



Research Article

Prevalence, Underreporting and Barriers of Needle Stick and Sharps Injuries (NSSIs) among Nurses at Primary Healthcare Centers, Riyadh, Saudi Arabia

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Abstract

Background: Needlestick and sharp injuries are a serious hazard to nurses. Estimating the prevalence and underreporting of such risk can improve the work environment at primary care setting.

Objective: This study aimed to estimate the prevalence and underreporting of needlestick and sharps injuries among nurses in a primary healthcare setting.

Methods: This is a cross-sectional study conducted at 18 primary healthcare operated by the military at the capital city of Riyadh in Saudi Arabia. A total of 474 nurses used a self-administrated questionnaire to answer questions about their background and their history of needlestick and sharps injuries.

Results: The prevalence of NSSIs in the PHC health workers was 15.2% with incidence rate 124 per 1000 employee. The level of underreporting was high with 58.3% have never or rarely reported NSSIs. Additionally, 46.6% of the participant never attended the employee health clinic after NSSIs despite the high awareness of policies and procedures (92.4%). The most common reasons for not reporting NSSIs are considering the needle or the sharp object clean because it is not used (47.2%) and unfamiliarity of the reporting process (15.5%).

Conclusion: The prevalence of NSSIs is higher than that reported in other Saudi studies. Underreporting problem is also an issue that needs urgent addressing. Working closely with the health staff to produce more convenient reporting process can reduce the rates of underreporting.

Keywords: Needle stick injury; Reporting; Barriers

Introduction

Healthcare workers are susceptible to injuries and diseases caused by contaminated sharp objects such as needles. These injuries and diseases can be serious such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and *Treponema palladium* [1-3]. The risk of contracting these diseases after sustaining injury from a pathogen-positive sharp object has been documented in several longitudinal studies. One study reported 0.6% risk of contracting HIV [4], 6.0% - 30.0% for HBV [5], and 0%-10.0% for HCV [2,6-8]. Due to the seriousness of such issue in the health work environment, several studies tried to quantify the incidence, prevalence, and underreporting of this problem. In the next section, we will give a review of the studies we found in the literature that work in the same scope as our study. This review will also give an appraisal for the studies produced locally, regionally, and globally.

Literature Review and Background

The literature review is divided into two sections. The first section is concerned with the studies about prevalence and incidence rates of NSSIs. The second section we review the studies that investigated underreporting of NSSIs.

Prevalence and Incidence of NSSIS Studies

Since 2000, the burden of Needlesticks and Sharp Injuries (NSSIs) has been in decline. In 2000, the burden of injuries for HIV, HBV, and HCV was estimated globally to be 1,000, 66,000, and 16,000, respectively [9]. A recent systematic review that estimated the economic burden of NSSIs showed a decline in the incidence rate. However, the economic burden was still significant, especially in the developing countries [10]. The systematic review concluded that the mean costs are \$384.92 (standard deviation \$199.58) per injury. The costs range from \$125 to \$850 according to the treatment procedure and severity of the injury [10].

The prevalence of NSSIs has been reported in several studies. Locally, A study conducted in Mecca region in 2015 reported 13.1% NSSIs among 168 healthcare workers. The authors used a modified EPINet questionnaire to collect the data retrospectively. The major contributor was needles recapping which contributed to approximately 36% of the injuries [11]. The study sample size lacks the power to estimate differences between different groups. Furthermore, the study used only descriptive methods to show the relationship between prevalence and potential factors.

Another retrospective study using EPINet conducted at a large tertiary hospital was published in 2002 by Memish and colleagues. The study reported the incidences of NSSIs healthcare

workers from 1997 to 2000 [12]. 33 incidences per 1000 workers were reported in all the years except 1997 which had a higher rate of 39 incidences per 1000. The major contributors are “unsafe practices” by the workers. This study has been conducted in one tertiary hospital in the city of Riyadh.

An of 5-year surveillance in a teaching hospital from 2001-2005 was published in 2008 [13]. The study reported only a crude number of incidences over the period of surveillance of 133 incidences. The study does not report the total number of employees surveyed per year or the incidence rate. Hence, the average incidence rate is approximately 14 per 1000. No comparisons were drawn to examine any potential factors or contributors.

Another retrospective study over two years between January 2002 and December 2003 reported an incidence rate of 110 per 1000 employee. The study was carried out in a tertiary hospital in Riyadh. This incidence rate was highest among nurse and technicians and lowest in physicians [14]. The incidence rate reported in this study is higher than those reported in other studies. However, the study’s results conform to the other local studies that needles recapping (syringes) are the most common cause of NSSIs [14].

Memish published another study for NSSIs at the same tertiary hospital investigated in 2001. The study analysed 433 reported NSSIs over the period 2007-2011. In 2009, 13.8% of the staff reported NSSI injury, and it was the highest rate reported. Nurses were the highest group at risk of NSSIs. The study reported disposable needles were the most common cause of NSSIs and hands were the most affect parts [15].

Regionally, we found results from Iranian study similar to our study. The prevalence of NSSIs was 16% in 2011 in 3806 healthcare workers staff. Similar to the results from the local studies, the Iranian study reported nurses at the highest group at risk of NSSIs. Additionally, most of NSSIs occurred during taking blood and injections (29.9%). The study also reported that 8:00-10:00 AM the period with the highest risk of sustaining an injury [16]. The study used modified EPINet questionnaire. The study also used the data from a single tertiary hospital.

An extended literature search to global studies revealed studies from developed and developing countries. A prevalence study conducted in a university hospital in Germany concluded that in 2007 out of 561 health worker staff 31.4% sustained NSSIs. The study used self-reporting questionnaire to obtain the data [17]. A Thai study also reported 32.4% prevalence of NSSIs in 247 hospitals [18]. This study is the most comprehensive in regards to the scale among all studies we reviewed. Such large-scale study can be considered a national and regional benchmark for any work. However, this study only surveyed nurses who worked

in operation rooms. So, the generalisability of the results to all healthcare workers should be carefully reported.

Underreporting of NSSIs

Locally, we did not find studies that measured underreporting of NSSIs directly. A study conducted in Iran measured underreporting and barriers of NSSIs reporting among nurses. The study published in 2010 used self-reporting questionnaire on 111 clinical nurses. In 12 months period, 14 out of 38 nurses officially reported the incidence. The most common reasons for not reporting are dissatisfaction of the follow-up procedure (33.3%), and safe/low risk considering of risk patients (29.2%) [19]. The study is one of the few studies found that discussed such issue. However, the drawbacks are the single location design and small sample size. A Chinese study reported 67.4% (161/239) did not officially report sustaining NSSIs. Safety/low risk of the source patient (62.8%) and annoyance from the procedure (17.9%) was the most common cause for not reporting the incidences [20]. The Chinese study was conducted in small and mid-sized clinics and hospitals. The setting is very similar regarding the services provided to the PHCs we are surveying. An older study conducted in Taiwan used a self-administrated questionnaire to quantify underreporting of NSSIs. The study surveyed over 8,645 healthcare workers from several hospitals in Taiwan. The results showed that 81.8% of the injuries were not reported. Physicians were more likely not to report the injuries. However, physicians were more likely to attend prevention programs. The most common reasons for nonreporting NSSIs were the item was unused (34.0%), self-assessment of injury (21.7%), and being busy to report the incidence (14.9%) [21].

The current study while it covers an issue that has been discussed in other studies conducted in Saudi Arabia, it has several advantages. First, it will provide an update on the current situation of NSSIs. Second, it will cover an area of interest that has not been covered by previous studies that are primary healthcare setting. Third, as far as our search is a concern, there are no studies that covered underreporting of NSSIs. Finally, we also investigate the barriers for nonreporting.

Objectives

1. Estimate the prevalence of Needlestick injuries among nurses at the primary health care centers operated by the military in Riyadh
2. Estimate the prevalence of underreported needlestick injuries among nurses at the primary health care centers operated by the military in Riyadh.

Methods

Sample size

The sample size will be considered as a survey for all the nurses working. The available nurses are 531, and 474 participated. This number of participants accounts for 89.2% response rate. The sample was collected over the period between 01/09/2017 and 15/12/2017. Multiple waves were carried out to achieve the final sample size.

Study Area

Primary health care centers operated by Prince Sultan Military Medical City at Riyadh City.

Target population

Nurses in the centers of interest.

Inclusion criteria

1. Nurses working at PHCs and OPD at PSMMC
2. Working exclusively for the military hospital for the last year.

Exclusion criteria

- Newly graduates without experience

Study design and sampling method

The study design is cross-sectional. The sample size will be considered as a survey for all the nurses working at PHCs operated by the military in Riyadh.

The Study Tools

The study employed a validated self-administrated questionnaire as a tool of the research. The questionnaire was designed by the author after extensive literature search. The face validation process included the consultation of 3 experts in the field and a statistician. After a period of receiving feedbacks and developing different versions of the questionnaire, the author adopted a final version of a pilot distribution. A test-re-test phase of 32 healthcare workers (nurses and lab workers) were asked to fill the questionnaire. The participants then were informed by the investigator that they would answer the same questionnaire in two weeks. A retest phase commenced two weeks after the initial distribution to all the participants. The average re-test time was 16.3 days.

A test of statistical agreement using Intraclass Correlation (ICC) was employed to test the internal validity of the questionnaire. The analysis did not yield statistically significant disagreement.

The temporal validity ranged between 68%-100%. The reliability of the questionnaire was tested using Cronbach’s alpha with half split data for the association. The Cronbach alpha was 0.86 which indicate the high reliability of the research tool. The half-split technique also did not show any insignificant association using Pearson’s coefficient of correlation. Therefore, we considered the tool reliable.

Data collection

The data collection was a continuous process as per the principal investigator questionnaire distribution waves.

Data management

The data was coded between the 15th and 18th of December 2018. The questionnaire then was entered using the coded form into IBM SPSS version 22.0. The data cleaning and final preparation were conducted before the final data analysis.

Statistical analysis

The statistical analysis used descriptive statistics and graphical interpretation of the data to fulfill the study’s objectives. Tables containing measures of central tendencies, frequencies, and percentages are produced. Bar and pie charts are produced as well to represent the data graphically.

Ethical Considerations

The study was approved by the ethical committee of PSMC. All the participants were informed that their participation is voluntary. Additionally, they were informed that they have the right to withdraw at any point without being persuaded. Also, the participants have assured their anonymity, the privacy of the data, and that their no repercussions or consequences for refusal to participate or to withdraw.

Results

The results of the statistical analysis of the data collected are presented in this section. The participants’ characteristics are presented in Table 1. The surveyed sampled consisted mainly of females (80.6%). The mean age of the participants is 33.9 years with a standard deviation of 7.7 years. The mean experience is eight years. The mean working hours is 45.9 hours weekly. The occupancy of the nurses distributed between 28.5% OPD nurses, 40.5% ER nurses, and 31.0 % PHC nurses. 18.4% reported that they do not perform injections. 45.1% answered that they perform between 1-10 injections daily, 26.6% perform 11-20 injections daily, and the rest are distributed as per Table 1. The majority attended educational sessions about NSSIs (76.6%), they know the hospital policy in case of NSSIs incidence (98.5%) and reported that they follow the guidelines precautions (99.5%).

Characteristic	Mean ± SD*	Frequency	Percentage
Age	33.9 ± 7.7		
Gender			
Male		92	19.4
Female		382	80.6
Total		474	100.0
Occupation**			
Nurses on OPD		135	28.5
Nurses in ER		192	40.5
Nurses in PHC		147	31.0
Total		474	100.0
Weekly working hours	45.9 ± 5.3		
Number of injection performed daily			
0		87	18.4
1-10		214	45.1
11-20		126	26.6

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21-30		11	2.3
31-40		6	1.3
>40		30	6.3
Total		474	100.0
Attendance of educational session about NSSIs[†]			
Yes		363	76.6
No		111	23.4
Total		474	100.0
Knowledge of the hospital policy about NSSIs[†]			
Yes		467	98.5
No		7	1.5
Total		474	100.0
Following guidelines precautions			
Yes		470	99.2
No		4	0.8
Total		100.0	100.0
*SD: Standard Deviation; *OPD: Outpatient Department, ER: Emergency Room, PHC: Primary Healthcare Clinic; [†] NSSIs: Needle Stick and Sharps Injuries			

Table 1: Characteristics of the participants (n=474).

The participants were asked about the procedure they apply in the case of recapping a used needle “What to do for recapping needles?” The answers distribution is shown in Figure 1. Most of the participants (65.8%) answered that they do not recap the needle. In Figure 2, the participants replied to the question about the supplication of adequate gloves wear. 85.7% of the participants confirmed receiving adequate gloves wear.

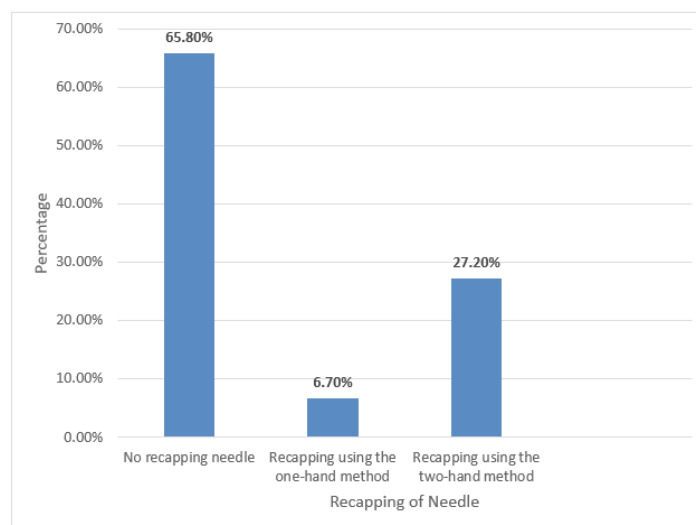


Figure 1: Answers to the question about the procedure when recapping a needle (n=474).

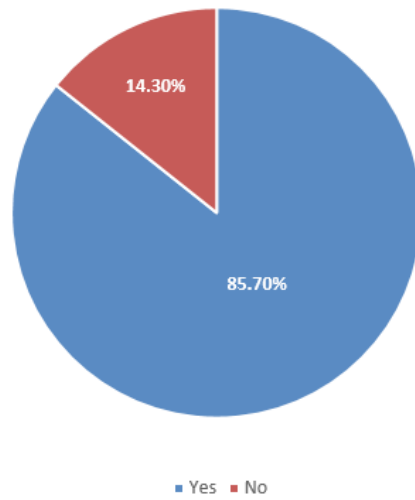


Figure 2: Distribution of the answers to the question “Have you been supplied with adequate gloves wear?” (n=474).

The awareness of the hospital policies and procedure in regards to NSSIs was asked to the participants. The answers distribution of this question is shown in Figure 3. The participants who responded that they are aware of the policy and procedure were 92.4% of the surveyed staff.

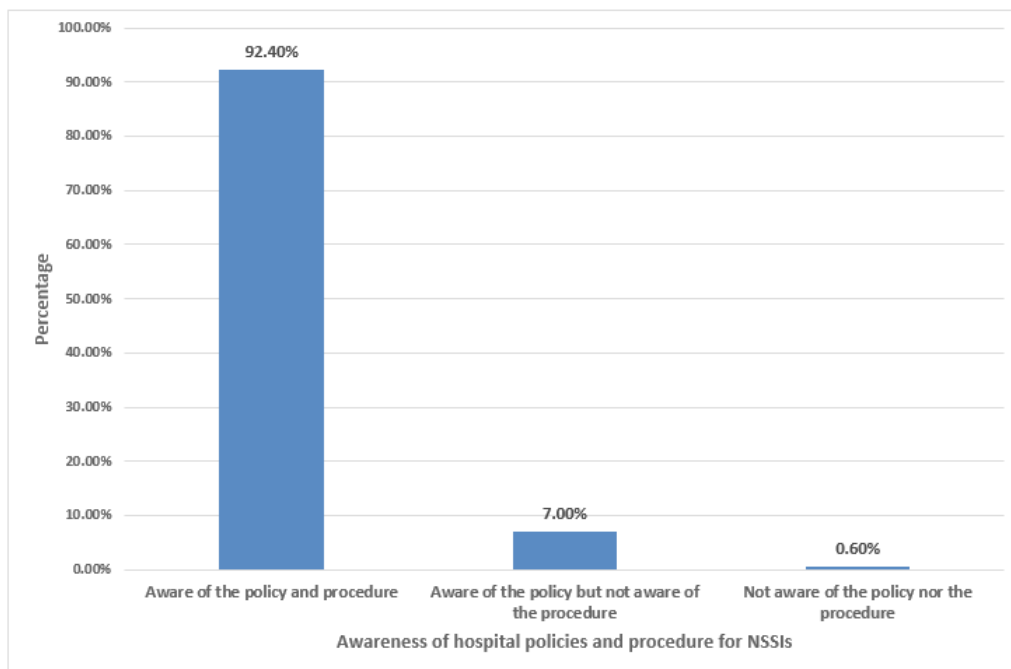


Figure 3: Awareness of the hospital policies and procedure in the incidence of NSSI (n=474).

The actions and steps taken after NSSIs are shown in Figure 4a and 4b. In Figure 4a, the participants mostly answered that they follow each step of the local procedure after NSSIs (95.4%). However, when the participants were asked about the steps that they should follow per the hospital policy, 73.8% answered the complete steps (Figure 4b) correctly.

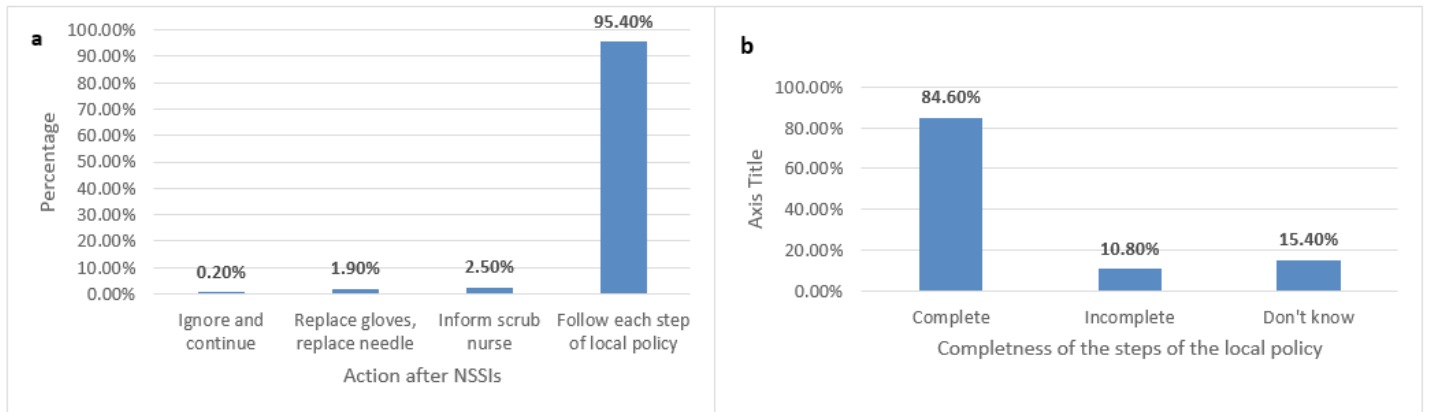


Figure 4: a) The distribution of the answers about the action commonly taken after NSSIs, **b)** The distribution of the answers about the completeness of the steps mentioned by the participant of the local policy after NSSIs (n=474).

The prevalence of NSSIs was measured in the last 12 months by a self-reporting question “have you been injured by a needle or a sharp object in the last 12 months?” The answers show that the prevalence of NSSIs is 15.2% (Figure 5). The total number of NSSIs was 59.

The underreporting of NSSIs was measured by asking the participants about the frequency of reporting NSSIs “how often do you report NSSIs at work?” Figure 6 shows the distribution of the answers. Only 30.4% of the participants answered that they always report NSSIs. While the underreporting is present in the majority, 28.1% never reported NSSIs, and 30.2% rarely report them.

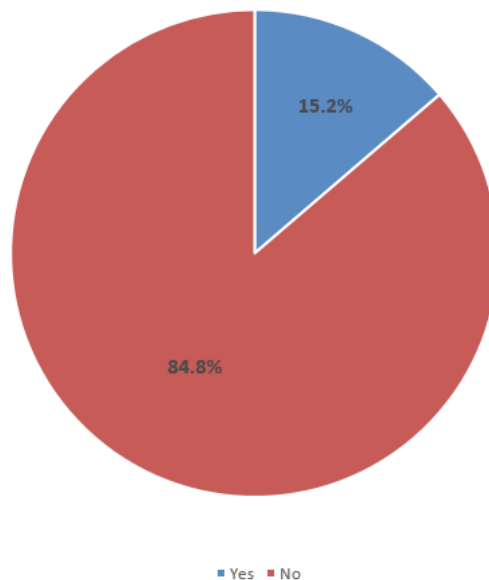


Figure 5: Prevalence of NSSIs in the last 12 months (n=387).

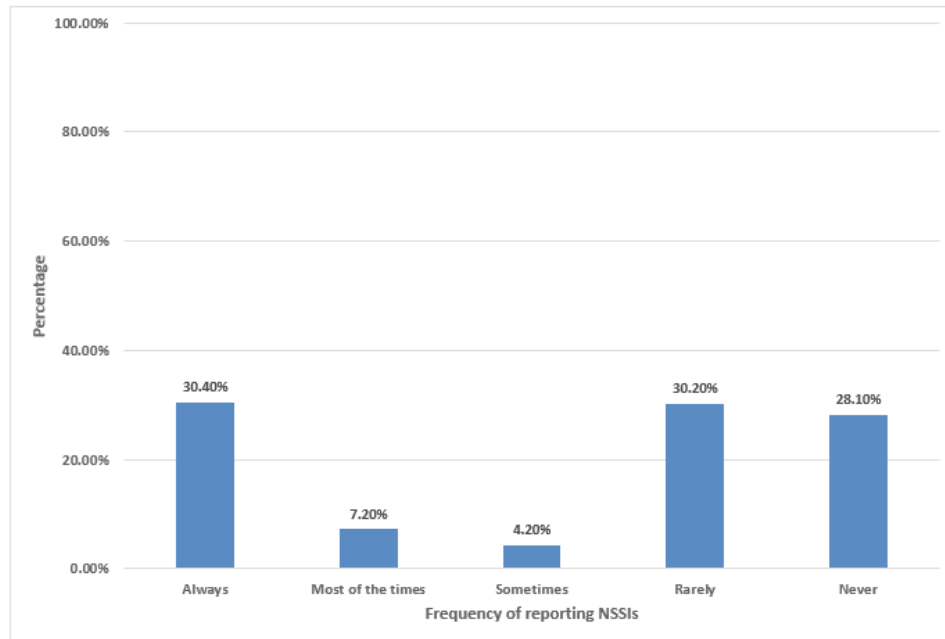


Figure 6: Frequency of reporting NSSIs by the participants (n=474).

The barriers to reporting NSSIs were investigated through a closed questionnaire question with the option to comment on the choices provided for additional reasons or information. The participant’s barriers for reporting NSSIs are summarised in Figure 7. The main barrier or reason for not reporting an NSSI is that the needle of the object is clean and not used (47.70%). The participants were asked their willingness to undertake training on NSSIs. 92% of the participants answered positively (Figures 7a and 7b).

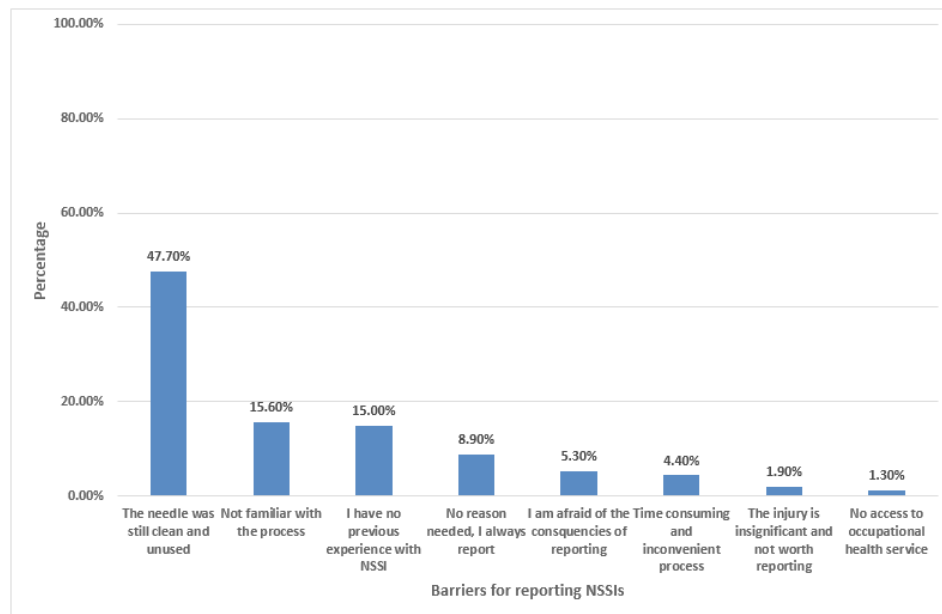


Figure 7a: Barriers for reporting NSSI among staff.

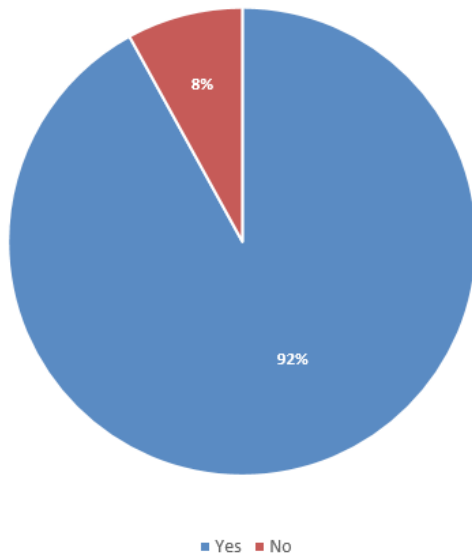


Figure 7b: Willingness to undertake training on NSSIs.

The underreporting of NSSIs was measured in a binary question to test the consistency of the answers with the previous one about the frequency of reporting. This question asked the participants if they “have ever visited the employee health clinic after NSSIs?”. The participants who answered negatively formed 46.6% of the answers (Figure 8). Finally, the participants were quizzed about receiving post-exposure prophylactic for NSSIs. Only 32.5% answered positively (Figure 9).

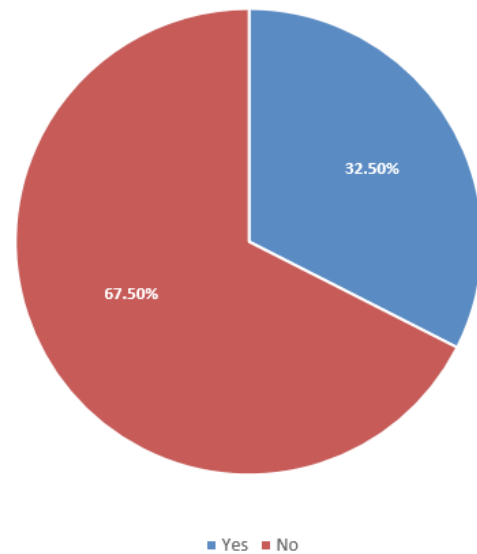


Figure 9: Percentage of participants who received post-exposure prophylactic for NSSIs.

Discussion

This study aimed to estimate the prevalence, underreporting, and barriers for NSSIs among nurses in PHCs. The findings show that prevalence of NSSIs in the 12 months before answering the questionnaire was 15.2% among the surveyed workers. The underreporting is estimated to range between 46.6% and 58.3% among the workers. The most common reason for underreporting NSSIs is considering the low injury risk due to the object is clean and unused.

The prevalence of NSSIs in our study is higher than what is reported in tertiary hospitals and ER in Saudi Arabia. The prevalence of 15.2% and incidence rate of 152 per 1000 employee were higher than all other local studies [12,14,15,22]. The prevalence in these studies ranged between 0.9% and 4.2%. This discrepancy can be due to several factors. One factor is the more hectic nature of primary health care settings than tertiary hospitals. Secondly, our sample constitutes of nurses only, who are more vulnerable to NSSIs than other occupations as documents in several studies [16,23-27]. Thirdly, our result shows lack of recapping needles practice by the staff, which can contribute to an increased hazard. Finally, it can be due to stricter policies implemented at these establishments.

However, there are studies that reported higher prevalence rates. Abbas, et al. reported higher NSSIs prevalence (23.6%) in Saudi Arabian hospitals and PHCs [28]. El-Hazmi, et al. reported 26% prevalence of NSSIs in a teaching hospital [13]. These higher prevalence rates can be attributed to the policies and safety measurements applied.

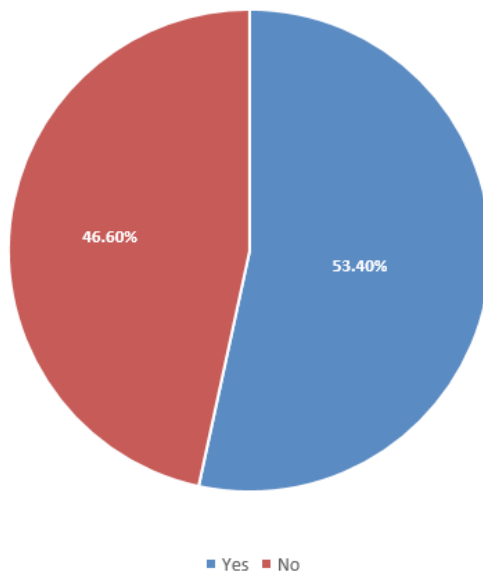


Figure 8: Percentage of health workers who visited the employee health clinic after NSSIs (n=474).

The underreporting of NSSIs is also one of the areas of investigations of this study. Our estimation using two different question that under-reporting can range between 46.6% and 58.3%. Since there are no local studies to draw a comparison, we compared our findings with studies from different countries. A Chinese study reported variable underreporting across tertiary hospitals' sectors. Outpatient clinics were the lowest with 46.2% underreporting and surgery the highest with 85.7% [20]. Another study in the US estimated underreporting of NSSIs by 65% [29]. This number increase to as high as 81.8% in a Taiwanese study [21]. Our study shows lower underreporting than other studies. This can be attributed to the nature of the sample. Several studies reported that physicians are more likely to self-assess NSSIs and not to report than other occupations [24,25,30-32].

The common reasons for not reporting NSSIs are similar to what we found in the literature. The most common reason is considering the low injury risk. This consideration either can stem from the belief that there is no risk from the unused object or that the patient is low risk [19,21,29,32,33].

This study has the advantage of being the first, as far as our search process is concerned, in KSA to have addressed the underreporting of NSSIs. It has investigated the barriers or reasons for not reporting NSSIs. Additionally, it has the advantage of being the first study in KSA that considered several PHCs and investigated such setting.

We acknowledge that our study also has several limitations. The self-administrated questionnaire is prone to recall bias and other subjective measurement problems. Also, the lack of diversity in regards to the areas of work that our sample came from. Only nurses with no lab workers, physicians or housekeeping staff. This issue limits the generalisability of our results.

Conclusion and Recommendations

The results show negative signs in regards to the relatively high prevalence of NSSIs in comparison to previous studies. Furthermore, the levels of underreporting are still worrying. The barriers to reporting are shared across the medical field globally, and it can be overcome with more effort to make the process more convenient. As per the results obtained from the data we recommend: Working closely with the staff to produce a more convenient process to report NSSIs; and to Improve the awareness of policies and procedures continuously also, Further studies that look deeper into the factors associated with injuries in PHC setting.

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