LIMITATION

There are some limitations with our study such as small sample size, limited population. The information given was from the past experience and hence may decrease the accuracy due to recall bias.

This is a small study and is used as a needs assessment for a larger study. Ongoing studies of larger population need to be done to get more conclusive data.

CONCLUSION

Sharp injuries were a common risk to anaesthesia providers in New York State. Future research should try to increase the sample size, response rate, and investigate strategies to reduce injury and improve reporting among anaesthesia providers.

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APPENDIX 1

Sharps Management Survey

Please indicate your best responses to the questions below as best as you remember.

1. What is your current level of practice? (Circle one)

a) Med student

b) Anaesthesia:

c) Resident: PGY1 CA1 CA2 CA3

d) Fellow

e) Anaesthesia attending years in practice ____

f) SRNA or CRNA

g) Surgery: Resident: PGY1 PGY2 PGY3 PGY4 PGY5 PGY6

h) Surgery Attending: years in practice ____

i) Nurse: years in practice ____

j) Surgical Technician

k) Anaesthesia Technician

l) Other _____

2. Where is your medical practice housed? Choose all that apply.

a) Academic Center

b) Private

c) Office based

d) Surgery Center

e) Other (please specify)

3. Gender Male ____ Female ____

4. How many times have you received sharp injury in practice?

1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above, Not applicable __,

5. Were you ever stuck with a "sterile sharp(s)" while preparing for, or providing, anaesthesia? (A "sterile" stick is described as a sharp that has had no contact with a patient or patient fluids. The needle/vial is sterile) Yes __, No__, Not Applicable

6. If you have been stuck with a "sterile sharp(s)" object while preparing for, or providing anaesthesia, indicate the number of times you were stuck by each type of sharp. (If you have not been stuck with a sterile sharp, skip this question)

a. Glass vial: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___

b. Needle: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___

A dirty sharp is defined as one that has been in contact with a patient, either directly such as in a vein or artery, or indirectly, such as in an intravenous line that is connected to a patient, or one used after a patient's blood entered a multi-dose vial or piggyback drip. Even if the sharp was connected to an IV line a distance from a patient that is still considered a dirty sharp.

7. Have you ever been stuck with a "dirty sharps" object? (Circle one) Yes No

8. How many "dirty" sharp sticks have you experienced?

a. Gauge needle: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

b. Hollow bore needle: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A __

c. Suture needle: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

d. Glass vial: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A __

e. Scalpel: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A __

f. Solid needle: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A __

g. Other: please describe _____

9. If there was a safety mechanism available for the sharp, did you use it?

Yes__, No__, N/A___

Question 10 asks about the situation in which you received the "dirty" stick, and how many times you received a particular "dirty". The response to question 10 must equal the response from question 8.

10. What was the situation in which you experienced a "dirty" stick, and how many times? The response from question 10 must equal the response from question 8.

a. Holding dirty sharp yourself: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

b. Someone else holding dirty sharp: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

c. Sharp lying on flat surface/tray: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

d. Other (please specify): 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

11. Did you incur the "dirty" sharp stick during an Emergent situation _____, Non-critical situation _____

12. Do you change the way you handle sharps when caring for patients known to have an infectious disease, such as hepatitis or AIDS? Yes No

13. What type of procedure were you doing when stuck with a dirty sharp? Indicate the number of times for each procedure. The total number needs to add up to your response to question 8. (If you have not been stuck with a dirty sharp, skip to end of the survey)

a. Blood draw: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

b. Intravenous insertion: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

c. Arterial blood gas stick: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

d. Arterial line insertion: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

e. Central line insertion: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

f. Swan Ganz catheter insertion: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

g. Spinal anaesthetic placement: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

h. Epidural anaesthesia: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

i. Peripheral Nerve block placement: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

j. Reaching into a dirt sharps bin: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

k. Blood or contaminated fluid: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

l. Neuromonitoring needle: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

m. Scalpel: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

n. Suturing a patient: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

o. Bitten or scratched by the patient: 1__, 2__, 3__, 4__, 5 __, 6__, 7__, 8__, 9__, 10 and above___, N A__

p. Comment (please specify):

If you have experienced a "dirty" sharp stick/contamination please answer questions 14-18

14. Did you complete an official report, such as an incident report? Yes No

15. If you experience a "dirty" sharp stick in the future, would you complete a hospital incident report?

Yes__, No__, May be__

16. Did you clean the wound with ... ? Choose all that apply. Water__, Alcohol__, Chlorhexidine__, Did not clean wound__, Comment (please specify)

17. Did you go to employee health service/emergency room after the "dirty" sharp stick? Always__, Sometimes__, k Not at all __, Comment (please specify)

18. Did you take prophylactic medication until HIV test results were known for the patient? Yes __, No__, Comment (please specify)