Needlestick injuries among nurses in a regional hospital in South Africa

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ABSTRACT

Needlestick injury in healthcare settings is a global issue, with the preponderance of these injuries among nursing staff being a common occurrence. A cross-sectional study was conducted on 202 nurses in a regional hospital using a 17-item anonymous self-administered questionnaire to describe the epidemiology of self-reported needlestick injury in a one-year period. Thirty-eight nurses (18.8%) indicated that they had had needlestick injuries in the previous 12 months. Most (78.3%) needlestick injuries occurred in wards with syringe needles being the most common causative device, while 28.9% occurred during recapping of needles. The majority of respondents (90.1%) were aware of the hospital policy on needlestick injury. Although needlestick injuries were prevalent at a low rate, only 50% were reported. It remains an important workplace hazard that needs on-going attention such as training, as it could be the cause for diseases, for example HIV and hepatitis B, among nurses.

Key words: self-reported needlestick injuries; nurses; regional hospital; prevention; training; knowledge

INTRODUCTION

Needlestick injuries remain a potentially life-threatening occurrence for healthcare workers (HCWs) globally and up to 16 billion healthcare injections administered annually are unnecessary.[1] These actions result in an increased risk for blood-borne infections making needlestick injuries the most common source of occupational exposure to blood and blood-borne infections globally.[2-4] A healthcare worker's risk of contracting HIV after an accidental needlestick injury from a HIV-positive source is 0.1-0.4% or 1 in 250, 5% for HBV and 3.5% for HCV.[5,6] The WHO reported in 2002 that an estimated 2.5% of HIV cases and 40% of hepatitis B and C cases among healthcare workers worldwide could be attributed to the occupational exposure to blood-borne infections.[7]

The preponderance of needlestick injuries occurring in nursing staff is a common feature of studies around the world.[2,3] This category of healthcare worker has presented the highest HIV seroconversion rates[8] with figures around two thirds of disease seroconversion following needlestick injury.[9] The majority of needlestick injury statistics and research globally used the data from officially reported incidents and such an approach may not accurately portray workplace events.[10] Not all needlestick injuries are reported and surveys suggest that between 60% and 80% of nurses do not officially report their needlestick injuries.[3] A study conducted in India found that only 37.4% of nurses reported their needlestick injuries to a supervisor.[11] In South Africa, 31-38% of nurses and doctors did not report their needlestick injury.[12] Anonymous self-report surveys have become increasingly common for establishing the epidemiology of needlestick injuries in hospital environments.[9] The majority of studies on needlestick injuries are conducted on healthcare workers in larger hospitals such as tertiary institutions.[6,8,9] Nursing staff have the highest risk

for sharps-related injuries in the workplace of any health professional group.[13] Few studies have been conducted on the safety climate towards the risk of needlestick injuries.[14] It was found that several aspects within the safety climate of an organisation contributed towards the risk of needlestick injuries.[15] Certain barriers to promote a safety climate could be found in smaller facilities.[16] It was therefore decided to use an anonymous self-administered questionnaire in a regional hospital, as it would provide a better reflection on the actual incidence.The purpose of the study was to describe the epidemiology of self-reported needlestick injury in a one-year period. The objectives were to:

- determine the demographics of nurses, frequency, circumstances, reporting as well as most common devices causing needlestick injuries among nursing personnel;
- assess the knowledge regarding diseases caused by needlestick injuries, measures to be taken following needlestick injuries and awareness about needleless safety devices, during a one-year period.

METHODOLOGY

A cross-sectional study was conducted. The study population consisted of 354 nursing personnel working in a regional hospital. The nursing personnel not involved in the direct management of the patients (e.g. nursing managers, tutorial staff) were excluded. A 17-item anonymous self-administered questionnaire was developed based on literature and was distributed among 330 nurses in 2008. The questions aimed to collect data on aspects such as demographic details of the participants, needlestick injuries in the previous 12 months, type of device and procedure associated with the injuries, reporting of the injury, and the work area where the needlestick injuries occurred. The research project was piloted among ten nursing staff of two local clinics and a few minor changes were made to the questionnaire.

Wards/departments with poor response rates were continuously motivated throughout the duration of the study. Data obtained were entered into an Excel spreadsheet and summarised using frequencies and percentages. Associations were investigated using chi-squared or Fisher's exact tests at 5% level of significance.

The study was approved by the Ethics Committee of the Faculty of Health Sciences, University of the Free State, and permission was obtained from the Department of Health and Social Services, Limpopo Province.

RESULTS

There were 202 completed questionnaires out of the targeted 330, giving a response rate of 61.2%. Table 1 shows the demographic profile of participants. Females comprised 89.1% (n=180) of the participants. The median age of the respondents was 34.5 years (range 21–65 years) and 40.6% were aged between 21 and 30 years. Work experience

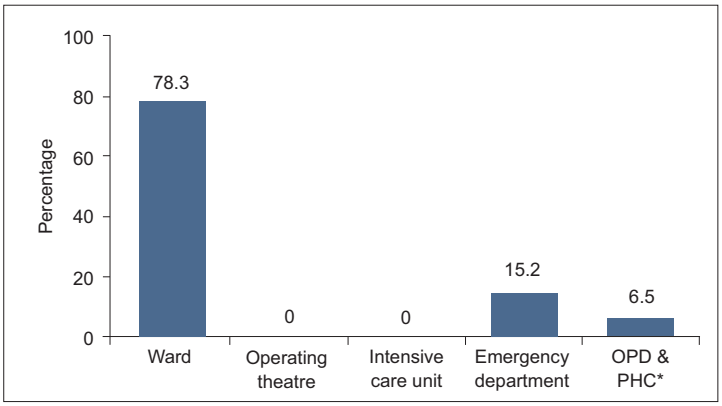
Table 1. Demographic characteristics of nursing personnel (participants) (N = 202)

Demographic characteristics		Number	Percentage
Gender			
Male		22	10.9
Female		180	89.1
	Total	202	100.0
Age (in years)			
21–30		82	40.6
31–40		46	22.8
41–50		48	23.8
51–60		23	11.4
≥ 60		3	1.4
	Total	202	100.0
Nursing experience (years)			
1–4		92	45.5
5–9		36	17.8
10–14		8	4.0
15–19		14	7.0
≥ 20		52	25.7
	Total	202	100.0
Nursing level			
Professional nurse		83	41.1
Enrolled nurse		47	23.3
Enrolled nursing assistant		72	35.6
	Total	202	202.0

"... surveys suggest that between 60% and 80% of nurses do not officially report their needlestick injuries."

among the participants ranged from one to 41 years, whilst 45.5% had 1 to 4 years' experience. Professional nurses accounted for 41.1% (n=83) of the respondents, followed by enrolled nursing assistants (35.6%; n=72). The target population consisted of 97 professional nurses (29.4%), 102 enrolled nurses (30.9%) and 131 enrolled nursing assistants (39.7%). A possible limitation of the study was not being able to obtain more demographic data on the staff establishment of the hospital.

A total of 38 nurses (18.8%) reported 48 needlestick injury events in the 12 months preceding the study, accounting for a rate of approximately 0.24 needlestick injury events/nurse/year, while only 50% (n=24) of these needlestick injuries were officially reported. Nine (23.7%) of the 38 nurses had more than one needlestick injury in the previous year. The majority (n=36, 78.3%) of the needlestick injuries occurred in the wards with 15.2 % (n=7) occurring in the emergency department (Figure 1). The most common device involved in needlestick injuries was a syringe needle,



*OPD & PHC: outpatients department and primary healthcare

Figure 1. Hospital location where needlestick injury occurred (n=46; two participants did not mention the location on the questionnaire)

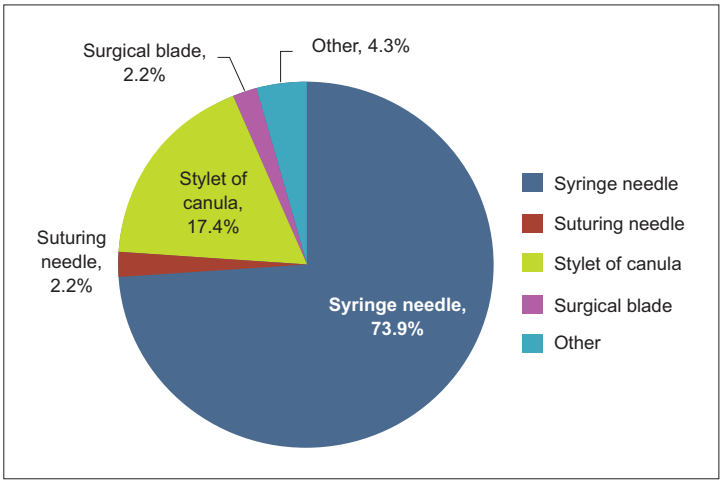


Figure 2. Device responsible for needlestick injury (n=46*) (*Two participants did not mention the device on the questionnaire)

Table 2. Procedure or incident related to needlestick injury (n=45*)

Procedure or incident	Number	Percentage
Recapping a needle	13	28.9
During surgery/suturing	0	0
Putting up IV line/administering injections	8	17.8
While managing a restless patient	10	22.2
Hidden sharp	2	4.4
Collision with a colleague	0	0
During disposal of used item	8	17.8
Cleaning up after a procedure.	1	2.2
Others	3	6.7

*Three participants did not mention the procedure on the questionnaire.

which accounted for 73.9% (n=34) of all needlestick injury events, followed by the stylet of a canula (17.4%; n=8). In two (4.3%) events, a blood glucose lancet was involved. Results with regard to causative devices involved in needlestick injuries are shown in Figure 2. Recapping a needle was the most common activity responsible for needlestick injury, accounting for 28.9% of needlestick injury events, and managing a restless patient accounted for 22.2%. Putting up an intravenous (IV) line or administering injections and disposal of the used item were responsible for 17.8% events, while 6.7% was caused by other activities which included drawing blood from a patient and monitoring a patient's blood glucose (Table 2).

Table 3 shows that 89.6% (n=181) of the participants had a history of receiving a vaccine against hepatitis B virus. Slightly more than 60% (n=109) of these 181 participants had received three vaccinations, 37% (n=67) less than three and 2.8% (n=5) had received more than three. Only 12.1% (22) went for laboratory tests to determine their antibody response after hepatitis B vaccination.

With regard to knowledge and practices and preventive measures by nurses (Table 4), 67.8% (n=135) of respondents knew about needleless safety devices and 90.1% (n=182) of participants stated that they were aware of the hospital's policy on needlestick injury. Most of the participants (70.3%; n=142) never recapped used needles. Concerning diseases transmitted by needlestick injuries, 82.2% (n=166) knew that hepatitis B could be transmitted by needlestick injury, while 97.0% (n=196) and 21.8% (n=44) indicated that HIV and hepatitis C respectively could be transmitted by needlestick injury. Table 4 shows the results with regard to measures that would be taken following a needlestick injury.

Professional nurses were significantly more likely to have been vaccinated against hepatitis B (95.2% compared to 89.4% and 83.3%, p=0.05), to never recap needles (83.1% compared to 66.0% and 58.3%, p=0.01) and to know about needleless devices (79.0% compared to 63.8% and 57.8% respectively, p=0.02) than enrolled nurses and enrolled nursing assistants, respectively. Significantly fewer enrolled

nursing assistants (66.7%) knew that hepatitis B could be transmitted by needlestick injuries than professional nurses (97.8%) and enrolled nurses (87.2%) ($p<0.01$).

DISCUSSION

The 18.8% of nurses in this study who had suffered at least one needlestick injury in the 12-month period preceding the investigation, is in line with a study in an Australian hospital.[4] Higher rates ranging between 50% and 90% were documented in a study among nurses in Turkey.[17] It must, however, be noted that the rate of needlestick injuries could vary from "high to epidemic"[1] among healthcare workers, depending on the availability of resources as well as the work environment.[17] In our study, the crude needlestick rate was 0.24 needlestick injury events/nurse/year, which was quite low when compared to a rate of 1.31 among Korean nurses[3] and 4.9 among nurses in Egypt.[18]

This study confirmed that syringe needles are the most common causative device as it accounted for 73.9% of all needlestick injury events at this regional hospital. A similar percentage (72%) was documented among healthcare workers in a tertiary hospital in Korea.[19] Another study showed that syringe needles were responsible for as high as 92% of needlestick injury events among nurses.[20] However, not all studies showed such high percentages of needlestick injuries associated with syringe needles. A study conducted in Singapore[21] indicated that syringe needles are responsible for about 23.2% among healthcare workers, compared to 52% among professional nurses in Korea,[3] as well as in Australia.[4] In our study, it was found that the knowledge of measures to be taken following a needlestick injury was inadequate.

The majority (78.3%) of needlestick injury events in this study occurred in the wards, which is similar to findings worldwide.[3,4,21] Needlestick injuries in operating rooms were found to be common in other studies,[5,20,21,22] although it accounted for no injury in this study. This could be explained by the hospital's policy of not allowing nurses to assist doctors in surgical procedures, except in emergencies.

International research has yielded conflicting results with regard to circumstances surrounding needlestick injuries; for example, an American hospital study has shown that the highest needlestick injury rate occurred "after use and before disposal".[4] In our study, 28.9% of needlestick injury events occurred while recapping a needle. Recapping needles is a high-risk activity regarding needlestick injury and the most common cause of needlestick injuries.[4] This result might not be surprising as 29.7% (n=60) of nurses in the current study sometimes or always recapped used needles. In the USA the recapping of needles has been prohibited under the Occupational Safety and Health Administration (OSHA) blood-borne pathogen standard.[23] However, the effect of the legislation has not been described.

Table 3. History of hepatitis B virus vaccination amongst participants

Hepatitis B vaccine history		Number	Percentage
Have you ever been vaccinated for hepatitis B in the past?			
Yes		181	89.6
No		21	10.4
	Total	202	100.0
Did you ever check antibodies to hepatitis B surface antigen?			
Yes		22	12.1
No		159	87.9
	Total	181	100.0
Number of hepatitis B vaccinations received			
1		22	12.1
2		45	24.9
3		109	60.2
4		3	1.7
5		2	1.1

"... 18.8% of nurses in this study ... had suffered at least one needlestick injury in the 12-month period."

Not all needlestick injuries are reported by healthcare workers, and some studies[1,17] found that reported needlestick injuries represented 8%–30.9% of all needlestick injuries. Half (50.0%) of the needlestick injuries were reported in this study. Although the low rate of reporting is an important finding of the study, it was lower than in other studies. This reporting behaviour among healthcare workers could be influenced by the fact that 90.1% of respondents were aware of the hospital's policy on needlestick injuries, which includes the need to report any such injuries. The study did not determine what the participants knew about the content of the policy and could therefore not be regarded a true reflection of the knowledge of the participants.

The hospital has a policy of offering employees hepatitis B vaccination at no cost, although only 60.2% of the participating nursing staff received the recommended minimum of three doses of the vaccine. It is advised to perform post-vaccination testing for certain categories of healthcare workers.[24] If such healthcare workers have a negative response after the initial immunisation schedule, a second three-dose vaccination schedule should be considered, as studies found that 44–100% of the initial non-responsive individuals did respond to a three-dose revaccination series. [25,26] The results of this study showed that only 12.2% had checked antibodies to hepatitis B surface antigen after the vaccination, although 2.8% of participants who received more than three vaccinations were not included in this group. It should be noted that the hospital does not make provision for post-vaccination antibody testing because of the financial implication based on the cost quotations received from the laboratory. The non-testing for antibodies of immunised employees found in this study is not unique to this hospital and has also been demonstrated in other studies.[27,28] However, it is recommended to test for antibodies after an immunised employee sustained a needlestick to ascertain the immune response of the injured healthcare worker[29] and to adhere to legislation requirements ensuring the safety of employees.

A positive aspect of the study was the fact that a high proportion of the participants knew that needlestick injury would transmit hepatitis B and HIV (82.2% and 97.0%, respectively). However, there was a lack of knowledge among participants regarding hepatitis C (21.8% being aware that needlestick injury could transmit this virus). This lack of knowledge could have a major impact on the behaviour of healthcare workers. The high level of knowledge regarding needleless safety devices (67.8%) was a positive outcome of this study. The use of a needleless safety device is not common in the hospital investigated in this study, but taking into consideration the high level of knowledge among nurses, it could be viewed as an alternative method to reduce needlestick injuries.[30]

A major limitation to this study was the low response rate especially from enrolled nurses and nursing assistants, and therefore the outcome of the study might not be a true reflection of the entire population of the nurses in this hospital. However, given the anonymity of the questionnaire, participants could have answered with no fear of being linked to their response and this might also have promoted the accuracy of the answers, hence recommendations could still be made based on the results obtained.

CONCLUSION AND RECOMMENDATIONS

Overall, the result of this study revealed that needlestick injury occurred at a lower rate when compared to other studies, and consequently the risk of blood-borne infection via needlestick injury might be lower. The high proportion of needlestick injury that was reported in comparison to other studies, was encouraging. The majority of the needlestick injury events occurred in the ward, with syringe needles being the most commonly involved causative device, and most events occurring during the recapping of used needles. The knowledge about needleless safety devices was high and should be used to the advantage of the hospital. Measures taken to prevent hepatitis B virus were inadequate and

also knowledge with regard to some aspects of diseases caused by needlestick injury. The recommendations from the study are:

- An on-going education programme on safe working practices including safe handling and disposal of sharp objects should be designed with periodic evaluation of such programme.
- An administrative policy prohibiting the recapping of needles must be instituted.
- Nurses should be involved in the evaluation and selection of an appropriate needleless safety device, training and on-going training in its appropriate use, as well as on-going evaluation of the usability and acceptability of such a device.
- Staff members should be involved in the planning of systems to improve the reporting of needlestick injuries so that appropriate protective measures can be taken.
- Measures should be put in place to ensure that the recommended course of hepatitis B vaccination is followed; this should include exploring how checking of antibody to hepatitis surface antigen could be made possible, and providing this at a subsidised rate should be considered, given the importance of the knowledge of one's immunity to the success of this immunisation.

Table 4. Knowledge, practices and preventive measures taken by nurses regarding needlestick injuries

Preventive measures	Number	Percentage
How often do you recap needles?		
Sometimes	48	23.8
Always	12	5.9
Never	142	70.3
Total	202	100.0
Which diseases are transmitted by needlestick injuries?		
Hepatitis B	166	82.2
Tuberculosis	5	2.5
Hepatitis C	44	21.8
AIDS/HIV	196	97.0
Meningitis	63	31.2
Ebola virus	63	31.2
Other	3	1.5
Hepatitis B & AIDS/HIV with no incorrect choices	97	48.0
Measures to be taken following needlestick injury		
Wash injury with soap and water	94	46.5
Allow injury to bleed	175	86.6
Notify infection control office	194	96.0
Apply antiseptic to injury	40	19.8
All of the above measures	25	12.4
Do you know about needleless safety devices?		
Yes	135	67.8
No	64	32.2
Total	199*	100.0
Do you know the hospital's policy on needlestick injury?		
Yes	182	90.1
No	20	9.9
Total	202	100.0

*Three participants did not answer the question.

• It might be beneficial in future to follow a group of nurses over a 12-month period in order to get a higher response rate and a less biased outcome.

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LESSONS LEARNED

- Needlestick injuries among healthcare workers in South Africa should not be ignored as unacceptable practices such as re-capping of syringe needles caused the majority of injuries in this study.
- A health promotion programme on the safe use and risks regarding needles should be presented to healthcare workers on a continuous basis as knowledge relating to the appropriate measures following a needlestick injury was poor.
- Hospitals should ensure that formal reporting procedures for needlestick injuries are in place and made known to all employees. Actions are required to encourage reporting as many nurses did not report their needlestick injuries.
- The hepatitis B vaccination programme for healthcare workers should be in line with evidence-based medicine and healthcare workers should be encouraged to complete the vaccination course.

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