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EURASIAN EXPERIMENT JOURNAL OF MEDICINE AND MEDICAL SCIENCES (EEJMMS) ISSN: 2992-4103
©EEJMMS Publications Volume 4 Issue 2 2023

Prevalence of Surgical Injuries, Commonest Causes of the Same, and Uptake of PEP amongst Health Workers at Jinja Regional Referral Hospital

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ABSTRACT

A needle stick surgical injury is said to have occurred if a medical practitioner punctures the skin with a needle or sharp instrument in contact with a patient's blood. The splashing of blood or other body fluids onto the conjunctiva is also included. To determine the prevalence of surgical injuries, the commonest causes attributed to the same, and the uptake of PEP among health workers at Jinja Regional Referral Hospital, a descriptive cross-sectional retrospective study was used with 168 documents reviewed. The study revealed a significant number of healthcare workers (HCWs) experiencing needle stick accidents, with the majority of these being nurses (35%) and interns (20%). Thirty-eight percent (38%) of accidents occurred in the procedure rooms and 29% in the inpatient departments, with 20% of the injuries occurring in the theater. The majority (48%) of the injuries occurred during the night shift when HCWs were on duty. Surgical needle manipulation (23%), disposal (17%), and IV access (15%) were the primary processes responsible for most injuries. Syringe needles accounted for 36% of injuries, followed by suture needles at 26%, phlebotomy needles at 15%, IV cannulas at 12%, and scalpels at 11%. Sixty-eight HCWs were started on PEP after the needle stick injury, with 58 of them recovering well and only four acquiring an infection. Additional courses are required for HCWs who are less experienced. Safety guidelines need to be posted in visually accessible locations in both procedure rooms and inpatient wards, as most injuries occur there, allowing for easy reference in case of need. Strict and proper scheduling of staff with adequate breaks after long working hours is necessary to avoid fatigue. Closer monitoring and possible daily counseling for workers initiated on PEP treatment are recommended.

Keywords: Needle stick, Surgical injury, HIV, Health worker, PEP.

INTRODUCTION

A needle stick surgical injury is said to have occurred if a medical practitioner punctures the skin with a needle or sharp instrument in contact with a patient's blood. Splashing blood or other body fluids onto the conjunctiva is also included[1]. Needle stick surgical injuries are the commonest route by which blood-borne viruses and infections such as HIV, Hepatitis B, and C are transmitted from patients to healthcare workers[2, 3]. Medical students are also at risk of such infections and injuries due to accidental contamination during their practical occupational exposure [2, 4]. It is, therefore, important to have occupational health measures in place to reduce the number of incidences medical professionals and medical students have during their work. One of these measures is the implementation of protocols that must be followed in cases where occupational health measures have failed. This is aimed at reducing the risk of transmission of pathogens from the patients to the health workers at risk. Two things are, therefore, involved: the common causes of needle prick injuries and the uptake of PEP after the accidents have occurred [5]. Cases of new infections from blood-borne pathogens spread in such a manner are still on the rise among health workers worldwide, and the question still remains: are the occupational health measures effective enough, or is there poor compliance with PEP uptake? [6]. Salelkar *et al.* [7] found out that around 34.8% (200/575) of the healthcare workers had experienced a needle stick injury in the last year. Aslam *et al.* [8] estimated that participants with a history of at least one-time NSI were found in 66% of the respondents, and around 13% of them had one or more needle stick injuries in the previous month at work, with half of them being affected by non-sterile needles. None of them sought medical care. Khader *et al.* [9] in their study, found out that of those that were injured, 77.9% did not report the injury for various reasons.

In one study, out of the 98 surgeons in the hospital, 44% anonymously admitted to having a needle-stick injury. Only 3 of those who sustained a needle-stick injury said that they followed the agreed local policy. Twenty-three surgeons performed first-aid-type procedures, such as informing the scrub nurse and changing needles and gloves. Seven

surgeons simply ignored the incident and continued [10].Reporting is one other aspect that needs to be practiced; however, this seems not to be followed, and this, therefore, needs to be enforced to abate the transmission of infection. Therefore, there is a paucity of information regarding compliance with needle stick injury protocols in Uganda, which necessitates further investigations. Acquiring diseases through accidents during work from blood-borne pathogens should be history in our current society; however, it is still an issue ranging from senior health workers to medical students, thus placing us in an unfavorable position. This causes psychological torture to those involved, significant financial burdens for both the hospital management and governments, and leads to labor inefficiency. A number of medical practitioners temporarily leave work after being involved in a needle prick accident due to emotional distress [11]. In the event that they acquire an infection, significant direct and intangible costs would be incurred [12]. Mannocci *et al.* [12] showed that direct costs include testing the source and exposed medical personnel, post-exposure medical visits, and treatment, as well as annual treatment costs and lifetime medical costs for HBV ($3,600 and $31,306, respectively), HCV ($24,424 and $23,173, respectively), and HIV infection ($35,745 and $441,342, respectively).

According to Bekele *et al.* [13], the prevalence of lifetime needle sticks and sharp injuries was 37.1% among healthcare workers (HCWs) in southern Ethiopia. In another study by Dilie *et al.* [14] when queried, 18.7% of the respondents encountered needle sticks and sharp injuries in the last year. These statistics are quite concerning, with high prevalence rates in most studies, indicating a need to identify common causes.

In a study by Mideksa and Feyera [15], they revealed that 30.1% of healthcare workers experienced needle-stick injuries within the last year. The commonest factors associated with the occurrence of injuries were work experience, the ward they worked in, knowledge of standard precautions, average hours involved in work, and organization with policy/protocol. All these observations provide evidence that needle-stick injuries are a common problem among HCWs in studied health facilities, suggesting a need for hazard identification and the implementation of a comprehensive prevention program to reduce needle-stick injuries. Optimizing current needle prick protocols or adopting new, more effective protocols is crucial for the continued effectiveness of the personnel and health systems. This report explores the prevalence and common causes of needle-stick injuries (NSI) and suggests steps for effective implementation

METHODOLOGY

Study Design

The research design used for this study was a descriptive retrospective cross-sectional study[16]. The retrospective design was chosen because it is less time-consuming, and data were collected more easily. It enabled the assessment of the sample population at one point in time without attempting to make interference. Additionally, it provided a way to gather information regarding a specific condition or disease and to study the patterns and connections between different variables in order to plan for future interventions.

Area of Study

The study was conducted at Jinja Regional Referral Hospital in Jinja District, located in Eastern Uganda. It has a total average population of 300 people, including doctors, nurses, interns, support staff, and students.

Study Population

It involved the populations of support staff and medical personnel—doctors, nurses, interns, and medical students—who worked at JRRH in the previous 5 years. These were chosen so that a wider variety of staff could be assessed for their involvement.

Sample size determination (Morgan'stable)

Morgan's table was used for sample size determination due to its ease. Based on the population size of 300 persons, considering a confidence of 95% and an error of 5.0%, a population size of 169 people was considered.

Inclusion and exclusion criteria

Medical personnel who had NSI between the years of 2013 and 2018 and the years before these were not considered.

Definition of variables

This study will include the prevalence of common causes of needlestick prick injuries and uptake of PEP among HCWs in JRRH.

Research Instruments

Data collection forms were used in this study because it is a retrospective study and data was collected from the administrative data center

Data collection method

Data collection forms were filled with input from the data centre.

Data Processing and Analysis

SPSS 21 and MS Excel 2013 were used in the proper analysis of the data.

Data Presentation

Study results were presented on pie charts, bar graphs, and tables. Descriptive statistics were used, where percentages for each point of interest are calculated to give the lesson learned and conclusion.

RESULTS

Data were reviewed for the years 2014– 2018, and all were for the HCWs that had had an NSI and had reported to the relevant authorities.

Incidence of NSIs

Table 1

Year	No. of injuries	%
2018	29	17
2017	38	23
2016	28	17
2015	40	24
2014	33	20

Table 1 shows the number of injuries that occurred over the years 2014 – 2018. The majority of the cases (24%) occurred in 2015. The least injuries (17%) occurred in 2016. In 2014 20% of the total cases occurred and 23% of cases occurred in 2017. By the time of the research, 17% of cases had occurred in 2018 and probably many more could occur as the year comes to an end.

Figure 1: Percentage number of injuries

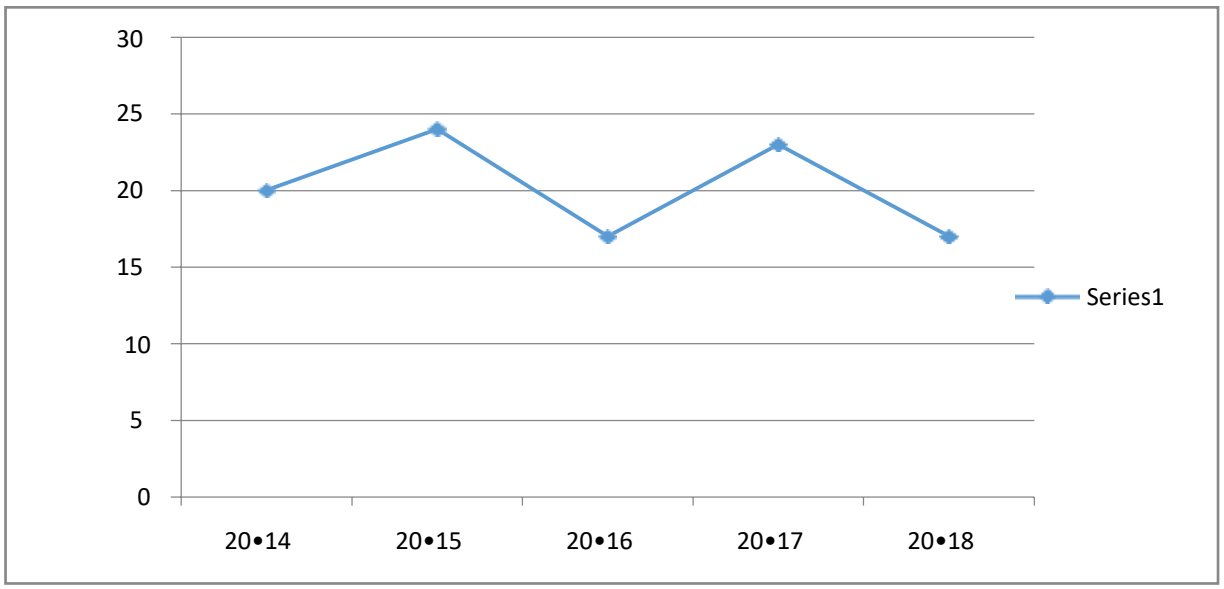

Figure 1 shows a fairly consistent rise and fall in the percentage number of injuries that have occurred over the years with a percentage difference of at least 5%.

Occupational groups and injuries

Figure 2: Percentage Injuries in different occupational groups

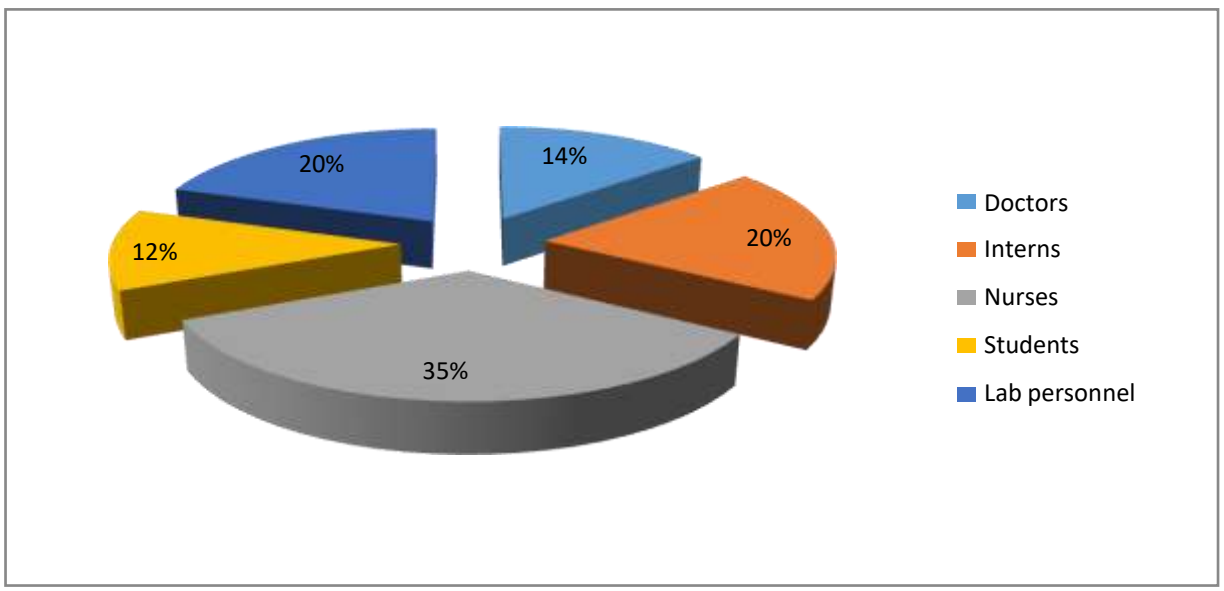

Figure 2 shows the percentage number of injuries among the different occupational groups with the majority of injuries, 35% (59 of the documents reviewed) occurring among the nurses. Then 20% (33 of the reviewed documents) among the interns, 20% (33 of the reviewed documents) among the lab personnel and 14% (23 of the reviewed documents) and 12% (20 of the reviewed documents) among the doctors and students respectively.

Common Causes of NSIs

Figure 3: Where injuries occur

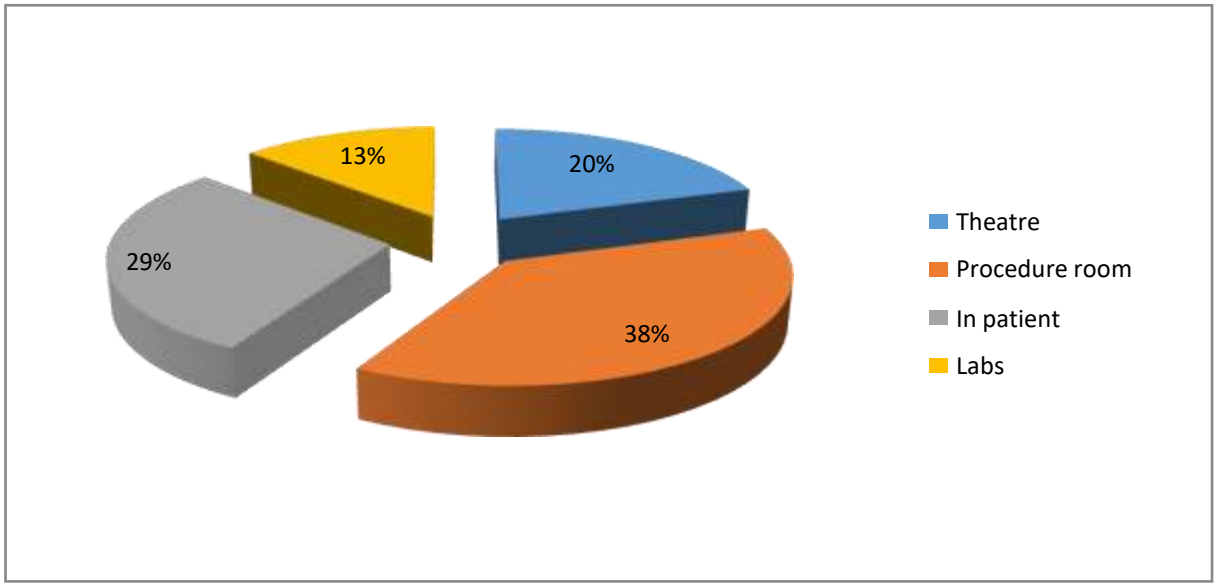

Figure 3 shows the number of injuries and where they occurred. Findings show that the majority of the injuries occurred in the procedure rooms (38%), 29% of the injuries occurred in the Inpatient departments, 20% in the theatre and 13% of the injuries in the labs. There is a statistical significance between the percentage number of injuries occurring in the procedure rooms and the injuries (35%) occurring amongst thenurses.

Figure 4: Timing of the injuries

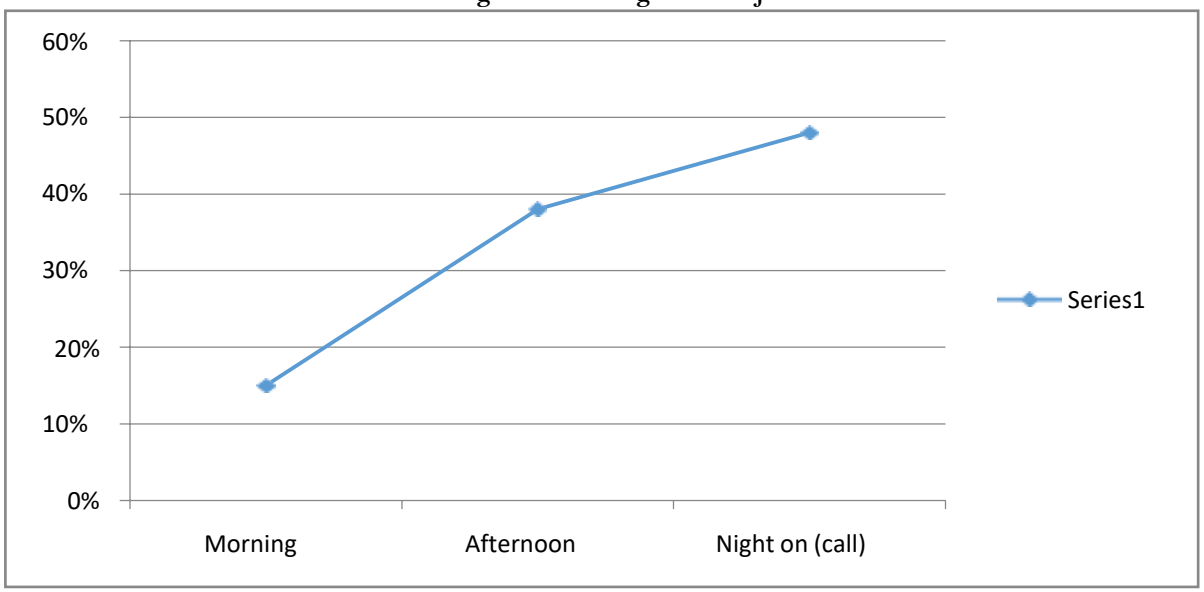

Figure 4 shows the percentage number of injuries and their timing. There is anexponential increase in the number of injuries that occurred from morning to night, where the majority, 48% occurred over the night as HCWs are on call. It was then followed by the afternoon where 38% of the injuries occurred with the least injuries having occurred in the morning 15%.

Figure 5: Circumstances leading to injury

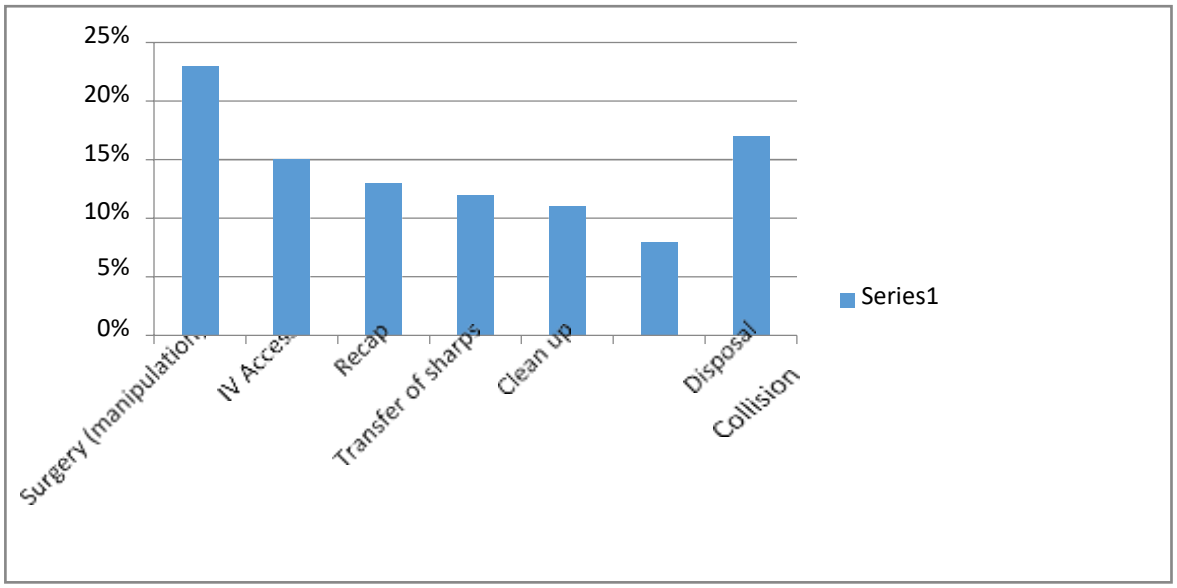

Figure 5 shows the percentage of injuries occurring as a result of the different circumstances. Manipulation of needles especially during surgical procedures was responsible for 23% of the injuries that occurred between 2014 and 2018 in JRRH andit was the leading cause of NSI accidents. 15% of the injuries were a result of IV access occurring during cannula insertion. Recapping was responsible for 13% of the injuries. Transfer of sharps after use was responsible for 12% of NSIs. During the clean-up ofSurgical Instruments, injuries occurred and these were responsible for 11% of the overall injuries. The collision was responsible for 8% of injuries and this was the least cause of NSIs. During disposal, 17% of the injuries occurred and it was the second lead

Figure 6: Percentage of injuries and common culprit devices

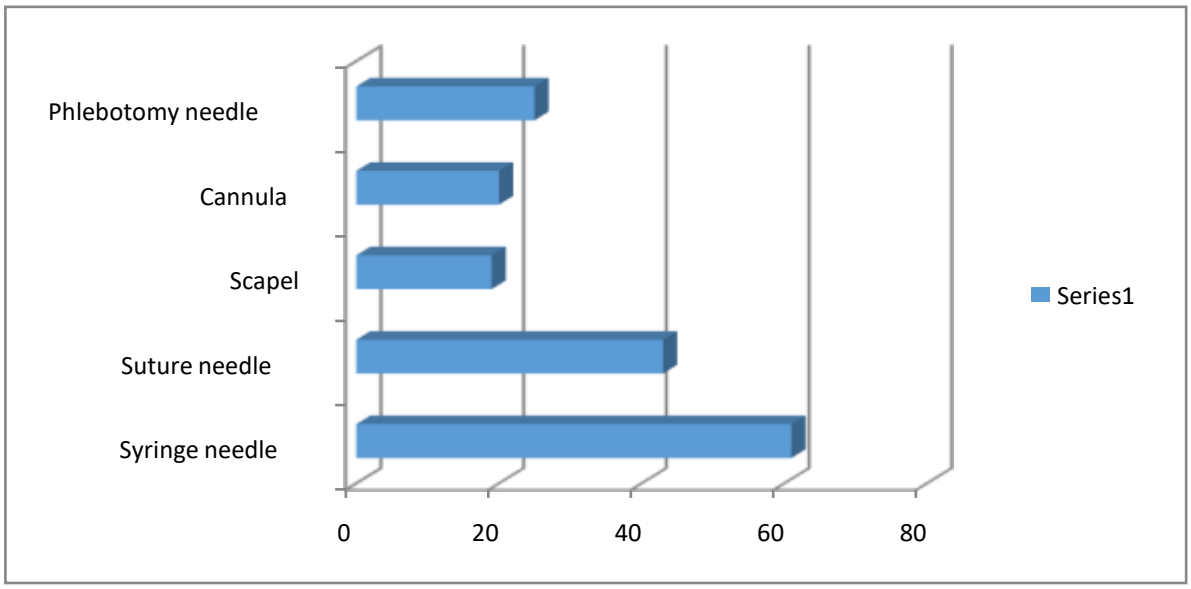

Figure 6 shows the percentage number of injuries and the common culprit devices responsible for the NSIs. Syringe Needles were the biggest culprit of NSIs and were responsible for 36% of the total injuries. These were followed by suture needles which were responsible for 26% of the injuries. Phlebotomy needles were the thirdmost common culprit with 15% of the total injuries. Cannula and

Scapel were the least implicated with 12% and 11% injuries respectively.

Table 2; Percentage number of injuries among different groups and locations

	Theatre	Procedure room	Inpatient	Labs
Doctors	24%	16%	16%	-
Interns	44%	29%	22%	-
Nurses	21%	46%	39%	-
Students	12%	10%	22%	27%
Labs	-	-	-	73%

Table 2 shows the percentage number of injuries that occurred in the various locations by different occupational groups. The Doctors had 24% of the injuries occurring in the theatre, 16% in the procedure room, and 16% of the injuries in the inpatient departments.Interns had 44% of the injuries occurring in theatre and these were the biggest numberof injuries that occurred in theatre. 29% in the procedure room, and 22% of injuries in the inpatient departments. Nurses had the largest number of injuries (46%) in the procedure rooms, 39% in the inpatient departments and 21% of injuries in the theatre. The Students had 12% of the injuries in theatre, 10% in procedure rooms, 22% in inpatient departments and 27% in the labs. Of all the NSIs occurring in the labs, 73% of them occurred to the lab technicians.

Uptake of PEP

Table 3

Cader	Number
Doctors	08
Interns	18
Nurses	21
Students	05
Lab personnel	10

Of the 168 documents reviewed, 62 of the culprits were started on PEP after the injuries with the majority being nurses followed by interns, then lab technicians, doctors, and lastly students. The final outcome was good for the majority (58) thatstarted PEP but however a few (4) proceeded to acquire Infection.

DISCUSSIONS

Incidence of NSIs

Findings showed a consistent rise and fall in the number of reported cases over the years, with a percentage difference of about 5% per year. This could have been the result of the new staff in the form of interns that the hospitals admit every year, and these come with inexperience, which may be thought to have been one of the causes of the needle stick injuries. According to a study done by Fedril *et al.* [17], one of the reasons for NSIs was the lack of required skills by the HCWs. The prevalence of needle stick injury in the present study was found to be 76.7% [18]. This revealed a high prevalence of NSIs among healthcare workers, and this is in line with the large numbers of injuries that occur in JRRH, as evidenced by an average of 33 HCWs getting needle stick accidents every year.

Different Occupational Groups and Injuries

Findings showed that 35% of the reviewed documents revealed nurses as the occupational group with the highest number of NSIs, followed by 20% for the interns. This could have been attributed to the fact that they are in direct contact and care for the patients, with most of the time spent on drug administration, minor surgical procedures, and other procedures requiring needle manipulation. Liyew *et al.* [19] showed that nurses and cleaners were at an increased risk for the occurrence of NSIs. Dilie *et al.* [14] also conducted a study that showed the highest number of injuries occurred in nursing staff (10.3%). Sharma *et al.* [20] also conducted a study that found radiology and physiotherapy personnel had the highest percentage of needle stick contacts, followed by nurses. All the above studies further correlate with the findings of this research, showing nurses with the highest percentage of injuries. These were later followed by injuries with the lowest prevalence among doctors and students at 14% and 12%, respectively. This could be attributed to the fact that they spend less time with the patients compared to the nurses and interns, who had a higher percentage of injuries.

Common Causes of NSIs: Locations and Injuries

The majority of injuries, accounting for 38%, occurred in the procedure rooms at the wards and emergency procedure rooms, followed by the inpatient departments at 29%. In these locations, most procedures are performed by intern doctors with the assistance of nurses and, at times, students. The highest number of injuries occurred among nursing staff, constituting 10.3%. In a study conducted by Huang *et al.* [21], it was revealed that injuries most frequently occurred in general wards (44.5%). This finding correlates with our study, which found that the majority of injuries occurred in the inpatient departments and the procedure rooms within those departments. Theatre injuries accounted for up to 20% (34) of the documents reviewed. According to Ghanei *et al.* [22], the prevalence of Needlestick Injuries (NSIs) was 32 (20.9%), with the majority of them occurring during assistance in the operation theatre, comprising 13 (37.4%). Among these cases, six (18.8%) were specialists, 12 (37.5%) were medical officers, 10 (31.2%) were house officers, and four were staff nurses (12.5%).

Timing of injuries

Findings showed that the majority of the injuries occurred at night while healthcare workers (HCWs) were on call, and this was related to the level of fatigue since they had been on duty for the better part of the day. Injuries increased in number as the day progressed. According to Isara *et al.* [23], the majority (62%) of Need lestick Injuries (NSIs) were sustained during the night shift. Hassanipour *et al.* [24] found a statistically significant relationship between the occurrence of NSIs and factors such as sex, hours worked per week, and frequency of shifts per month. All of these factors directly correlate with the level of fatigue and an increase in the number of injuries that occurred.

Processes of Injury and common devices

Manipulation of sharps was the most common cause of accidents, with a prevalence of 23%, followed by injuries during disposal at 17%, and then during IV access with a 15% prevalence [25]. Their study revealed that more than half (56%) of the NSI incidents occurred while nurses were recapping the needle, 10% of the incidents occurred while passing the needle, and 10% while disposing of the needle and/or breaking it. The most common cause of NSI, as perceived by nurses, was a lack of proper equipment for disposal (50%), followed by increased workload (24%), carelessness (18%), and fatigue (8%) [18] Huang *et al.* [21] also reported that the circumstances that involved the most frequent injuries included surgical needle insertion, removing an arteriovenous needle from a patient, and recapping the needle. Single-use syringes caused more injury incidents than other instruments. Jacob *et al.* [26]found that the most commonly associated procedures were injection, venipuncture, suture, and insertion and manipulation of IV catheters. From the above findings, the commonest culprits of sharp-related accidents were recapping, needle manipulation, IV access lines, and disposal of sharps, which were the most common sites of injuries. This also revealed that syringe needles were the biggest culprit device (36%) for needle prick accidents, followed by suture needles at 26%, phlebotomy needles at 15%, cannula at 12%, and scalpels at 11%. Interns had the highest number of injuries in the theatre (44% of all theatre injuries), nurses had the highest number of injuries in the procedure rooms (46% of injuries in the theatre rooms), and the inpatient departments, with doctors and students having fewer accidents in each of those locations. The injuries to the interns are highly related to their level of experience compared to the doctors, who had fewer injuries and are more experienced than the interns [27, 28]. Barger *et al.* [29] revealed that the incidence of NSI among healthcare workers in the orthopedics ward was not any higher compared to similar studies, but it was found that the prevalence was higher in junior doctors compared to specialists and staff nurses, and this was statistically significant. This further justifies the finding that inexperience is a major factor in needle prick accidents. Nsubuga & Jaakkola [30] in their study showed a high rate of needle stick injuries among nurses and midwives working in Uganda. The strongest predictor for needlestick injuries was a lack of training. Other important risk factors were related to long working hours, working habits, and experience. This relates to the findings of this study, as most nurses have injuries, followed by the interns who actually have a bigger workload and longer working hours than the rest of the staff. In the same vein, they are also at risk of pressure from work, trying to work against time, increasing their chances of injury. Rais & Jamil [31] showed that some circumstances, such as the pressure of work and time constraints, were contributing factors. They revealed that despite knowing the risks, the incidence of NSI was higher in HCWs, reflecting bad practices due to overburdening and carelessness.

Uptake of PEP

PEP uptake after injury was good, with 58 of the 62 that were initiated on PEP not progressing to acquired disease and only 4 of whom were culprits reporting non-adherence as a common reason for the progression to infection with HIV.

CONCLUSION

The study found a notable prevalence of Needlestick Injuries (NSIs) among healthcare workers (HCWs), with nurses (35%) and interns (20%) being the most affected groups. Lab personnel accounted for 19% of cases, doctors 14%, and students 12%. The majority of these injuries occurred in procedure rooms (38%), inpatient departments (29%), and theatres (20%).

NSIs were most common during night shifts (48%), followed by afternoon shifts (38%), and morning shifts (15%). The main causes of NSIs were surgical needle manipulation (23%), disposal (17%), and IV access (15%). Needle recap accounted for 13% of injuries, transfer 12%, clean-up 11%, and collisions 8%. Syringe and needles caused 36% of injuries, followed by suture needles (26%), phlebotomy needles (15%), IV cannulas (12%), and scalpels (11%).

Regarding post-exposure prophylaxis (PEP), 68 HCWs received it after NSIs, with 58 of them recovering without infection, while only 4 developed infections.

RECOMMENDATIONS

It is important that most of these under-skilled staff undergo frequent training and refresher courses on how to prevent injuries. Safety guidelines need to be prominently displayed in both procedure rooms and inpatient wards, as most injuries

occur in these areas. This will make it easy for staff to reference them when needed. There is a need for strict and well-planned scheduling for staff, including adequate breaks after long working hours to prevent fatigue. Proper disposal practices and careful, double-gloved cleaning of instruments are also required. Avoid recapping needles and practice careful needle insertion. Closer monitoring and possibly daily counseling for workers undergoing PEP treatment are crucial, as this can help eliminate cross-infection. Proper adherence to these guidelines has proven effective in preventing cross-infection.

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