



Comparative Assessment of Occurrence of Sharp Injuries, Knowledge and Utilization of Post-exposure Prophylaxis among Health care workers In South-South Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Worldwide, sharp injuries remain the most common cause of exposure to blood and body fluids. Preventing this exposure to blood and body fluid is the most important strategy of minimizing transmission of Human immuno-deficiency virus, Hepatitis B and Hepatitis C infections in health care setting. However, post exposure prophylaxis or management are key element of the complete

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program needed in preventing blood borne infections among HCWs. Post Exposure prophylaxis (PEP) is any preventive medical treatment started immediately after exposure to a pathogen (such as a disease-causing virus), in order to prevent infection by the pathogen and the development of disease.

Objectives: To assess the occurrence of sharp injuries, knowledge and utilization of post exposure prophylaxis among Health Care Workers at the three level of health care delivery in South-south Nigeria.

Methods: The cross sectional study was carried out among 492 Health Care Workers at the three level of health care delivery in South-south Nigeria. Multi stage sampling technique was used to recruit health care workers into this study and SPSS was used in data analysis.

Results: More than one-third of the health care workers at the three levels of health care delivery reported having sharps injuries, however, majority (50.4%) of HCWs in the primary health care centres had more exposure to Blood and body fluids (BBFs) compared to the other level of care. A large proportion of the health care workers (HCWs) in the primary health care workers (83.7%) and more than half of their counter parts at the secondary health care (SHC) had poor knowledge of PEP compared to the tertiary health care (THC) where only 27.4% of the respondents had poor knowledge of PEP. Moreover, the utilization of post exposure prophylaxis was generally low at all levels of health care; it was higher (15.6%) among the PHC workers and least (14.30%) at the secondary health care level.

Conclusion: Despite the essential and indispensable role of post exposure prophylaxis in controlling occupational blood borne infections (post exposure infections), it was sad to note that most of the HCWs had poor knowledge and utilization of post exposure prophylaxis. Also, most HCWs had sharp injuries during their course of patient care. Therefore, there is need for regular training and sensitization of HCWs on the principles of post exposure prophylaxis and adherence to standard precautions.

Keywords: Comparative; sharp injuries; knowledge and utilization of PEP; Healthcare Workers; South-south Nigeria.

1. INTRODUCTION

Worldwide, sharp injuries remains the most common source of occupational exposures to blood and body fluids (BBFs) and the major cause of blood-borne infections, such as hepatitis B, Hepatitis C and human immunodeficiency viruses, to health care workers in health care environment [1-4]. Globally, there are 35- 40 million health care workers providing services to patients, however, three million of these Health care workers are exposed to sharp injuries. However, only less than 10% if these exposures occurs in developed world while majority of the exposures occurs in developing countries like Nigeria [5-6]. Approximately 2.5% cases of HIV and 40% cases of HBV and HCV infections recorded among healthcare workers, occur as a result of these occupational exposures [6]. Yearly, as a result of this occupational exposure, an estimated 66,000 Hepatitis B, 16,000 Hepatitis C and about 1,000 HIV infections are reported among healthcare workers [7,8].

In health care settings worldwide, including South-South Nigeria, following standard

protocols continues to be the most effective way to avoid the spread of blood-borne illnesses [2,3,9-10]. Basic prevention of occupational exposure to BBFs and sharp injuries is achieved through the reduction of needless use of injections and adherence to standard precautions (Safe injection practices, regular hand washing, use of personal protective equipments). Preventing exposure to blood and body fluid is the most important strategy of minimizing transmission of HIV, HBV and HCV infections in health care setting, however, post exposure prophylaxis or management are key element of the complete program needed in preventing blood borne infections among HCWs [11,12].

PEP is any preventive medical treatment started immediately after exposure to a pathogen (such as a disease-causing virus), in order to prevent infection by the pathogen and the development of disease.¹ PEP is 85–95% and 81% effective in preventing HBV and HIV infection, respectively, according to findings from prospective and retrospective trials conducted in developed nations.¹ It is more effective if treatment is commenced within 7days for HBV and 72hrs for HIV infection (preferably as soon

as possible after exposure) [1,13-15]. Though various studies have demonstrated the role of post exposure prophylaxis in preventing and controlling blood borne infections [13-15], the knowledge and utilization of PEP in developing countries among HCW is still inadequate [16-17]. Hence, this study was carried out to assess and determine primary, secondary and tertiary health care workers exposure to sharp injuries and their utilization of post exposure prophylaxis.

2. METHODOLOGY

The comparative cross sectional survey was conducted among different categories of health care workers in the three level of health care in suburban and rural communities in South-South Nigeria. The South-south region comprise of six states, they are Edo, Delta, River, Calabar, Akwaibom and Bayelsa. Using the multi stage sampling technique, Edo State and subsequently Edo Central Senatorial District was randomly chosen and all the health care workers who met the inclusion criteria (who are involved in direct patient care and having been working in primary, secondary or tertiary public health care setting for at least a year preceding the study were included) in the Central Senatorial District was selected and included in this study. A total of 492 healthcare workers were recruited for the study utilising the multistage sample strategy, which includes the systematic simple random sampling method, as previously mentioned. Data were pull together through an interviewer administered standardized questionnaires created for the study. The study was pretested among other health care workers in another senatorial district. Occurrence of sharp injuries in the previous 12 month and utilization of PEP was the outcome variable, and socio-demographic variables such as (age, sex, job category, level of education, occupation).

Five questions had a "yes or no" option. A "yes" option meant the health care workers were exposed, while no meant the HCWs had not been exposed. The Yes and No options were calculated and expressed in percentage to show the 12 months prevalence of sharp injuries. The knowledge and utilization of PEP among health care workers were assessed with 12 questions. The knowledge of PEP was assessed using 4 closed and 2 open ended questions. Each question had a "yes or no" option. A "yes" option meant correct answer and it was assigned a score of one and a "no" option meant wrong answer and was assigned a score of zero. Three

questions had other options, the correct answers were assigned one mark and the wrong answers were assigned zero mark. Two of the questions were open ended questions and scores were given based on whether they were correctly answered, partially answered or not answered at all. When the questions were correctly answered a score of 2 was assigned, when partially answered a score of 1 was assigned while when no answer at all a score of zero was assigned. The maximum obtainable score was 8, while the minimum was 0. The scoring system was an adaption and a modification of a previous scoring system [16]. HCWs with scores between 6-8(75-100%) were categorized as having good knowledge of PEP while a score between 4-<6(50-75%) was considered as fair knowledge of PEP while a score between 0-<4(<50%) was considered as poor knowledge [16]. The practice or utilization of PEP was assessed with six questions on whether the HCWs reported exposures, started PEP or not etc, the utilization of PEP was expressed in percentages.

Data were entered into a spreadsheet and analyzed using IBM SPSS (statistics product and service solution) version 20 [18].

3. RESULTS

Majority of the respondents, 240(48.8%), were within the age group of 30-39 (mean age of 34.58 ± 8.12 years). Out of the total participants recruited 147 (29.0%) were males and 345(71%) were females, giving male to female ratio of 1:2.3. Almost sixty three percent(62.4%), and 37.8 percent of the health care workers were married and health assistants respectively. A significant proportion, 343(69.7%), of the participants had tertiary level of education, while 99(20.1%) and 50(10.2%), of the participants had primary education and secondary education respectively (Table 1).

Table 2 presents the relative prevalence of occupational exposure to BBFs at the three levels of health care. Comparatively, more (50.4%) of the HCWs at the PHC level recorded higher prevalence of sharp injuries compared with HCWs at the secondary (34.9%) and tertiary (24.4%) levels respectively.

More than half (54.6%) of the respondents were exposed to sharp injuries at least 2-4 times; 26.4% had sharp injuries only once while 17.4% were exposed to sharp injuries 4-9 times. However, only 1.6% of the respondents had sharp exposure more than 10 times (Fig. 1).

Table 1. Socio-demographic profile of the health care workers

| Variable | Frequency | Percent(100%) |
|---------------------------|-----------|---------------|
| Age group | | |
| 20-29 | 131 | 26.6 |
| 30-39 | 240 | 48.8 |
| 40-49 | 90 | 18.3 |
| 50-59 | 31 | 6.3 |
| Sex | | |
| Males | 147 | 29.0 |
| Females | 345 | 71.0 |
| Level of education | | |
| Primary | 50 | 10.2 |
| Secondary | 99 | 20.1 |
| Tertiary | 343 | 69.7 |
| Marital status | | |
| Single | 173 | 35.2 |
| Married | 307 | 62.4 |
| Divorced | 2 | 0.4 |
| Widowed | 10 | 2.0 |
| Job category | | |
| Doctor | 79 | 16.1 |
| Nurse | 193 | 39.2 |
| Health Assistants | 186 | 37.8 |
| Laboratory Workers | 34 | 6.9 |

Table 2. Occurrence of occupational exposures to BBFs at the three levels of health care within 12month preceding study

| | PHC | SHC | THC | Text | p-value |
|-----|-------------|------------|-------------|------------------------|---------|
| YES | 125(50.4%) | 15 (34.9%) | 49 (24.4%) | | |
| NO | 123 (49.6%) | 28 (65.1%) | 152 (75.6%) | X ² = 32.03 | 0.00001 |

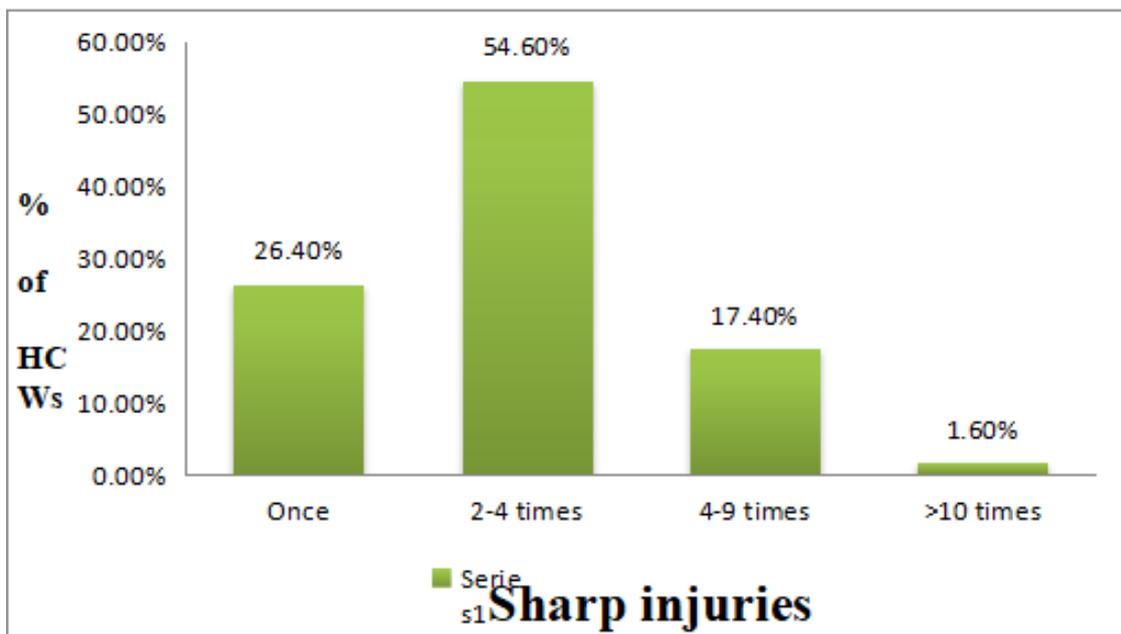


Fig. 1. Yearly frequency of accidental exposure to sharp injuries

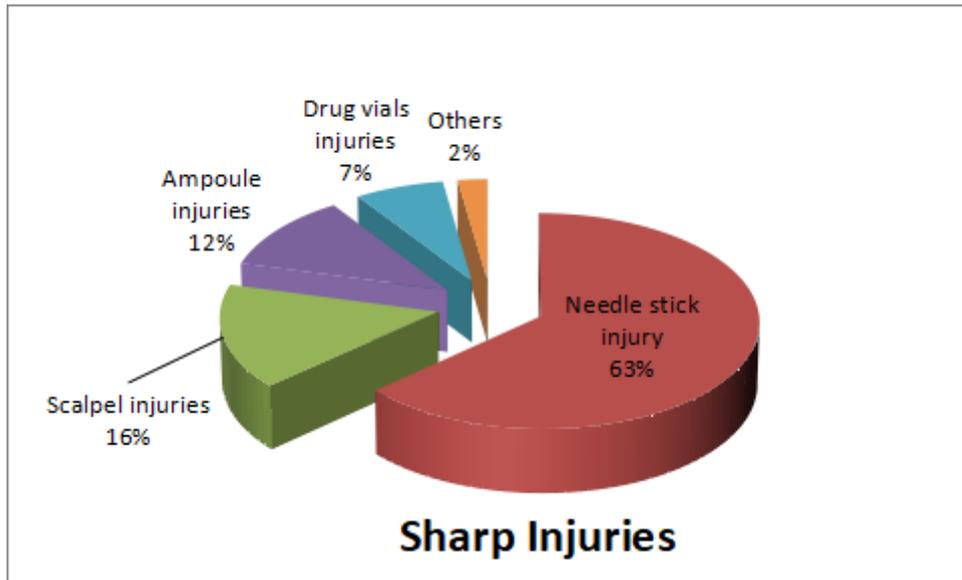


Fig. 2. Allocation of causes of sharp injuries among the respondents

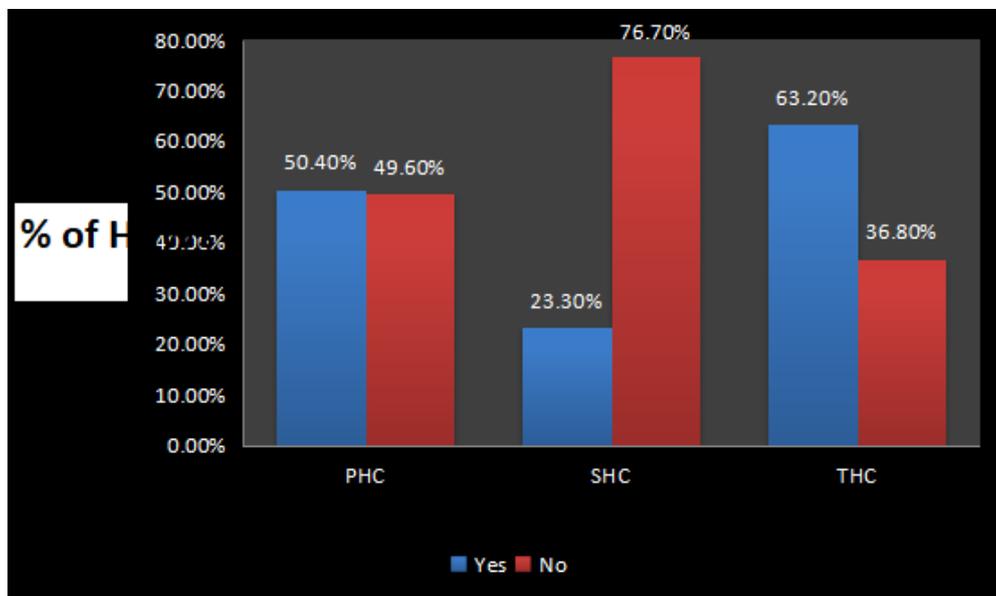


Fig. 3. Awareness of PEP at the three levels of health care

A large proportion of the sharp injuries was due to needle stick injuries, it accounts for 63% of the exposures compared to scalpel (16%), ampoules (12%), drug vials injuries (7%). However, others (blade, bottles etc) contributed to 2% of the sharp injuries.

A significant proportion of the HCWs, 262(53.3%), at the three levels of health care were aware of PEP. A large proportion, 230 (46.7%), were however not aware of PEP (Table 3).

One hundred and twenty seven (63.2%) HCWs in the THC had heard of PEP, compared with 125 (50.4%) and 10 (23.3%) of the participants in the PHC and SHC respectively.

Almost forty percent(35.4%) of the nurses were aware of PEP compared to doctors, which account for 35.4% of the awareness of PEP. Also, 22.2% and 5.8% of the health assistants (HA) and laboratory workers (LW) were aware PEP respectively (Fig. 4).

Table 3. Respondents' overall Awareness of Post Exposure Prophylaxis

| Awareness | Frequency | Percent (%) |
|-----------|-----------|-------------|
| Yes | 262 | 53.3 |
| No | 230 | 46.7 |
| Total | 492 | 100 |

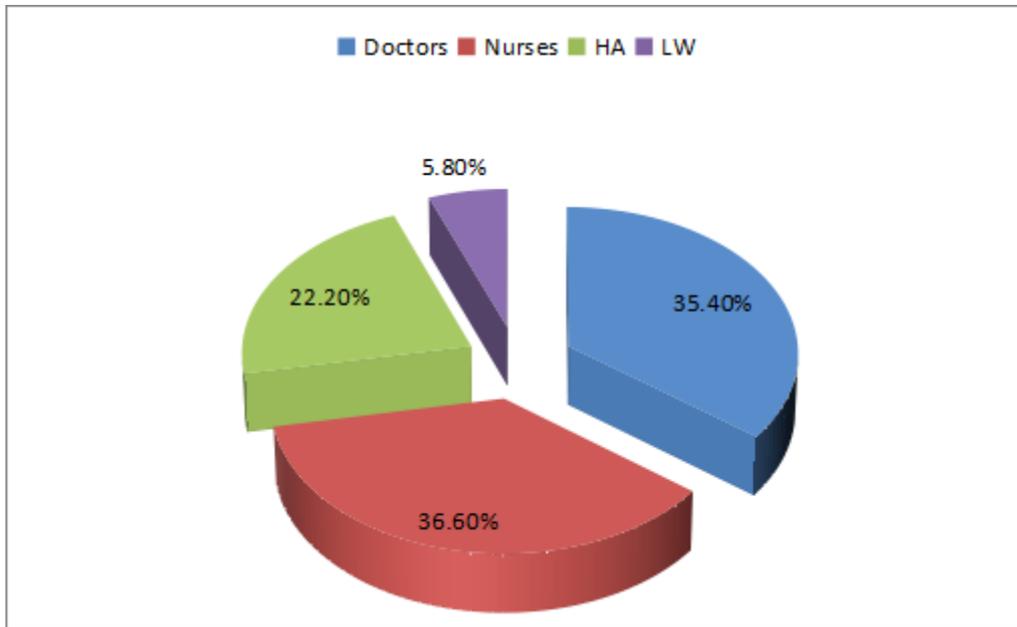


Fig. 4. Health care workers awareness of post exposure prophylaxis

Table 4. Respondents' knowledge of post exposure prophylaxis at the three levels of health care

| Health facility | Frequency(n=492) | | | Test | p-value |
|-----------------|------------------|-----------|-----------|-------------------------|---------|
| | Poor | Fair | Good | | |
| PHC | 140(56.5%) | 60(24.2%) | 48(19.4%) | X ² =63.5237 | 0.00001 |
| SHC | 36(83.7%) | 5(11.6%) | 2(4.7%) | | |
| THC | 55(27.4%) | 81(40.3%) | 65(32.3%) | | |

In the PHC, 48 participants (19.4%) have good understanding of PEP, but in the SHC and THC, the corresponding numbers of responders were 2 (4.7%) and 65 (32.3%). Greater than half of the HCWS in the PHC and SHC had poor knowledge of PEP (83.7%: 56.5). Also, 60(24.2%), 5(11.6%) and 81(40.3%) of the respondents in the primary, secondary and tertiary health care centres had fair knowledge of PEP. However, there was statistical significant different in the knowledge of PEP across the tiers of health care delivery.

Less than half of the respondents (43.1%; 38.1%; 36.8%) in the PHC, SHC and THC respectively, reported their exposure to the supervisors (Table 5). There was no statistically

significant difference in the reporting of exposure in relation to the level of health care.

Less than one-fifth, (15.1%), of the Health care workers exposed to blood and body fluids utilized post exposure prophylaxis, while 84.9% never utilized post exposure prophylaxis following occupational exposure to BBFs.

At all the levels, utilization of post exposure prophylaxis was higher (15.6%) among the PHC workers compared to SHC and THC levels. Comparatively however the secondary level of care recorded the least utilization of post exposure prophylaxis (14.30%) after exposure to BBFs as against 14.5% utilization rate recorded among the THC workers.

Table 5. Proportion of respondents who reported exposure to supervisor

| Health facility | Yes | No | Test | p-value |
|-----------------|------------|------------|-----------------------|---------|
| PHC | 119(43.1%) | 157(56.9%) | X ² =1.743 | 0.4182 |
| SHC | 16(38.1%) | 26(61.9%) | | |
| THC | 54 (36.8%) | 93(63.2%) | | |

*Multiple responses

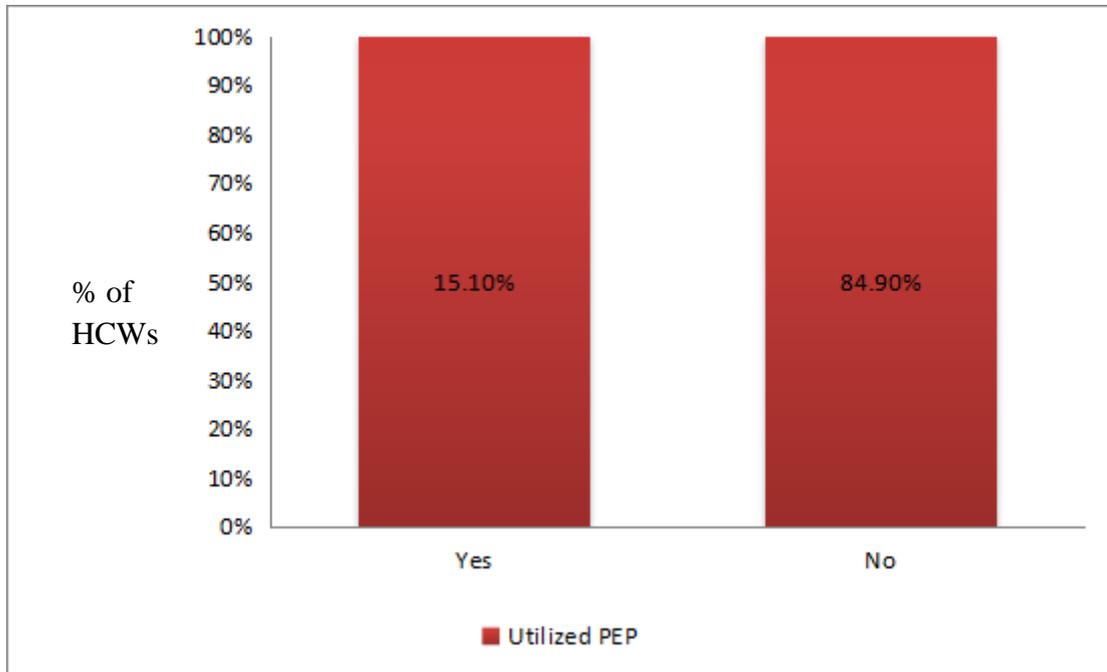


Fig. 5. Overall proportion of HCWs exposed to BBFs that utilized Post exposure prophylaxis (PEP)

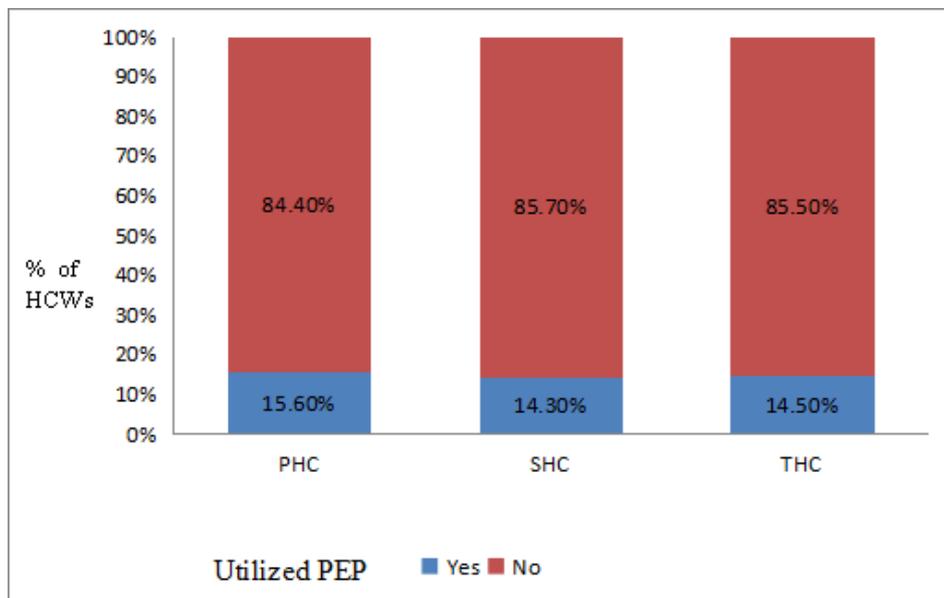


Fig. 6. Proportion of HCWs exposed to BBFs that utilized Post exposure prophylaxis (PEP) at three level of health care

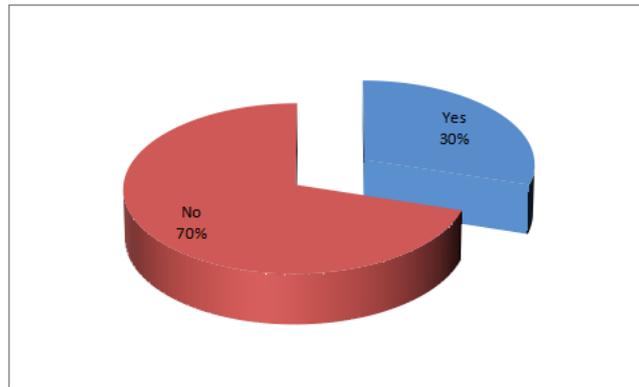


Fig. 7. Proportion of HCWs that completed Post exposure prophylaxis (PEP)

Seventy percent of the respondent that started PEP did not complete the treatment; however, only thirty percent of respondents completed post exposure prophylaxis treatment.

positive and others respectively (discrimination, adverse effect of the medication ,lack of exposure register or functional PEP unit (Table 6).

***Multiple responses:** One hundred and seventy six (35.8%) of the respondents perceived that exposed individuals are hindered from utilizing PEP because of stigma. Also, 174 (35.3%), 101 (20.5%), 133(27.06%) and 18(3.60%) of the respondents perceived that exposed HCWs are hindered from utilizing PEP due to lack of knowledge, low risk perception, fear of testing

Statistically significant: Report of exposures incorporated into the logistic regression model showed that there was association between this study variables and utilization of PEP (p=0.0001). However, occurrence of sharp injuries, level of health care and categories of HCWs showed no statistical association regarding utilization PEP Table 7.

Table 6. Factors (perceived) affecting utilization of PEP

| FACTORS | FREQUENCY (n=492) | PERCENTAGE |
|--------------------------|-------------------|------------|
| Stigma | 176 | 35.8% |
| Lack of knowledge | 174 | 35.3% |
| Low risk perception | 101 | 20.5% |
| Fear of testing positive | 133 | 27.06% |
| Others | 18 | 3.60% |

Table 7. Logistic regression analysis of variables that may have impact on utilization of PEP

| Variables | B-coefficient | Odds ratio (95% CI) | p-value |
|--------------------------------|-----------------|-----------------------|---------|
| Type of health facility | | | |
| PHC | Reference group | | |
| SHC | 1.061 | 2.889 (0.613- 13.610) | 0.180 |
| THC | -0.034 | 0.966 (0.523-1.783) | 0.912 |
| Job category | | | |
| Doctors | Reference group | | |
| Nurses | -0.290 | 0.748(0.376-1.491) | 0.410 |
| Health assistants | -0.035 | 0.966 (0.475-1.963) | 0.923 |
| Laboratory workers | -0.356 | 1.428(0.429-4.754) | 0.563 |
| Sharp injuries | | | |
| Yes | -0.452 | 0.636(0.400-1.013) | 0.057 |
| No | Reference group | | |
| Report of exposure | | | |
| No | Reference group | | |
| Yes | | 6.097 (3.559 -10.445) | 0.0001* |

3. DISCUSSION

Occupational exposure to sharp injuries are associated with transmission of potentially infectious pathogens, such as Human immunodeficiency virus, Hepatitis B and C virus [1,3]. This has continued to pose threats to healthcare workers at all levels of health care. Utilization of post exposure prophylaxis remains one of the most important strategies advocated by World Health Organization and Centre for Disease Control in controlling and reducing post exposure infections [4,10,12].

Greater than half of the HCWs were exposed to sharp injuries in the PHC settings. This observation corresponds with what was recorded among PHC workers in a developed country in Asia [19]. However, the rate recorded in this study is higher compared to the figure recorded in other studies [20,21]. A large percentage of the secondary health care workers recorded sharp injuries 12 months preceding study. The findings in this study were higher compared to what was reported among HCWs in Nigeria and other developed countries [22-24].

However, the yearly rate of sharp injuries among HCWs at the higher level of care (THC) was lesser than the rates observed in other parts of the country, where the value varies between forty-nine to fifty five percent [25,26,27]. The differences in prevalence may be due to better knowledge of injection safety practices and availability of standard precaution tools among health care workers at the higher level of care. The soaring increase in prevalence of sharp injuries in this study and other developing countries portends a likely increase in the burden of blood borne infections among health care workers in developing countries. These blood borne pathogens/infections do not only affect the wellbeing of health care workers, but they also compromise the worth of health care delivery systems in Africa and other developing countries [6,7].

Prevention of occupational exposure and post exposure management remains the basis for minimizing blood borne infections among health care workers [11,12,17]. Although, the proportion of health care workers that had heard about post exposure prophylaxis appeared high, especially at the THC compared to the SHC and PHC. The value was quite low when compared to the figures reported among HCWs at the three levels of health care in Northern and South West

Nigeria, where the proportion of those who had heard about PEP was as high as 97% and 97.7% respectively [28,29]. The probable reasons for the differences in level of awareness may not be unrelated to the fact that the previous studies were conducted either among health care workers in tertiary institutions alone or only among doctors, who by virtue of their training are supposed to be well-informed of post exposure management compared to the other HCWs. It is therefore not surprising that in this study the majority of the health care workers in the tertiary health care centres had heard about post exposure prophylaxis, with the result mirroring closely findings reported in Ethiopia and London [16,30].

Despite the fact that the majority of the health care workers across the three levels of health care had heard about PEP, only less than 5% of the health care workers had good knowledge of post exposure prophylaxis as greater than eighty percent of the HCWs at the SHC had poor knowledge of PEP compared to other HCWs at PHC and THC. The poor knowledge of PEP may hinder utilization of post exposure prophylaxis, a situation that potentially translates to more HCWs harboring blood borne viruses which is inimical to health and productivity. In this study, the finding concerning knowledge of PEP contrasts the finding reported in a similar study where almost ninety percent of the HCWs had good knowledge of PEP⁸⁰; however, the observation is similar to the report in previous studies in Ethiopia and Nepal, where less than eighty percent of the HCWs had good knowledge of PEP [16,31].

In terms of reporting of exposure, only 43.1%, 37.1% and 36.8% of the health care workers at the Primary, secondary and tertiary health care levels, reported the exposure to appropriate authorities, implying either a lack of procedure for reporting, lack of confidence in the PEP system at the centres or ignorance. Risk communication is an important component of every occupational health service and must be strengthened at all levels of health care to ensure health workers are adequately protected. Other studies in Nigeria and Kenya found out that greater than eighty percent of the health care workers reported their exposure to appropriate authority [17,32].

Apart from poor reporting, utilization of PEP was also very low across the three levels of health care as only twenty percent of the HCWs utilized PEP. Exposures are probably overlooked by the HCWs because of false

negative results obtained during window period of the viral infection.³ Therefore, the aftermath of not reporting or utilizing PEP as stipulated by CDC, may result in an unseen increase of occupationally acquired viral infections [11].

The report regarding use of PEP in this present study is similar to the findings from studies in Nigeria tertiary health institutions in which only 6.3% and 23.1% of the health care workers utilized post exposure prophylaxis against HIV [17,28]. The percentage of utilization of PEP is lower than that reported in other studies conducted among HCWs in the THC and SHC [16,32]. Although, a study conducted in India, corroborated the findings from this study as less than thirty five percent of the exposed utilized PEP [33]. Aside from the low utilization of PEP, another area of concern is the fact that of those who started PEP, only less than one-third of them completed the treatment. This figure is in tandem with the report given in a similar study [17], but in variance with the figure given in another study conducted among HCWs in a Tertiary hospital in south western Nigeria [28]. A major reason why HCWs do not complete their treatment may be attributed to absence of symptoms (or lag time between exposure and the appearance of symptoms). It is often difficult to convince people to adhere to treatment when they have no symptoms, particularly if the treatment has unpleasant consequences or side effects

4. CONCLUSION/RECOMMENDATIONS

It was concerning to see that the majority of healthcare workers (HCWs) lacked adequate knowledge and use of post-exposure prophylaxis, despite the crucial and necessary role it plays in preventing occupational bloodborne diseases (post-exposure infections). The study found that healthcare professionals had a high rate of sharp injury incidents; however, primary healthcare workers had a higher incidence of injuries than those at other levels of care. The majority of healthcare professionals had inadequate knowledge of post-exposure prophylaxis, according to the study. Similarly, the utilization of post exposure prophylaxis was very poor across the three level of health care, with worst indices recorded among secondary health care workers compared to the other levels of care. Therefore, there is need for regular training and sensitization on standard precaution, post exposure prophylaxis viz a viz principles and importance of post

exposure prophylaxis in preventing occupational acquired infections.

ETHICAL APPROVAL

Ethical approval was obtained from the Ethics and Research Committee of Irrua Specialist Teaching Hospital.

CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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