

The Prevalence of Needle Stick Injuries among Health Care Workers in Baquba Teaching Hospital

Dr. Shahab A. Alazawy * M .B.Ch.B, D.C.M , F.I.B.M .S.O& E Medicine

Introduction

Needle stick injuries (NSIs), also referred to as sharps injuries, percutaneous injuries and sharps exposures, represent accidental breaks in the skin with needles, scalpels or other sharp objects that have been in contact with a source patient's blood or body fluids[1]. Blood borne infections have been recognized as an occupational hazard for nearly 50 years [2]. However, it is only in the last 20 years that there has been a widespread recognition of the specific risk posed to health care workers (HCWs) by blood borne viruses such as hepatitis B, C and human immunodeficiency virus (HIV). While as many as twenty blood borne pathogens can be transmitted through accidental needle sticks, [3] the potentially life threatening are (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV). A health care worker's chance of contracting HIV after an HIV-infected accidental needle sticks is one in 250, while the chance of contracting HBV after an accidental needle sticks is one in 20. The chances of contracting HCV after an HCV-contaminated accidental needle sticks average 3.5 in 100 [4].

There is lack of information about the various factors that cause accidents with needles. Surveillance programs that provide in-depth analysis of needle stick accidents are important tool for obtaining this information.

The purpose of this study was to calculate the prevalence and the circumstance of NSI among a group of health care workers in Baquba teaching hospital as well as their knowledge, attitude and practices regarding the use of protective strategies against exposure to blood-borne pathogens (standard isolation precautions, double gloving and post-exposure prophylaxis).

Materials and Methods

This is a cross-sectional study carried out in Jan 2010 till Feb 2010 to determine the prevalence of needle-stick injuries among health care workers. There were a total of 30 doctors, 150 staff nurses, in Baquba teaching Hospital and 60 medical students in Medical College/ Diyala University.

Department of Community Medicine\ Diyala Medical College\ Diyala University *

Out of these, 30 doctors, 150 staff nurses were selected by stratified random sampling and all the medical students (final two years) were selected. The medical officers selected consisted of staff from internal medicine, general surgery, anaesthesia, orthopaedics, urology, and pathology. Baquba teaching hospital is the state and referral hospital for the state of Baquba. It has 400 beds and 20 clinical specialties and various supportive services. It is also an institution for training of medical students. The survey research was carried out using a structured questionnaire. The questionnaires were divided into four parts. The first part consisted of questions on their socio-demographic characteristics and Hepatitis B immunization status. The other parts were on the prevalence study of needlestick injuries where the respondents were asked about their experience in handling needles and the prevalence of needlestick injuries in the past one-year. The respondents were also asked about their knowledge on blood borne diseases and standard precautions. For blood-borne diseases, the questions were about HIV/ AIDS, Hepatitis B and Hepatitis C and standard precautions; they were also asked about the different types of body secretions and the role of standard precautions in dealing with the body secretions. The questionnaires were also translated into Arabic in order to make interviewing easier especially among the nurses. The questionnaires were pre-tested among 15 medical students before they were used. The questionnaires were administered by using face-to-face interviews to ensure a good response rate and to ensure all questions were answered. Needlestick injury in this study refers to percutaneous injury caused by a needle or sharp instrument. Case of needle-stick injury means number of respondents experiencing needle-stick injury. Episode of needlestick injury refers to the number of needlestick injuries occurring in each case. There are occasions where a case may experience more than one episode of needlestick injuries. Prevalence of cases of needlestick injury is the total number of cases of needlestick injuries in one year (2009) divided by the total number of respondents and stated as a percentage. Prevalence of episode of needlestick injury is the total number of episodes of needlestick injuries in one year (2009) divided by total respondents in percentage. Data were entered into a personal computer and analyzed using SPSS Version 15.

Results

The study was carried out among 240 health care workers comprising 30 doctors, 150 staff nurses, and 60 medical students at Baquba teaching hospital (Table 1). All those selected agreed to the interview, giving a response rate of 100%

Table (1): Needle handling and types of procedures performed by respondents

Procedure performed	Doctors	Nurses	Medical students	Total

	(n=30)	(n=150)	(n=60)	(n=240)
Using hollow-bore needles	29 (96.6)	150 (100.0)	60 (100.0)	239 (99.6)
Using suture needles	27 (90.0)	24 (16.0)	56 (93.3)	107 (44.6)
Blood taking(venepuncture)	28 (93.3)	130 (86.6)	59 (98.3)	217 (90.4)
Setting drip	28 (93.3)	134 (89.3)	57 (95.0)	219 (91.3)
Parenteral injections	14 (46.6)	104 (69.3)	32 (53.3)	149 (62.1)
Suturing	26 (86.6)	62 (41.3)	50 (83.3)	138 (57.5)
Performing minor procedures	24 (80.0)	4 (2.7)	20 (33.3)	48 (20.0)
Assisting in surgery	12 (40.0)	18 (12.0)	46 (76.6)	76 (31.6)
Performing surgery	10 (33.3)	0 (0)	3 (5.0)	13 (5.4)
others	1 (3.3)	2 (1.3)	3 (5.0)	6 (2.5)

Based on this study, 239 (99.6%) respondents had handled hollow-bore needles in the past one-year. About 107 (44.6%) respondents had used suture needles before. Suture needles were mainly used by doctors (90.0%) and medical students (93.3%) compared to nurses (16.0%). Needles were most commonly used by respondents for blood taking (venepuncture) (90.4%), drip setting (91.3%), and giving parenteral injections (62.1%) (Table 1).

Table (2): prevalence of cases and episodes of needlestick injuries according to job category

Number (%)				
Exposure	Doctors (n=30)	Nurses (n=150)	Medical students (n=60)	Total (n=240)
Cases of needlestick injuries				
Total No. of needlestick injuries	14	28	15	57
Prevalence of cases	46.6	18.7	25.0	23.75
Episode of needlestick injuries				
Total No. of needlestick injuries	44	80	20	144
Prevalence of cases	146.6	53.3	33.3	60.0

The overall prevalence of cases of needlestick injuries was 23.8% (57 cases) i.e. 46.6% among doctors, 25.0% among medical students, and 18.7% among nurses (Table 2). There were a total of 144 episodes of needlestick injuries with episode ranging from 1 to 13 episodes. The overall prevalence of episode of needlestick injuries is 60.0% (Table 2). Prevalence of episode of needlestick injuries was highest among doctors (146.6%), followed by nurses (53.3%) and medical students (29.4%) (Table 2). Out of the 144 episodes of needlestick injuries, 110 (76.3%) episodes were due to hollow-bore needles. The prevalence of episode of hollow-bore needlestick injuries is 45.8%.

Table (3): Needlestick injuries according to procedures and stages of blood taking

Number (%)				
	Doctors (n=30)	Nurses (n=150)	Medical students (n=60)	Total (n=240)
Procedures				
Taking blood	27(90.0)	51(34.0)	21(35.0)	97(40.4)
Setting drip	0(0.0)	6(4.0)	3(5.0)	9(3.8)
Parenteral injections	0(0.0)	7(4.7)	0(0.0)	7(2.9)
Suturing	11(36.6)	0(0.0)	0(0.0)	11(4.6)
Performing minor procedure	6(20.0)	2(1.3)	0(0.0)	8(3.3)
Assisting in surgery	2(6.6)	2(1.3)	0(0.0)	4(1.6)
Others				
Stages of blood taking				
Removing needle cap	2(6.6)	20(13.3)	2(3.3)	24(10.0)
Recapping needle	15(50.0)	21(14.0)	8(13.3)	44(18.3)
Inserting needle into vein	2(6.6)	30(20.0)	5(8.3)	37(15.4)
Removing needle	0(0.0)	30(20.0)	1(1.6)	31(12.9)
Throwing needle	1(3.3)	10(6.6)	1(1.6)	12(5.0)
Putting blood sample into the tube	2(6.6)	5(3.3)	1(1.6)	8(3.3)
Others	1(3.3)	1(0.7)	0(0.0)	2(0.8)

Overall, the prevalence of episode of needlestick injuries occurred most commonly during venepunctures (40.4%), followed by suturing (4.6%) and setting drips (3.8%). Prevalence of episode of needlestick injuries during suturing was more common among medical officers (46.6%) compared to the other categories of health care workers (Table 3). Episodes of needle-stick injuries happen most commonly when the needle is recapped after blood taking (18.3%) and also while removing needle cap (10.0%) (Table 3).

Out of the 57 cases of needlestick injury, 30 (52.6%) of them wore gloves while doing procedures on patients. The other 27 cases (47.4%) did not wear gloves and gave reasons such as uncomfortable wearing gloves (14.1%), in a hurry (11.3%), unnecessary because patient was not a blood-borne pathogen carrier (4.2%), not able to palpate the pulses (4.2%), lazy (1.4%), allergic to rubber gloves (1.4%), no more gloves and no suitable size (1.4%).

Table (4): Reasons for reporting and not reporting exposures according to job category

Number of cases (%)				
	Doctors	Nurses	Medical students	Total
Reasons for not reporting				
Source thought not to be infectious	3(30.0)	10(20.0)	5(22.7)	18(21.9)
Incidence was not important	2(20.0)	2(4.0)	2(9.1)	6(7.3)
Worried about future consequences	2(20.0)	5(10.0)	5(22.7)	12(14.4)
Did not know who to report	1(10.0)	13(26.0)	5(22.7)	19(23.1)
Did not know injuries reportable	1(10.0)	20(40.9)	5(22.7)	26(31.7)
No of respondents	10	50	22	82
Reasons for reporting				
Worried about future consequences	4(50.0)	7(35.0)	5(50.0)	16(57.1)
Hospital policy	0(0.0)	0(0.0)	0(0.0)	0(0.0)
To seek further investigations	1(12.5)	10(50.0)	3(30.0)	14(50.0)
Responsibility	1(12.5)	3(15.0)	2(20.0)	6(21.4)
Incidence was important	2(25.0)	0(0.0)	0(0.0)	2(7.2)

No of respondents	8	20	10	28
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Reasons for making the reports were because they were worried about long-term consequences (57.1%), wanted further investigations to be done (50.0%), sense of responsibility to report (21.4%) and felt that the incidence was important to them (7.2%). For those who did not report, because it is not the hospital policy/rules requiring all needlestick injuries to be reported, the reasons given were because the patient's blood and body fluid could not be contaminated (21.9%), the incidence was not important (7.3%), worried about future consequences if known by administration (14.4%), did who to report to (23.1%), did not know injuries reportable (31.7). (Table 4). not know

Table(5): Hepatitis B immunization status of the respondents

Job category	Doctors (n=30)	Nurses (n=150)	Medical students (n=60)	Total (n=240)
Received hepatitis B vaccine				
Yes	25(83.3)	50(33.3)	10(16.6)	85(35.4)
No	5(16.6)	100(66.7)	50(83.3)	205(85.4)
Immunization status				
Complete	3(10.0)	15(10.0)	5(8.3)	8(3.3)
Not complete	27(90.0)	135(90.0)	55(91.6)	217(90.4)

85 respondents (35.4%) had already been vaccinated against Hepatitis B and (3.3%) completed the vaccination schedule (Table 5). 205 respondents were not vaccinated and reasons given for non-vaccination were that they already have antibody towards Hepatitis B, did not know their Hepatitis B status, or were busy and had not had time to go for vaccination.

Respondents were asked how often they practice standard precautions. The result shows that the majority of respondents have the correct practices in standard precautions. However, there are still respondents who have the wrong practices such as recapping needle after use, bending needle after use, detaching needle from syringe after taking blood to transfer the blood from syringe to containers and throwing used needles and syringe into the normal dustbin.

Discussion

This study showed that needlestick injuries are a potentially serious threat to health care workers. Of concern is the risk of exposure to blood-borne pathogens, including hepatitis B and C viruses (HBV and HCV) and human immunodeficiency virus (HIV). Thirty five percent of the health care workers in this study reported HBV immunization. In the study by Norsayani et al. [5], the immunization rate was 93% and only 10.1% did not complete the 3 doses. However, in this study about 85% of the respondents did not complete the immunization schedule. This is of concern because this may result in an inadequate antibody response and as a result the health care workers are not fully protected. The respondents may also have a false sense of security and may not use appropriate prophylaxis after exposure to HBV. The study also showed that health care workers in the hospital, despite the awareness of HBV infection are noncompliant for HBV vaccination. This means that there is a need for a more aggressive approach to the vaccination of health care workers because a significant percentage of them are not fully protected.

Hollow-bore needles accounted for the highest proportion of sharp object injuries in this study (46.0%), corresponding to findings in another study by Ng et al. [7]. The prevalence of exposures of hollow-bore needlestick injuries was highest among doctors (46.6) followed by medical students (25.0%) and staff nurse (18.7%). The prevalence of exposures of hollow-bore needlestick injuries among medical students in this study is equal to that shown in the study by Norsayani et al. where the prevalence rate was 20.9% [5]. Hollow-bore needles (the type of needle used for giving injections or drawing blood) is important because they are implicated as the devices most often associated with the transmission of blood-borne pathogen infections [8].

In this study, prevalence of cases of needlestick injuries among the 240 respondents is 23.8%. It involves 57 cases i.e. 14 cases (46.6%) among doctors, 15 cases (25.0%) among medical students, and 28 (18.7%) cases among nurses. In term of episodes, there were a total of 144 episodes of needlestick injuries. Doctors have the highest prevalence of episode (146.6%) of needlestick injuries compared to nurses (53.3%) and medical students (33.3%). The same finding has been shown in a study by Newsom and Kiwanuka in a Ugandan teaching hospital which found that interns suffered more needlestick injuries than any other occupational group [9]. However, in one study from Italy by Ippolito et al., where data regarding a total of 1,592 exposures reported in 1,534 workers, showed that nurses were the most commonly exposed hospital personnel (67.2%) followed by physicians and surgeons (17.5%) [1]. The differences in distribution of injuries among health care workers most likely reflect differences in level of exposure to the needlesticks. A study done by Naing et al. revealed that the prevalence of needlestick injury among medical students was 24.7% [10]. The result showed a similar picture to the prevalence of injuries among student health care workers in

this study. Medical students generally were at somewhat lower risk compared with medical officers. This result illustrates the importance of targeting prevention efforts to specific groups, such as doctors.

Since the study depends on the respondents to recall cases and episodes of needlestick injuries in the past year, this may result in recall bias as respondents may not be able to remember. They may give socially desirable responses especially when asked about practice of universal precautions. Hence, the results in this study must be interpreted with consideration of recall bias and socially desirable response as reports of occupational exposures and infection control practices may not be accurate.

The commonest cause of episode of needlestick injury was during the process of venepuncture (44%). Nineteen percent of the reported episodes of needlestick injuries when taking blood were due to recapping the needle. This figure is still high considering that recapping of needles should be prohibited. In another study among medical students, 92% of the needlestick injuries occurring during venepuncture were also due to recapping of the needle [10]. A study carried out by Jagger et al. showed similar findings where one third of the injuries were related to recapping of used needles [11]. Heald and Ransohoff reported that recapping of needles was the cause of needlestick injury in 38% of non-surgical residents [12]. Competing hazards were often cited as reasons for recapping [11]. They included the risks of disassembling a device with an uncapped, contaminated needle and the difficulty of safely carrying several uncapped items to a disposal box in a single trip. Devices should be designed so that the worker's hand remain behind the needle as it is covered, the needle should be covered before disassembly of the device, and the needle should remain covered after disposal [12,13]. Safety devices have been demonstrated to reduce needlestick injuries by 23–85% [12, 13, 14].

Twenty seven percent of the needlestick injury cases did not wear gloves and gave reasons like in a hurry, uncomfortable wearing gloves, not able to palpate the pulses, lazy, unnecessary because patient not high risk, allergic to rubber gloves, no more gloves and no suitable size. Gloves protect against blood and body fluid skin contamination and reduce the volume of material transferred to the skin in case of needle stick. They should be worn by all health care workers when exposure to blood or body fluid is anticipated.

Only 23.75% of all episodes of needlestick injuries were reported by those reporting. The episodes reporting rate is much lower than the cases reporting rate because many respondents in this study had been exposed more than once and did not report all their injuries. The results of the

episodes reporting rate in this study are higher than previously documented rates by Resnic and Noerdlinger (11.2%) and O'Neill et al. (9%) [14,15]. In India Ministry of Health hospitals, all cases of needlestick injury must be reported within 24 hours to the Head of Department or the Infection Control Team or to the Safety and Health Committee [16]. However, this is just a guideline for health care workers and reporting is purely voluntary. Hence, the prevalence of reported and non-reported sharps injuries remains uncertain. Until health care workers acknowledge the importance of reporting such incidents, the size of the problem cannot be accurately determined.

For those who did not report, the main reason given was because "the patient's blood and body fluid could not be contaminated". The reason "not infectious" was also quoted by Resnic and Noerdlinger as one of the main reason for not reporting [14]. The implication of this result is that a large segment of individuals exposed to sources with unknown HIV status are making the judgment that the patient is in fact HIV negative. This is contradictory to the principles of universal precautions, mandating that all patients be considered infectious. The concept of universal precautions i.e. all patients should be treated as infective using appropriate infection control procedures, because infected patients cannot always be identified is very important to prevent infection [17].

The "prevalence was not important or insignificant", "worried about future consequences if known by administration", "too complicated and too many forms to fill when reporting", "embarrassed", and "it was only a minor injury" were the other reasons given. Reasons stated for not reporting injuries indicate a need for continued education in the risk of acquiring blood-borne pathogens from such injuries. Some of them did not know that needlestick injury needs to be reported and did not know to whom and how to report. In this study, no reports were made to various people including the Sister-in-charge of ward, Head of Department, nurses, specialist and medical officer. This shows the lack of clear guidelines on how reporting of cases should be done and to whom they should report to. This findings also agree with previous studies by Norsayani et al., O'Neill et al. and Resnic et al. that students frequently cited "did not know how to report" as a reason for not reporting [5, 14, 15]. This result highlights the need for educating the new members of clinical teams and medical students on the procedures for reporting exposures. Efforts may need to be made to simplify the reporting process. Hospital may be able to increase rates of reporting of percutaneous exposure to blood by developing programs that are easy to access and efficient.

In this study, medical officers form the largest group that underreports episodes of needlestick injuries. Health care workers, especially doctors, may not report needlestick injuries if they fear that

their medical practice would be affected if they contract an infectious illness and that information becomes public.

Less than half of the medical students obtained their knowledge on universal precautions from formal lectures. This is low compared to another study where 77.5% of the students acquired their knowledge through formal lectures [5]. Their main source of knowledge appears to be from other health care personnel (informal). More emphasis should be given to the teaching and training of universal precautions through formal lectures to the medical students to ensure students understanding of the universal precautions guidelines. Ideally this should be given in their pre-clinical years before they start performing procedures on patient.

There are also still a large percentage of the respondents who still have the wrong practice of universal precautions. Generally, recapping of needles by health care workers is not recommended and prohibited. Education of health care workers about occupational risks and adherence to universal precautions in infection control are important to prevent exposure to blood-borne pathogens.

Knowledge of blood-borne diseases and universal precautions did not seem to influence cases of needlestick injuries. There was no difference in knowledge on blood-borne diseases and universal precautions between cases and non-cases of needlestick injuries. However, this does not mean that education on blood-borne diseases and universal precautions can be neglected. Knowledge of both these subjects is very important and can lead to increase compliance with practice of universal precautions.

Conclusion

1. This study showed that accidental needle stick injuries by health care workers are very high and at high risk for occupational exposure to blood-borne pathogens.
2. A high prevalence of cases and episodes of needlestick injuries among health care workers because they do not fully practice standard precautions although they have adequate knowledge of it.
3. Rate of underreporting is also very high among the health care workers.
4. All health care workers must be properly trained in infection control, for example, on the safe use and disposal of needles and sharps at the earliest opportunity. Modification of work practices such as appropriate handling of needles, the adoption of the concept of

universal precautions, and compliance with use of personal protective barriers should be emphasized.

5. Universal precautions should be included in the training curriculum of medical students and nurses.
6. There is a need to ensure all health care workers complete the 3 doses hepatitis B immunization.
7. Procedures for reporting of needlestick injuries should strengthen and made very clear to all health care workers.
8. There is a need of Infection Control Team or the Safety and Health Committee in Baquba teaching hospital.

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