# Human Immunodeficiency Virus Post- Exposure Prophylaxis Among Health Care Workers in Nigeria: A Review On Research Evidence and Practice

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***Abstract***

Background: The prevalence of human immunodeficiency virus (HIV) post- exposure infections among health care workers (HCW) in Nigeria is higher than the National prevalence. Hence, the need to strengthen capacity to opt in for post-exposure prophylaxis HCWs. The aim of this review is to evaluate the practice of post exposure prophylaxis (PEP) for HIV infection among HCWs in Nigeria to in order to break the cycle of transmissions.

Methodology: A search was made to review articles published on the PubMed® database using "Post-Exposure Prophylaxis"[MeSH], "Occupational Exposure" and HIV, Nigeria yielding 39 articles. Further search was made in Google Scholar with the key words: "HIV PEP" AND "health workers", "Nigeria" that produced 76 results giving rise to a total of 115 articles from 2010 to 2019. After screening, ten studies were eventually included in this study.

Result: The studies reviewed were cross-sectional studies that involved different cadres of HCWs practising at different levels of health care. Majority of the HCWs studied had knowledge of existing protocol for PEP while only a fifth reported undergoing HIV PEP training programs. The practice of PEP was low in the studies. Training on occupational exposures and HIV PEP was found to be significantly associated with high knowledge and practice of HIV PEP in the studies reviewed. The reasons responsible for the low use of the HIV prophylaxis among HCWs were lack of written PEP protocols, lack of the antiretroviral drugs, fear of stigmatization and fear of side effects of the ART.

Conclusion: Training HCW across different healthcare cadres on the practice of HIV prophylaxis should be routine in all health care facilities.

**Keywords: Post-Exposure Prophylaxis, HIV, Health workers, Nigeria.**

## INTRODUCTION

Human immunodeficiency virus (HIV) infection is a pandemic of public health concern. By the end of 2019 about 38 million people were infected with HIV globally and about 1.7 million new HIV infections reported worldwide.[1] Of this number, 4.9 million reside in Western and Central Africa with just 58% of them having access to antiretroviral drugs.[1] Nigeria has the second largest HIV epidemic in the world and one of the highest rates of new infection. In 2019, an estimated 1.9 million people living with HIV were reported in Nigeria, with 130,000 new infections and 53,000 AIDS-related deaths by the end of 2019.[2]

The prevalence of HIV among health care workers in Nigeria has been shown to be 9.7% in 2017,[3] which is above the national prevalence of 3.6% for the same year.[4] This is quite disturbing and calls for scale up of interventions to prevent HIV in this cohort. Health care workers are occupationally vulnerable to HIV infection through percutaneous or needle stick injuries, splash of blood and body fluid to non-intact skin and mucosal in the course of carrying out their professional duties. Percutaneous injuries carry greater risk of HIV infection of about 0.3% which is more than the risk for mucosal exposure (0.09%).[5]

Although sexual transmission could be a potent medium of transmission of HIV among health care workers, a study conducted by Prüss-Üstün, Rapiti and Hutin in 2005, estimated that up to 66% to 95% of exposures to blood borne pathogens are due to percutaneous injuries.[6]

About 2.5% of HIV in health care workers are due to percutaneous injuries resulting in approximately 1000 HIV infections globally each year.[5] Most of this infection occur in Africa where the prevalence of HIV is high and compliance with universal precautions against transmission of infectious agents are inadequate.[5,7] Therefore, there is a dire need for interventional actions as regards occupational transmission to mitigate the transmission of HIV.

The prevalence of needle stick injuries among health care workers in Nigeria has been shown to range from 22.4% up to 69.4%.[8-10] Arinze-Onyia et al in 2018, reported the poor practice of universal precautions among 50% of the health care workers studied despite a high knowledge of universal precautions, they attributed this to the high prevalence of needle stick injuries.[7] Studies using animal models showed that following primary exposure to HIV, the virus replicates in the "dendritic cells of the skin and mucosa" from where it spreads to the body system via the lymphatic network thus leaving a "window of opportunity" for antiretroviral drugs to stop the replication and spread of the virus.[11]

The factors that increase the risk of HIV after occupational exposure to blood and body fluid include the mechanism of exposure, the amount of contaminant involved and the amount of the virus present in the contaminant at the time of exposure.[11]

Post exposure prophylaxis is designed to inhibit the replication of the virus thereby preventing the development of the HIV infection and has been found to be effective in preventing sero-conversion of health care workers following occupational exposures to HIV.[12] It is however worrisome to note that most of these injuries are under-

reported and often times the health care workers involved do not practice post-exposure prophylaxis for various reasons.[5]

HIV post-exposure prophylaxis comprise of actions taken after exposure to blood and body fluid of individuals which could be occupational or non-occupational in nature.[13] Such exposures are encountered by a health care worker while carrying out his or her duties through various means.

The suitable practice of HIV post exposure prophylaxis according to the World Health Organisation guidelines involves the initial management on exposure to blood and body fluids of patents. These include washing with soap and water, reporting and documentation of such exposures, risk assessment and commencement of antiretroviral drugs within 72 hours if applicable for four weeks.[14] A triple drug combination therapy using Zidovudine (AZT), Lamivudine (3TC) and Efavirenz (EFV) and follow-up HIV test at appropriate intervals is the approved line of management.[13,14]

Health care workers (HCW) in Nigeria are exposed to blood and body fluid on regular basis.[15] Giving the high prevalence and incidence of HIV infection in the country,[16] it is pertinent to investigate the practice of post exposure of HIV among health care workers in Nigeria. Furthermore, the consequences of the health care worker being infected with HIV can be enormous and ranges from distress to chronic illness and possibly death of the health care worker.[17] These underscore the importance of investigating the practice of post-exposure prophylaxis (PEP) with a view to scale up its utilisation among HCW in Nigeria.

The aim of this review is to evaluate the practice of PEP for HIV infection among HCW in Nigeria to in order to break the cycle of HIV transmissions.

## METHODS

### SEARCH STRATEGY AND STUDY SELECTION

To conduct this review, a search was made in PubMed® database for original articles on the practice of HIV post-exposure prophylaxis among health care workers using the following keywords: "Post-Exposure Prophylaxis"[MeSH] OR "Occupational Exposure" AND HIV, Nigeria. It gave 39 articles. Further search was made in Google Scholar using the key words: "HIV PEP" AND "health workers", Nigeria which produced 76 results giving a total of 115 articles. Ten articles were duplicates from the searches while 105 titles and abstracts were screened using the inclusion and exclusion criteria. After screening, 85 articles were excluded while 20 full texts were further assessed. Ten studies were included in the literature review as shown in Appendix 1. The search strategy and study selection are presented in figure 1.

### ELIGIBILITY CRITERIA

The inclusion criteria were original articles that were quantitative studies, written in English language, done among health care workers in Nigeria from 2010 to 2019 and published in peer-reviewed journals. Studies that reported lifetime exposures to infectious materials and practice of post exposure prophylaxis in the previous six months or previous year were included.

Exclusion criteria were studies done about non-occupational post-exposure prophylaxis of HIV and studies on knowledge of post exposure prophylaxis among health care workers that did not include the practice of post exposure prophylaxis among them. Conference abstracts, newspaper articles and unpublished articles were also excluded.

### DATA EXTRACTION

Data was extracted using a structured template with the following headings: Author and year of publication, location, aim, methods, sample population, sample size and response rate and results. Articles that met the inclusion criteria were evaluated for prevalence and pattern of occupational exposures of health care workers to HIV, knowledge and practice of HIV PEP and factors associated with knowledge and practice of HIV PEP among HCW in Nigeria.

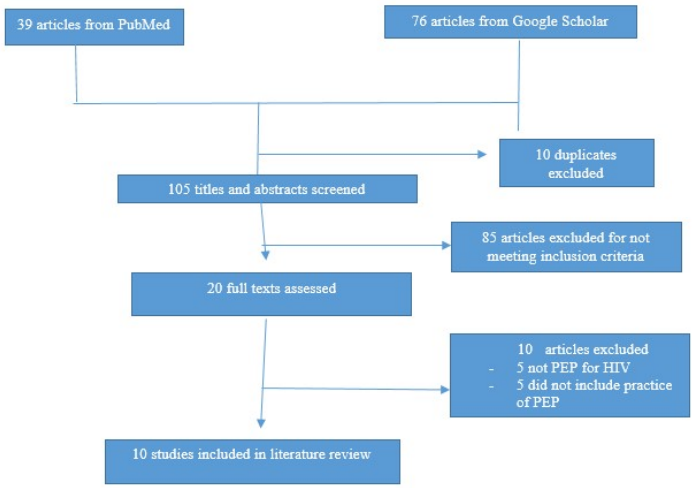


Figure 1: Flow chart of search strategy.

## Results

### Characteristics of studies on PEP for HIV infection

All 10 (100%) of the studies found were descriptive cross-sectional studies. Though cross-sectional studies are at the lower end of the ladder in the hierarchy of evidence, all the studies involved more than 120 health care workers each and had response rates above 80%. These are as shown in Table 1.

TABLE 1: Characteristics of studies on PEP for HIV

| Author(s)/ year of publication | Journal title | Study title | Study design | Response rate | Sample size | Sampling method | Population Sampled |
|---|---|---|---|---|---|---|---|
| Oche et al., (2018)[18] | Journal of family medicine and primary care | Determinants of appropriate knowledge on human immunodeficiency virus post exposure prophylaxis among professional health-care workers in Sokoto, Nigeria | Cross-sectional | 97.6% | 156 | Stratified sampling | Doctors, nurses, midwives, community health extension workers (CHEW), Pharmacists, Medical laboratory Scientists/Technicians |
| Uzochukwu et al., (2014)[19] | Journal of AIDS Clinical Research | How do Primary Health Care Workers Perceive and Practice Post Exposure Prophylaxis for HIV in Enugu State | Cross-sectional | 100% | 129 | - | Doctors, Nurses, others |
| Ajibola et al., (2014)[20] | The Pan African medical journal | Knowledge, attitude and practices of HIV post exposure prophylaxis amongst health workers in Lagos University Teaching Hospital | Cross-sectional | 100% | 372 | - | All cadres of health care workers |
| Nwankwo & Aniebue, (2011)[21] | Nigerian journal of clinical practice | Percutaneous injuries and accidental blood exposure in surgical residents: Awareness and use of prophylaxis in relation to HIV | Cross-sectional | 80% | 230 | Consecutive sampling | Doctors in surgery department |
| Onolabi et al., (2012)[22] | Journal of the International Association of Physicians in AIDS Care | Knowledge and practice of post-exposure prophylaxis (PEP) against HIV infection among health care providers in a tertiary hospital in Nigeria | Cross-sectional | 100% | 230 | Stratified random sampling | Doctor, nurses, laboratory scientists |
| Onuoha and Omosivie, (2019)[23] | Asian Journal of Medicine and Health | Knowledge, attitude and utilization of HIV post-exposure prophylaxis among health care workers at HIV Treatment Centres in Port-Harcourt Metropolis | Cross-sectional | 97.6% | 204 | Multi-stage sampling | Doctors, nurses, medical laboratory scientists |
| Adebimpe, (2018)[24] | Bulletin of Faculty of Pharmacy, Cairo University | Knowledge and practice of health care workers towards post exposure prophylaxis in the era of low and stable HIV prevalence in South Western Nigeria | Cross-sectional | 100% | 300 | Multi-stage sampling | Nurses, laboratory scientists and CHEW |
| Odinaka et al., (2016)[25] | Nigerian Journal of Paediatrics | Post exposure prophylaxis against human immunodeficiency virus: awareness knowledge and practice among Nigerian Paediatricians | Cross-sectional | 83% | 150 | - | Paediatricians |
| Ekundayo & Ogbaini-Emovon, (2014)[26] | International Journal of Community Research | Knowledge, attitude and practice of human immunodeficiency virus infection post-exposure prophylaxis among resident doctors in a tertiary hospital, Benin city, Nigeria | Cross-sectional | 97% | 187 | Stratified random sampling | Resident doctors from various specialities |
| Agaba et al., (2012)[27] | Nigerian medical journal | Awareness and knowledge of human immunodeficiency virus post exposure prophylaxis among Nigerian Family Physicians | Cross-sectional | 62% | 175 | - | Family Physicians |

The studies were spread around the country as they included studies from five out of the six geo-political zones of the country. These are as shown in figure 2.

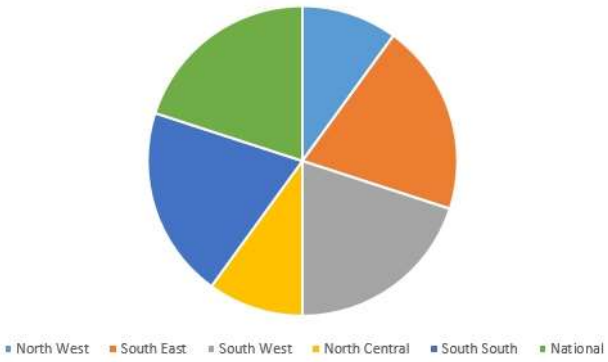


Figure 2: Geopolitical regions of the country the studies were conducted.

The studies comprised different cadres of health care workers comprising doctors, nurses, midwives Laboratory scientists and technologists, community health extension workers (CHEW) and health attendants. Two of the studies were surveys among different ranks of doctors from every part of the country attending different conferences, while two other studies were among resident doctors in the South Southern and South Eastern zones of the country. One of the studies was done among health care workers other than doctors [17] while others included various cadres of health care workers in each study. Half (50%) of the studies used stratified sampling method to encompass the various cadres of health care workers and the different levels of health care services and facilities in the country.

The studies were done among health care workers practising at varying levels of health care. Two of the studies were carried among health care workers working in Primary Health Centres. Another two of the studies were carried out among health care workers practising in various health care settings including private, primary, secondary and tertiary health facilities,[19] while the rest were carried out among health care workers at various tertiary health facilities across the country. However, two of the studies were carried out at National conferences among doctors from diverse regions who worked at various levels of health care facilities in the country. These are shown in figure 3.

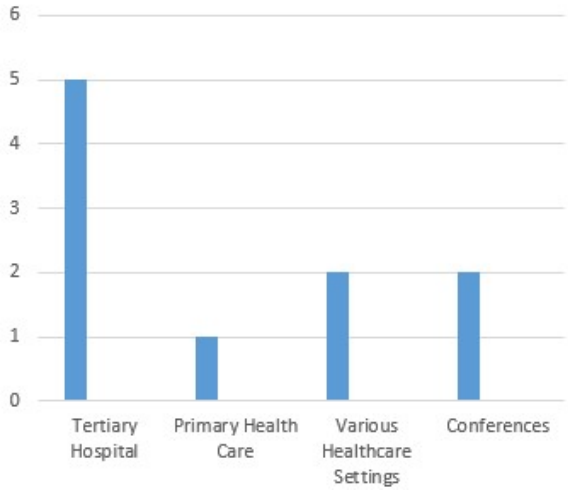


Figure 3: Settings of the studies.

**Prevalence and pattern of occupational exposures of health workers to HIV**

The rate of occupational exposures of the health care workers to HIV was found to vary widely in the studies. Half (50%) of the studies measured lifetime history of occupational exposures/percutaneous injuries of which most of these injuries were needlestick injuries, these ranged from 22.1% to 69.4%. The rate of occupational exposure over one year ranged from 10.2% to 31%, while the rate of occupational exposure over six months ranged from 14.7% to 65.7% among different cadres of health care workers.

**Awareness, knowledge and practices of HIV PEP among health workers**

The awareness of post exposure prophylaxis was high and ranged from 60.3% to 97.7%. However, good knowledge of post exposure prophylaxis was low ranging from 2.7% in South Western, Nigeria to 41% in South Eastern, Nigeria.

Majority (60%) of the studies showed that more than half of the health care workers studied had knowledge of protocol for PEP either in their health care facilities or in the country. However, only 20% of the studies reported HIV PEP training programs in up to half of the health care workers studied.

The practice of post exposure prophylaxis was as low as 1.4% in a study conducted among surgical resident doctors in South Eastern Nigeria. However, the practice of post exposure prophylaxis was slightly higher in studies comprising of mixed cadres of health care workers. Majority of the studies (70%) found that health care workers disregarded occupational exposures after application of first aid measures. Training on occupational exposures and post exposure prophylaxis of HIV was found to be significantly associated with high knowledge and practice of post exposure prophylaxis of HIV in 20% of the studies reviewed.

| Author | Awareness of PEP for HIV | Knowledge of PEP for HIV | | Practice of PEP for HIV |
|---|---|---|---|---|
| | | General knowledge | Adequate knowledge | |
| Oche at al., (2018)[18] | 87.2% | - | 71.2% | 23% |
| Uzochukwu et al., (2014)[19] | - | 86% | | 17.8% |
| Ajibola et al., (2014)[20] | 83.3% | - | 54% | 6.3% |
| Nwankwo and Aniebue, (2011)[21] | 93.5% | 93.5% | 41% | 2.9% |
| Owolabi et al., (2012)[22] | 97% | - | 71% | 5.6% |
| Onuoha and Omosivie, (2019)[23] | 98.5% | 93% | 39.7% | 45.5% |
| Adebimpe, (2018)[24] | 60.3% | - | 60% | 65.9% |
| Odinaka et al., (2016)[25] | 96% | - | - | 11% |
| Ekundayo and Ogbaini-Emovon, (2014)[26] | 90.4% | - | 66% | 47.4% |
| Agaba et al., (2012)[27] | 97.7% | - | 79.4% | 21.6% |

Note: - indicates unavailable data

**Factors associated with knowledge and practice of HIV PEP**

Training of health care workers on occupational exposures and post exposure prophylaxis of HIV was reported to be significantly associated with high knowledge and practice of post exposure prophylaxis of HIV. This underscores the need for routine training of health care workers on HIV PEP.

The reasons for the low utilisation of HIV PEP among health care workers in the studies were diverse. One third of the studies found that some health care workers lack information on what to do and who to report incidences of occupational exposure to blood and body fluid of patients.

Unavailability of the antiretroviral drugs was cited by the studies conducted among Primary Health Care facilities as the reason for not practicing HIV PEP by the health care workers. Fear of stigma and discrimination by the health care workers were prominent as reasons for not practicing post exposure prophylaxis of HIV in 80% of the studies reviewed. The fear of side effects of the antiretroviral therapy was cited by 40% of the studies as the reason for not practicing post exposure prophylaxis among the health care workers.

**TABLE 3: Awareness, Knowledge and Practice of PEP for HIV**

| Author | Awareness of PEP for HIV | Knowledge of PEP for HIV | | Practice of PEP for HIV |
|---|---|---|---|---|
| | | General knowledge | Adequate knowledge | |
| Oche at al., (2018)[18] | 87.2% | - | 71.2% | 23% |
| Uzochukwu et al., (2014)[19] | - | 86% | | 17.8% |
| Ajibola et al., (2014)[20] | 83.3% | - | 54% | 6.3% |
| Nwankwo and Aniebue, (2011)[21] | 93.5% | 93.5% | 41% | 2.9% |
| Owolabi et al., (2012)[22] | 97% | - | 71% | 5.6% |
| Onuoha and Omosivie, (2019)[23] | 98.5% | 93% | 39.7% | 45.5% |
| Adebimpe, (2018)[24] | 60.3% | - | 60% | 65.9% |
| Odinaka et al., (2016)[25] | 96% | - | - | 11% |
| Ekundayo and Ogbaini-Emovon, (2014)[26] | 90.4% | - | 66% | 47.4% |
| Agaba et al., (2012)[27] | 97.7% | - | 79.4% | 21.6% |

Note: - indicates unavailable data

## DISCUSSION

Globally, the major source of occupational transmission of blood-borne pathogens are needlestick injuries.[28] There is dearth of data on the accurate rate of needle stick injuries due to under-reporting.[5] Needle stick injuries have been found to be high in developing countries and majority of the needle stick injuries not reported.[28,29] The range of needle stick injuries reported in the studies reviewed is similar to the rate of 54% and 54.2% found in Indian and Pakistan studies respectively.[31,32]

The rate of needle stick injuries in the studies reviewed was higher among health care workers in tertiary health care facilities compared to health care workers in primary health care facilities. This may probably be a result of the higher number of patients that health care workers in tertiary health facilities attend to on a daily basis. It may also be as a result of complexity of disease condition, patients needing intensive care, instrumentation, surgical and diagnostic procedures. The rate of occupational exposures also varied with the different cadres of health care workers. Occupational exposures were higher among doctors and nurses compared to Community Health Extension Workers (CHEW) and Community Health Officers.[8,10,19,23] This may be a result of the different scope of the jobs of the various health care workers.

All the studies found a high awareness of post exposure prophylaxis among the different cadres of health care workers. This is similar to studies that found that 80.4% and 97.3% of health care workers in Tanzania and Ghana respectively were aware of HIV PEP.[33,34] The awareness was found to be higher among health care workers in tertiary health care facilities which may be owning to most of the tertiary health facilities being treatment centres for HIV that are usually donor-funded.

Despite the high rate of awareness among the health care workers, majority of the studies found a low level of adequate knowledge of PEP for HIV among them. This is similar to the study of the knowledge of PEP in Ghana which showed that 20% of health care workers had good knowledge of post exposure prophylaxis.[33] While 23% of health care workers demonstrated good knowledge of HIV PEP in Eastern Ethiopia.[35]

However some studies found high level of knowledge of post exposure prophylaxis among health care workers in tertiary health facilities.[9,20,22] It is of note that there was no uniform measure of assessment of knowledge of HIV PEP in the various studies. The questions assessing knowledge of post exposure prophylaxis differed from one study to another and the measure of good knowledge of post exposure prophylaxis were not standardised hence making comparisons between studies difficult.

The knowledge of HIV PEP was associated with designation of the health care worker, level of education, number of years of service and source of information about HIV PEP.[9,22-,24] Knowledge of post exposure prophylaxis was found to be better among doctors, health care workers with higher education, among those with greater than five years of service and those who had training on post exposure prophylaxis. This is in consonance with studies in Tanzania and Ghana that had the same findings.[33,34] This is not surprising as health care workers with higher education are likely to have been taught about post exposure prophylaxis of HIV in school. Moreover, health care workers who have had more than five years of service were likely to have had opportunity of training in HIV PEP. As expected, training on post exposure prophylaxis increases knowledge about it.

There was a curious association of knowledge of post exposure prophylaxis with rank of doctors. Junior doctors appeared to have better knowledge of post exposure prophylaxis of HIV than senior doctors.[8,10] This calls for the need to ensure updating of knowledge and sensitisation towards occupational transmission of HIV among senior doctors as Medicine tends to be a dynamic field.

The practice of post exposure prophylaxis for HIV in all the studies was low despite the high level of awareness and knowledge of HIV post exposure prophylaxis. The use of HIV PEP among the different cadres of health care workers in the various studies varied widely. This finding agrees with similar studies in other parts of Africa (Tanzania and Ethiopia) where the practice of post exposure prophylaxis is low despite the high prevalence of HIV.[34,35] However, a studies in the United States of America and United Kingdom reported higher compliance to post exposure prophylaxis of HIV by health care workers.[36,37]

A significant number of the health care workers did not report incidences of occupational exposures to HIV neither did they follow through with risk assessment or administration of antiretroviral drugs. This seems to be common to the developing countries as reported in Ghana, Tanzania and India.[33,34,38]

Most health workers in Nigeria did not utilise HIV PEP because of inadequate information on correct practices and lack of domestic written policies and protocol on post exposure prophylaxis of HIV. Similar finding were reported in Ghana, South Africa, Ethiopia.[39-41]

It was also observed by Auta et al., in a systematic review of literature about occupational exposures to HIV among health care workers in Africa.[5] This informs the need

for the establishment of written protocols for post exposure prophylaxis of HIV in all health care facilities at all levels in the country. Where such protocols exist, there is need for clear and regular communication and sensitisation of health care workers to adhere to the guidelines.

HIV care programmes in Nigeria were mainly situated in the secondary and tertiary health care facilities in the country because of the donor-funded nature of the programme. This made antiretroviral drugs unavailable in many primary health care facilities, hence health workers in primary health care facilities may not have easy access to post exposure prophylaxis of HIV. This finding highlights the need for extension of HIV care programmes to the community through the Primary Health Care facilities that are more accessible to individuals in the communities.

Majority of the studies cited fear of stigma and discrimination by the health care workers as reasons for not practicing post exposure prophylaxis of HIV. This points to the high rate of stigma and discrimination against people living with HIV in the country.[42] Similarly the fear of side effects of the antiretroviral drugs were reasons for not practicing PEP of HIV by some health care workers. Several side effects have been documented by other studies in non-HIV clients taking antiretroviral drugs for post exposure therapy which led to discontinuation of the drugs.[43,44]

**Study Strength and Limitations**

The study covered PEP for HIV practices in all the various geopolitical zones of the country and among the different cadres of health care workers in the country. It also elicited the reasons for the practices observed among the health care workers.

The limitations noted in this study are all the studies were cross-sectional descriptive studies which cannot be used to define causal relationships. Furthermore, the studies reviewed used self-reported retrospective data that may be prone to recall and desirability biases.

Conclusion and recommendations

This review of literature has highlighted the low practice of post exposure prophylaxis among health care workers in Nigeria despite the high awareness demonstrated. It also highlighted the need for establishment and regular communication of post exposure prophylaxis protocols and guidelines in the various levels of health facilities in Nigeria. Continuous training and retraining across diverse cadres of health care workers in the country will ensure adherence to these guidelines and consequent prevention of occupationally acquired HIV infections among health care workers in Nigeria.

Further research is required to develop a standardized assessment tool for knowledge of post exposure prophylaxis of HIV. This will make comparison of level of knowledge of post exposure prophylaxis of HIV uniform across various cadres of health workers and across different locations in the world.

Qualitative studies may be needed to explore the in-depth reasons for health care workers not practising post exposure prophylaxis of HIV following occupational exposures despite their knowledge of the effectiveness of post exposure prophylaxis.

**Conflict of Interest**

The authors declare no conflict of interest.

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