

Factors Associated with Percutaneous Injuries & Needle Stick Injuries among Health Care Workers in Nyangabwe Referral Hospital Francistown, Botswana

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Abstract

The study is designed to establish the factors associated with percutaneous /needle stick injuries among health care workers (HCWs) working in Nyangabwe Referral Hospital. Institution-based cross-sectional study design was conducted among 222 randomly selected health care workers in Nyangabwe Referral hospital. The data was collected using self-administered questionnaires. The data was entered into epi info version 7.2.2.16 for analysis and exported to Microsoft excel for visualization. The multivariate regression model was used to determine the association of variables with needle stick injuries/percutaneous injuries with AOR and 95% CI & P value ≤ 0.05 . This study revealed that 57% of the health care workers in Nyangabwe referral hospital had sustained percutaneous injuries/needle stick injuries during their period of work in the hospital. Nurses were the most affected cadre. Needles, suture needles, and cannulas are the most contributors to percutaneous injuries and needle stick injuries. NSI/PI occurs mostly due to fatigue, workload, inattentiveness, and distraction. The most significant associated factors to PI/NSI were Education level, work unit, years of experience, use of IPC guidelines, work environment as well as working hours. Percutaneous injuries/needle stick injuries in this study area were prevalent. The most contributing factors to NSI/PI were work unit (medical and pediatric ward), Work environment (busy wards), hours of work (≥ 40 hours per week), non-utilization of infection prevention and control guidelines.

Keywords: *Contributing factors, Healthcare workers, Needlestick injuries, Percutaneous injuries.*

Introduction

Percutaneous injuries/needle stick and sharps injuries are defined as accidental skin penetrating wounds caused by hollow-bore needles such as hypodermic needles, blood collection needles, intravenous (IV) stylets, and scalpels, scissors, suturing materials, and broken ampoules. Exposure among healthcare workers is caused by percutaneous injuries with sharp objects contaminated with blood or body fluids and can cause substantial health consequences and psychological stress for healthcare workers and their loved ones [1]. Work-related injuries from contaminated

needles, sharps, and exposure to blood; body fluids are among major occupational hazards, infection risks, and sources of anxieties emanating from fear of contagion among health care workers. Accidental percutaneous injury and acquiring blood-borne diseases are common problems among health care workers (HCWs). They are also at increased risk of acquiring infection because of direct exposure to patients' blood and other body fluids. World health organization reports the world report reported that of the 35 million health care workers, two million experience percutaneous exposure to the infectious disease each year. It further noted that 37.6% of Hepatitis B, 39% of

Received: 16.03.2022

Accepted: 26.04.2022

Published on: 30.06.2022

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Hepatitis C and 4.4% of HIV/AIDS in health care workers around the world are due to needle stick injuries.

Every year hundreds of thousands of health care workers are exposed to deadly diseases like HIV and Hepatitis C through needle sticks and sharp injuries. Every year, health care workers experience between 600 000 and 800 000 blood-borne pathogens through contaminated needle sticks, sharps, or splash exposures.

The world health organization (WHO) estimates suggests of the 35 million health workers in the world, 3 million sustain occupational injuries each year. More than 500 health care workers contract HIV because of occupational exposure to contaminated medical devices every year. Most HIV transmission among healthcare workers occurs in developed countries. 3 million healthcare workers are exposed to blood-borne viruses through percutaneous injuries every year worldwide, 90% of whom are in developed countries. Health care workers (HCWs) are at increased risk of accidental injury and acquiring infections, including hepatitis virus and Human Immune Deficiency virus (HIV) infection. Percutaneous injury may result in serious health risks, including psychological trauma, chronic diseases, and even death.

Methodology

Study Area and Period

The study is conducted in Nyangabwe Referral Hospital in the city of Francistown second city of Botswana. Nyangabwe Referral hospital is a 100% government of Botswana owned public health care institution. Nyangabwe Referral Hospital is a tertiary care hospital with about 550 beds capacity, with 120 to 150 beds at internal medicine department. The hospital service an estimated population of 981 000 in the northern part of the country. The hospital has at least 500 healthcare workers. The health workers in Nyangabwe Hospital include specialists, physicians, medical officers,

general Nurses, midwives, nurse specialists, cleaners, health care auxiliary, porters, mortuary attendants, mental health attendants, laboratory scientists/technicians, as well as ambulance drivers, among others.

Study Design

An institutional-based cross-sectional study design was conducted.

Sample Size

The study included randomly selected 222 participants/health care workers (HCWs) in Nyangabwe Referral Hospital consisting of physicians, medical officers, nurses, midwives, Health care auxiliary, healthcare assistants, hospital orderly, laboratory scientists, phlebotomists, laboratory technicians, cleaners as well as other clinical cadres in all departments of the hospital.

Yamane's Formula was used to calculate the sample size for a population of 500 healthcare workers.

The formula for calculating the sample size for the study was,

Yamane (1967)'s Sample size formula

$$n = \frac{N}{1 + Ne^2} = \frac{500}{1 + (500 \times 0.05^2)} = \frac{500}{2.25} = 222$$

Where:

n= the required sample size for the key indicator

e= margin of Error to be tolerated (5%)

Sampling Technique

Participants were selected by using a simple random sampling technique from each ward based on proportion until the required sample size is obtained (probability proportion to size).

Data Collection Tools

The data was collected using self-administered questionnaires on which respondents were issued the same questionnaires to respond to the questions, and they were collected by the researcher after completion for analysis.

Data Processing and Analysis

The data was collected, coded, cleaned, and checked for completeness. Data validation was also done. The data was entered by the researcher into EPI Info version 7.2.2.16. The data was also synthesized, processed, visualized, and analyzed using EPI INFO version 7.2.2.16. The multivariate logistic regression model was done to identify the relative importance of each predictor to the dependent variable by controlling for the effect of other variables. These variables, which are potential independent predictors, were entered on multivariate analysis with p-value <0.05 and ≤ 0.2 , respectively. The data was then exported to Microsoft excel 2010 for analysis, presentation, and visualization was done using figures, graphs, and tables.

Ethical Considerations

The Ethical approval was obtained from the ministry of health and wellness Botswana: Health Research and Development Division (HRDC) following approval from the Institutional Review Board (IRB). The permission to go ahead with the collection of data was obtained from the Hospital Superintendent (HS) and from the principal nursing officer 1(matron) of Nyangabwe

Referral Hospital. The study was conducted in non-experimental research; informed consent was obtained from respondents. The objective and the importance of the study were fully explained to the study respondents. Confidentiality of the respondents was highly maintained because the respondents did write their names on the questionnaires instead, the questionnaires were coded using numbers.

Results

Socio-demographic Characteristics

Two hundred and twenty-two health care workers were included in this study. The response rate was 100% (n=222). 70.7% of respondents were females, while 29.3% were males. The majority age group was 26-35 (42.3%), followed by 36-45 (36.5%), 18-25 (9.9%), 46-55 (9.5%) and 56-65 (1.8%) respectively. Out of 222 respondents, 204(91.9%) possess post-secondary education, 14 (6.3%) possess secondary education, whereas 4(1.8%) possess primary education. Nurses were the most respondents with a response rate of 67.6%, followed by medical officers (9.9%), cleaners (5.9%), medical officer interns (3.2%), and HCA (3.2%) as well as other support staff. (See Table 1).

Table 1. Socio-demographic Characteristics of Healthcare Workers in Nyangabwe Referral Hospital

Gender	Frequency	Percentage
Female	157	70.72%
Male	65	29.28%
Age		
18-25	22	9.91%
26-35	94	42.34%
36-45	81	36.49%
46-55	21	9.46%
56-65	4	1.80%
Cadre		
Cleaner	13	5.86%
Dentist	4	1.80%
HCA	7	3.15%
Hospital Orderly	6	2.70%

Lab Scientist	2	0.90%
Lab technician	5	2.25%
Medical officer	22	9.91%
Medical officer intern	7	3.15%
Nurse	150	67.57%
Pharmacist	2	0.90%
Phlebotomist	4	1.80%
Educational Level		
Primary	4	1.80%
Secondary	14	6.31%
Post-secondary	204	91.89%

Experiences with Needle Stick Injuries/percutaneous Injuries

Hundred and twenty-six respondents (57%) have sustained needle stick injury/percutaneous injuries during their period of work as health care workers, while ninety-six (43%) have not experienced needle stick injury or percutaneous injury. Most of the respondents, 78(35.1%) sustained sharps injury from needles, 12 (5.4%) sustained injury from suture needles, 10 (4.5%) sustained injury from a razor blade, 8 (3.6%) sustained injury from the lancet, 7(3.2%) sustained injury from the cannula, followed by scalpels, staples, and pair of scissors respectively. Out of 222 respondents, 97 (43.6%) did not sustain NSI/PI, 72 (32.4%) sustained PI/NSI during patient care, 20 (9.0%) when recapping the needle, 17(7.7%) sustained injury during ward proceedings, 12 (5.4%) sustained the injury during clinical waste disposal, while 4 (1.8%) sustained PI/NSI during clinical waste handling. The respondents who participated in this research questionnaire were 222, 43.3% did not sustain NSI/PI, 34.6% sustained PI/NSI once, 9.5% sustained PI/NSI

twice, 8.6% sustained PI/NSI more than three times whereas 4.1% sustained PI/NSI three days at the workplace. This analysis suggests that most of the respondents have sustained PI/NSI at least once in the workplace. 18.5% of the respondents experienced NSI/PI >twenty-four months back, 43.7% did sustain PI/NSI, 7.2% experienced NSI/PI six months back, 2.7% experienced NSI/PI this month, 6.8% experienced NSI/PI three months back, 11.2% experienced NSI/PI twelve months back while 9.9% experienced NSI/PI twenty-four months back. Out of 222 respondents, 24 (10.8%) feel like distraction contributes to PI/NSI, 44(19.8%) think fatigue contributes to PI/NSI, 26 (11.7%) is of the view that inattentiveness contributes to NSI/PI, 19 (8.6%) stated that they think inexperience contributes to NSI/PI, 24 (10.8%) feels that long working hours also contributes to NSI/PI, 18(8.1%) says restless patients contribute to NSI/PI, 23 (10.4%) thinks that work environment contributes to NSI/PI while 44(19.8%) is of the view that workload really contributes to NSI/PI as well. (See Table 2).

Table 2. Experiences with Needle Stick Injuries/percutaneous Injuries

Have you ever sustained a sharp object injury at work?	Frequency	Percentage
No	96	43.24%
Yes	126	56.76%
Which sharp object did you sustain injury from?		
Cannula	7	3.15%
Lancet	8	3.60%
N/A	96	43.24%

Needle	78	35.14%
Pair of scissors	1	0.45%
Pins	4	1.80%
Razor blade	4	4.50%
Scalpels	10	1.80%
Staples	2	0.90%
Suture needle	12	5.41%
When was the last time you experienced NSI/PI?		
>twenty-four months back	41	18.47%
N/A	97	43.69%
Six months back	16	7.21%
This month	6	2.70%
Three months back	15	6.76%
Twelve months back	25	11.26%
Twenty-four months back	22	9.91%
When did the NSI/PI occur?		
Clinical waste disposal	12	5.41%
Clinical Waste handling	4	1.80%
During patient care	72	32.43%
During ward proceedings	17	7.66%
N/A	97	43.69%
When recapping the needle	20	9.01%
What do you think mostly contributes to NSI/PI?		
Distraction	24	10.81%
Fatigue	44	19.82%
Inattentiveness	26	11.71%
Inexperience	19	8.56%
Long working hours	24	10.81%
Restless patients	18	8.11%
Work environment	23	10.36%
Workload	44	19.82%
How many times did you sustain NSI/PI?		
>three times	19	8.56%
N/A	96	43.24%
Once	77	34.68
Three times	9	4.05%
Twice	21	9.46%

Facilitators/contributing Factors to Needle Stick Injuries/percutaneous Injuries

The multivariate logistic regression model was done to identify the relative importance of each predictor to the dependent variable by

controlling for the effect of other variables. These variables, which are potential independent predictors, were entered on multivariate analysis with p-value <0.05 and ≤ 0.2, respectively. (See Table 3).

Multivariate Logistic Regression Model Analysis of Circumstances Leading to NSI/PI Or Contributing Factors To NSI/PI (n=222)

Table 3. Multivariate Logistic Regression Model Analysis of Circumstances leading to NSI/PI or Contributing Factors to NSI/PI

Variables	Category	NSI/PI		AOR (95% CI)	P Value
		Yes	No		
Educational Level	Post-Secondary	134	28	0.5349(0.280,2.202)	0.052 *
	secondary	32	10	0.227(0.076, 0.699)	0.009 **
	Primary	8	6	-	-
Work Unit	Emergency	2	5	0.703(0.267,1.934)	0.494
	ICU	1	2	1.082(0.321,3.79)	0.914
	Medical	23	28	0.795(0.384,1.642)	0.012*
	Surgical	28	16	0.691(0.325,1.486)	0.340
	OPD	6	4	0.722(0.399,1.793)	0.442
	Paediatric	30	5	0.314(0.117,0.828)	0.019**
	Other	55	16	-	-
Years of experience	0-20	114	39	0.599(0.284,1.315)	0.200**
	21-35	12	18	0.4549(0.165,1.186)	0.109*
	>35	20	19	1	-
Availability of IPC guideline/SOP	Yes	90	30	1.226(0.788,2.155)	0.580
	No	37	45	1	-
Use of IPC guideline/sop	Yes	66	9	-	-
	No	126	21	1.965(1.86,3.256)	0.08*
Use of PPE	Yes	148	38	1.227(0.717,2.097)	0.458
	No	11	25	1	-
Work environment	Noisy	20	14	0.754(0.214,1.375)	0.362
	Congested	38	24	0.707(0.214,23.330)	0.569
	Busy	42	18	6.321(2.865,13.948)	0.049*
	Normal	35	31	0.90790.267,37.86)	0.856
Hours of work per week	≥ 40 hours	186		2.903(1.297,6.498)	1.010**
	≤ 40hours	6		1	-

*Significant at $P \leq 0.2$; ** at $P \leq 0.05$. AOR= adjusted odds ratio; OPD= outpatient department; ICU= intensive care unit, PPE= Personal protective equipment, IPC= infection prevention and control; SOP= Standard operation procedure

In the multivariate logistic regression analysis, educational level post-secondary qualification and secondary school qualification are significant contributors to needle stick injuries and percutaneous injuries. Those health care workers who worked in ICU were four times less likely to sustain NSI/PI than those in medical wards. Health care workers who work in medical wards and pediatric wards are more

likely to sustain NSI/PI than other wards in the hospital. Years of experience also significantly contributes to NSI having workers with 0-20 years of experience (inexperience) sustaining more NSI/PI as compared to those with >35 years of experience. Busy wards significantly contribute to NSI/PI as compared to congested, noisy, and normal wards. Officers who work

≥40 hours a week are most likely to sustain PI/NSI.

Psychological Effects of Needle Stick Injuries/percutaneous Injuries

Out of the 222 respondents who answered this questionnaire, 42 (18.9%) felt depressed post. PI/NSI, 17 (7.7%) were just fine, 94 (42.3%) did not sustain any NSI/PI, 21 (9.5%) were sad after experiencing NSI/PI, 11 (5%) blamed themselves for sustaining NS while 37 (16.7%) were stressed out after sustaining

NSI/PI. 97 (44%) of respondents did not sustain PI/NSI, whereas 125 (56%) of respondents who sustained PI/NSI did not receive any counseling post the event. This analysis suggests that there is no professional counseling for healthcare workers after sustaining NSI/PI as evidenced by the 56% of respondents who did not receive counseling post NSI/PI. The psychological support rate or counseling rate post PI/NSI of respondents is at 0% (see Table 4).

Table 4. Psychological Effects of Needle Stick Injuries/percutaneous Injuries

How did you feel after experiencing NSI/PI?	Frequency	Percent
Depressed	42	18.92%
Just fine	17	7.66%
N/A	94	42.34%
Sad	21	9.46%
Self-blame	11	4.95%
Stressed	37	16.67%
Did you receive counseling post NSI/PI?		
N/A	97	43.69%
No	125	56.31%
Yes	0	0%

Events Following NSI/PI

Out of 222 respondents, 95 (42.8%) did not sustain PI/NSI, 59 (26.6%) did not enroll on post-exposure prophylaxis with different reasons, while 68 (30.6%) did enrol on post-exposure prophylaxis. From the 222 respondents who participated in this research, 95 (42.8%) did not experience NSI/PI,

96(43.2%) did test for blood-borne diseases, and 31 (14%) did not test for blood-borne infections. For those who tested for blood-borne diseases (HIV, HBV, and HCV) did not contract the diseases. None of them tested positive for any blood-borne diseases. This means their infection rate is still at 0% (see Table 5).

Table 5. Events Following Needle Stick Injuries/Percutaneous Injuries

PEP enrollment	Frequency	Percent
No NSI/PI	95	42.79%
No	59	26.58%
Yes	68	30.63%
Did you test for blood borne diseases post NSI/PI?		
NO NSI/PI	95	42.79%
No	31	13.96%
Yes	96	43.24%
Which blood borne disease were you infected with?		

NO NSI/PI	124	55.86%
None	98	44.14%

Discussion

This study suggests that most of the respondents who took part in this research were nurses, followed by medical officers and other support staff in the medical profession. Nurses being the predominant cadre make them to be at a greater risk of needle stick injuries/percutaneous injuries than other cadres. Considering the cadres at the hospital, respondents who are working as nurses stand a higher chance of being involved in needlestick injuries/ percutaneous injuries as compared to other cadres. This compares well with a cross-sectional study done in Serdang Hospital Malaysia [2], who found out those nurses had the highest prevalence of 27.9% of sharps injuries. Another study which was conducted in Saudi Arabia [3] also indicated that most reported sharps injuries involved nurses with 45%, followed by doctors at 26% and downstream staff at 24.8%. These study findings are higher than the findings in the study conducted in Australia and Malaysia where the incidence rate was 17.7% and 27.9%, respectively [4, 5].

Moving further on establishment of the magnitude of needle stick injuries and percutaneous injuries among health care workers in Nyangabwe referral hospital, the findings indicates that 126(57%) experienced NSI/PI at the workplace, 96(43%) never sustained NSI/PI at the workplace during the period of their career as healthcare workers. This analysis implies that more than 50% of respondents sustained NSI/PI at the workplace. Out of 222 respondents who participated in this study on establishment of common instruments that healthcare workers sustain percutaneous/needlestick injuries from, the analysis have indicated that 78(35.14%) sustained injuries from needles, 96(43.2%) did not sustain any injury, 12 (5.41%) sustained injury from suture needle, 10(4.5%) sustained injury from razor

blade, 8(3,6%) sustained injury from the lancet, 7(3.2%) sustained injury from the cannula, 4(1.8%) sustained injury from scalpels, 2(0.90%) sustained injury from staples while (1.8%) sustained injury from pins and 0.45% sustained injury from pair of scissors. This is because needles are devices/instruments that are commonly used in a hospital setting for medication injection or for, withdrawing body fluids or when performing minor and major surgical procedures, either clean, sterile or surgical procedures hence increased risk of sustaining needle stick injuries by healthcare workers as compared to other instruments and figure stick devices. The other reason is that needles are hollow hence their makeup poses health hazards to the users who in this case, are healthcare workers.[6], reported that 62% of exposures to blood and body fluids involved hollow bore needles. This finding was also consistent with the findings presented by Error! Reference source not found, where hollow-bore needles accounted for 68.5 % of percutaneous injuries.

On the establishment of mannerisms/behaviors leading to needlestick injuries and percutaneous injuries; the findings indicate that 97 (43.6%) did not sustain NSI/PI, 72 (32.4%) sustained PI/NSI during patient care, 20(9.0%) when recapping the needle, 17(7.7%) sustained injury during ward proceedings, 12(5.4%) sustained injury during clinical waste), while 4(1.8%) sustained PI/NSI during clinical waste handling. This analysis implies that most respondents (32.4%) sustained PI/NSI during patient care, followed by 9% who sustained an injury when recapping the needle as well as during clinical waste disposal and handling, respectively. During patient care, procedures like injections, blood collection, acupuncture, injecting and withdrawing secretions from the body, skin suturing, and venipuncture take place, hence the increased risk of sustaining percutaneous

injuries/ needle stick injuries during patient care. Recapping needles also pre-dispose one to NSI/PI as indicated by the 9% of respondents who sustained PIS / NSIs when recapping. However, most of these injuries take place after use and before or during the disposal process by which time the needle or sharp instrument was already contaminated. Recapping a needle is extremely dangerous because the individual handling the needle may miss the plastic cap or pierce the end of the cap leading to a finger or hand puncture, the cap may not be secure and could fall off, and an individual may be stuck when taking the needle apart from the syringe assembly and end up causing injury [7].

Moving on with the findings on the frequency of needle stick injuries/percutaneous injuries among health care workers in Nyangabwe referral hospital; the respondents who participated in this research questionnaire were 222, 43.3% did not sustain NSI/PI, 34.6% sustained PI/NSI once, 9.5% sustained PI/NSI twice, 8.6% sustained PI/NSI more than three times whereas 4.1% sustained PI/NSI three days at the workplace. This analysis suggests that most of the respondents have sustained PI/NSI at least once in the workplace.

Furthermore, on the frequency of NSI/PI among healthcare workers; the analysis indicated that 18.5% of the respondents experienced NSI/PI >twenty-four months back, 43.7% did sustain PI/NSI, 7.2% experienced NSI/PI six months back, 2.7% experienced NSI/PI this month, 6.8% experienced NSI/PI three months back, 11.2% experienced NSI/PI twelve months back while 9.9% experienced NSI/PI twenty-four months back. This analysis implies that most of the respondents, which is 18.5%, experienced PI/NSI more than 24 months back, followed by twenty-four months back, twelve months back, and six months back, respectively. This finding differs from the findings of a study conducted by Dessie town public hospitals [8] which found out that 32.7%, and also differs from a study done in Ethiopia, which was 35.8% [9]. This analysis

goes on to explain and discuss further the contributing factors to NSI/PI, looking at the issue of experience in the workplace and their thoughts/opinions as healthcare workers as to what they believe really contributes to NSI/PI. The least experience as those who experienced NSI/PI this month and three months back. In the study conducted by [4] it indicated that 1/3 of health care workers had an injury in one-year duration.

Moreover, 24 (10.8%) feel like distraction contributes to PI/NSI, 44(19.8%) think fatigue contributes to PI/NSI, 26 (11.7%) is of the view that inattentiveness contributes to NSI/PI, 19 (8.6%) stated that they think inexperience contributes to NSI/PI, 24 (10.8%) feels that long working hours also contribute to NSI/PI, 18(8.1%) says restless patients contribute to NSI/PI, 23 (10.4%) thinks that work environment contributes to NSI/PI while 44(19.8%) is of the view that workload really contributes to NSI/PI as well. This analysis implies that most respondents are of the sentiment that fatigue, workload, distraction, and work environment contribute to NSI/PI. While others are of the view that inattentiveness, inexperience, and restless patients also contribute to NSI/PI although their opinions were of low percentages. These findings are the same as the findings of [10], which their findings also indicated that these factors are interconnected, and their significance is not isolated. Another study conducted by [11] indicated that most sharps injuries occurred because of uncooperative patients who moved during injection procedures due to fear of injection, while my findings 8.1% felt like restless patients contribute to needle stick injuries and percutaneous injuries.

Moving on with the establishment of facilitators of needle stick injuries, this was done by establishing the level of significance or the significance of association between the outcome and the variables. The variables were analyzed using multivariate logistic regression.

In the multivariate logistic regression analysis, Educational level post-secondary qualification with AOR= 0.5349 95% CI (0.280-1.202) and P-value 0.089 is significant, and secondary qualification is more significant with an AOR=0.227 95% CI (0.076-0.699) and a P value of 0.009 because in Nyangabwe Referral hospital is a tertiary hospital which works with intellectuals and qualified personnel on which most of them possess secondary and post-secondary qualification so they have a higher chance and probability of sustaining PI/NSI.

Furthermore: those health care workers who worked in ICU were four times less likely to sustain NSI/PI than those in medical wards (AOR = 0.795 95 % CI 0.384-1.642)and P-value of 0.02 than healthcare workers who worked in paediatric wards AOR= 0.314 95% CI 0.117-0.828 with a P-value of 0.019 and outpatient department (AOR= 0.325 95% CI 0.116- 0.934) respectively, because medical wards are busy and congested wards, paediatrics are usually restless and irritable in nature pre-disposing healthcare workers to PI/NSI, whereas in ICU most of the patients are critically ill and under life support equipment. A study conducted in Felege Hiwot Referral Hospital indicated that health care workers working in the maternity unit were 99.1% less likely to sustain needle stick injuries than those working in the laboratory unit [12]. Another study conducted by [13] indicated that the medical department/medicine department recorded a high incidence of injuries with 51.9 %.

Years of experience is also statistically significant AOR= 0.599 (0.284-1.315) healthcare workers with years of experience 0-20years are 1.57 times more likely to sustain NSI/PI than healthcare workers with 21-35 AOR= 0.4549 95% CI (0.165-1.186) and > 35years respectively. A study conducted by Error! Reference source not found, in Ethiopia agrees with the fact that health care workers with work experience greater than 10 years are six times at higher risk of sustaining needle

stick injury than who have less work experience. This is because of the issue of inexperience in the work area, experience and competence go hand in hand. Inexperience means incompetence hence increased risk of sustaining PI/NSI at work. Those with more years of experience are competent enough to avoid circumstances leading to PI/NSI. But a study conducted by Error! Reference sources not found differed with this study as they found little or no association between duration of service and the risk of sharps injury.

Moving on to hours of work: Healthcare workers who worked >40 hours per week were nearly three times at higher risk of sustaining PI/NSI than those who worked equal or less than 40 hours per week (AOR= 2.903 95% CI (1.29706-4980) with a P-value of 0.010. A study conducted in public hospitals of Dessie town, Northeast Ethiopia on the prevalence of needle stick injury and its associated factors by [8] and came up with a conclusion that nurses who worked > 40 hours were three times at higher risk of needle stick injuries than nurses who worked ≤ 40 hours of work. This is also similar to the findings of Iran and Sub-Saharan Africa [14].

It also shows a significant association, and the use of IPC guideline/SOP are statistically significant with the occurrence of NSI/PI AOR=1.965 95% CI (1.86, 3.256) & P-value of 0.009. This analysis means health care workers who use IPC guideline/SOP are 16 times more likely not to sustain NSI/PI in the workplace than those who do not use it of which the association is more significant. But the availability of IPC guideline/SOP; AOR=1.226 95% CI (0.788-2.155) and the use of PPE; AOR= 1.227 95% CI (0.717-2.097) had not demonstrated any significant association.

The study went on to establish the psychological effects of percutaneous injuries/needle stick injuries on health care workers. The findings indicated that; out of the 222 respondents who answered this questionnaire, 42(18.9%) felt depressed post-

PI/NSI, 17 (7.7%) were just fine, 94 (42.3%) did not sustain any NSI/PI, 21 (9.5%) were sad after experiencing NSI/PI, 11 (5%) blamed themselves for sustaining NSI while 37 (16.7%) were stressed out after sustaining NSI/PI. This analysis indicates that most of the respondents went through strong emotions of depression, stress, sadness as well as self-blame post NSI/PI. 97 (44%) of respondents did not sustain PI/NSI, whereas 125 (56%) of respondents who sustained PI/NSI did not receive any counselling post the event. This analysis suggests that there is no professional counselling for healthcare workers after sustaining NSI/PI as evidenced by the 56% of respondents who did not receive counselling post NSI/PI.

Moving further on establishing the presence of infection prevention and control measures available in the facility, 66.2% stated that they had IPC guidelines, while 33.8% did not have. 65% of the respondents did not use IPC guidelines, and 35% did use IPC guideline. Those who did not use IPC guidelines/SOPs were more at risk of sustaining NSI/PI. The findings were similar to the findings in Kenya by [15]. On the Post-exposure prophylaxis enrolment, the analysis indicated that 95(42.8%) did not sustain PI/NSI, 59(26.6%) did not enrol on post exposure prophylaxis with different reasons while 68(30.6%) did enrol on post exposure prophylaxis. Most health care workers do not report NSI, and they end up not enrolling on PEP as indicated by the study conducted by [16].

Furthermore, out of 222 respondents who participated on this research 95(42.8%) did not experience NSI/PI, 96(43.2%) did test for blood-borne diseases, 31(14%) did not test for blood-borne infections. For those who tested for blood-borne diseases (HIV, HBV, and HCV) did not contract the diseases. None of them tested positive for any blood-borne diseases. That means their infection rate is still at 0.

Conclusion

This study revealed that there is a high incidence of needle stick injuries/percutaneous injuries among health care workers in Nyangabwe Referral Hospital. According to this research, the incidence of NSI/PI is at 57%, which means more than ½ of the health care workers in Nyangabwe Hospital have been exposed to NSI/PI at some point. Nurses are the most affected cadre by NSI/PI followed by medical officers because of the nature of their job. Most health care workers sustain or experience sharps injury caused by needles being the major contributor to sharps injuries as well as from cannulas and suture needles, respectively. Most of the percutaneous injuries and needle stick injuries occur during patient care and recapping of needles. The study has come to a conclusion that needle stick injuries and percutaneous injuries occur due to fatigue, workload, work environment, inattentiveness, and distraction. Working hours, work unit, years of experience, and the use of infection prevention and control guidelines/standard of operation procedure are significant facilitators of needle stick injuries and percutaneous injuries. Blood-borne infections are not common among health care workers who experienced NSI/PI. However, healthcare workers go through lot of psychological problems including depression yet there is not any psychological support that they received following needle stick injuries/percutaneous injury.

Limitation

By concluding 57% of health care workers sustained percutaneous injuries/ needle stick injuries in Nyangabwe hospital, this study was a cross sectional study on which establishment of PI/NSI was to be made for the period of work by the health care workers, not for a specific period of time which did not reflect well as a generalized time frame was used, so a systemic review is mandatory to the made generalised time frame.

Abbreviations

CI: confidence interval, AOR: Adjusted odds ratio, NSI: Needle stick injury, PI: Percutaneous injuries, HCW: Health care workers, PEP: Post-exposure prophylaxis.

Authors Contributions

N.K: Conceived and designed the study, collected data, analyzed the data, and wrote the Manuscript. The study was done by a single author.

Acknowledgements

It is a genuine pleasure to express my deep sense of thanks and gratitude to my supervisor Mr Emmedy Neo Sakala, and my local guide Mr Thuto Tomeletso. Their dedication and keen interest above all their overwhelming attitude to help me had been solely and mainly responsible for completing my dissertation. Their timely advice, meticulous scrutiny, scholarly advice, and scientific approach have helped me to a great extent to accomplish this task.

I owe a deep sense of gratitude to Nyangabwe Referral Hospital Institutional Review Board (IRB) for making it possible for me to conduct my data collection in the institution with the permission granted. I also thank Nyangabwe Referral Hospital staff for their kind help and cooperation throughout my study period. Not forgetting God, all-mighty,

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for his constant protection and making it possible for me to carry out my study.

Competing Interests

The manuscript maintains no competing financial interest declaration from any person or organisation, or non-financial competing interests such as political, personal, religious, ideological, academic, intellectual or any other.

Availability of Data and Materials

The data sets used and analysed on the study are available from the author on reasonable request.

Ethics Approval and Consent to Participate

The Ethical approval was obtained from the ministry of health and wellness Botswana: Health Research and Development Division (HRDC) following approval from the Institutional Review Board (IRB). The permission to go ahead with the collection of data was obtained from the Hospital Superintendent (HS) and from the principal nursing officer 1(matron) of Nyangabwe Referral Hospital.

Funding

There is no funding for this research. All costs of data collection and analysis were covered by the author.

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