REVIEW PAPER

Knowledge regarding post-exposure prophylaxis amongst nurses in an African context

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Abstract

Occupational exposure to human immunodeficiency virus (HIV) among nurses had been reported to be a major challenge in South African and broader African context. There seems to be an increase in the level of exposure and uptake of post-exposure prophylaxis (PEP) in Africa. This had warranted the need to establish a systematic review on the level of knowledge among nurses regarding PEP in the African continent. The search engines used included: EBSco Host (North-West University [NWU] library), Sabinet, Google Scholar, ScienceDirect, and PubMed. The search was limited to the current decade (2008-2018), including articles that are in English. Keywords used were: 'knowledge', 'post-exposure prophylaxis/PEP', 'HIV', and 'nurs*'. Thematic evaluation to pick out commonalities of the applications covered in this review have been achieved. The themes identified from the review were: poor knowledge regarding PEP, receiving training on PEP for HIV, immediate steps to take after exposure to infected blood, exposure to HIV, and not taking PEP.

There is a strong need to increase the awareness and knowledge regarding PEP as well as to implement training programs to train nurses on the process of PEP in healthcare settings, to increase knowledge on PEP, and thereby decrease seroconversion of HIV. y.

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Introduction

Occupational exposure to human immunodeficiency virus (HIV) among nurses had been reported to be a major challenge in South African as well as other African countries [1]. 'Nurses' in this systematic review shall mean all category of nurses, thus student nurse, enrolled nursing auxiliary, enrolled nurse as well as professional nurse. Nurses face a great challenge due to occupational HIV exposure, as they provide baseline care to diverse, unique individuals, thus nurses are treating people who are HIV-positive, HIV-negative, and with unknown HIV status. Occupational exposure contributes to the burden of HIV in the workplace, with increased morbidity and mortality on healthcare workers who provide care to people living with HIV [2]. As of December 31, 2013, 58 validated occupational transmissions of HIV and one hundred and fifty viable transmissions had been reported in the United States. Of these, solely one validated case has been suggested since 1999. Underreporting of instances had been described by the National Institute for Occupational Safety and Health (NIOSH) as a matter of concern, and this is so given that case reporting is voluntary [3].

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The World Health Organization (WHO) outlined that each year there are three million cases of percutaneous exposure in healthcare settings [4-6]. Percutaneous, contact, and mucous membranes were revealed to be the customary types of exposure. It was further highlighted that percutaneous exposure via a needlestick is the most common mode of occupational HIV transmission [1, 2]. Transmission via mucous membranes as well as through abraded skin is the least common mode of occupational HIV transmission. The average risk of percutaneous exposure following HIV exposure is estimated to be 0.3% and 0.09% after exposure to mucous membranes [8]. The studies showed that occupational exposures occur predominantly in developing countries, although they are infrequently reported [9, 10].

Occupational exposure is explained as the contact with an infected patient's blood or bodily fluids by healthcare personnel at work [17]. When there is an occupational exposure to HIV, post-exposure prophylaxis (PEP) is a routine method to be implemented as it prevents 81% seroconversion [4, 6, 11, 12]. PEP comprises of first aid, counselling, risk assessment, HIV testing, established informed consent of the exposed individual as well as by maintaining confidentiality of the findings, with continuous counselling and support to promote adherence [9, 13, 14]. PEP does not guarantee that one cannot get infected by HIV after exposure, as it is not 100% effective, but it can decrease the risk of HIV transmission by 81% [13, 15, 16].

PEP was defined as a precautionary medication of 2-3 antiretroviral (ARV) drugs administered following exposure to a pathogen, to prevent or reduce the likelihood of HIV transmission [1, 16, 18]. PEP should be administered/initiated as early as possible, but at least within one hour of exposure, with the latest being within 72 hours after exposure [19]. The ARVs, however, should be taken for a period of 28 days after exposure [20, 21]. PEP is still the best prophylaxis and currently the only method used to prevent seroconversion after exposure. There seems to be an increase in the level of exposure and uptake of PEP in Africa. This had warranted the need to establish a systematic review on the level of knowledge among nurses regarding PEP in the African continent.

Material and methods

The study conducted was documented in a study protocol. The types of studies that were required for this review were cross-sectional descriptive studies, which were used to discover the knowledge of nurses regarding PEP. Participants were nurses in Africa. Interventions were finding out information regarding nurse's knowledge on PEP. The outcome measures were for nurses to have sufficient knowledge on PEP.

The search engines that were used were: EBSco Host (NWU library), Sabinet, Google Scholar, ScienceDirect, and PubMed. The search was limited to the current decade (2008-2018) and the articles included were English written. Keywords that were used were: 'knowledge', 'post-exposure prophylaxis/PEP', 'HIV', and 'nurs*'. PRISMA (preferred reporting items for the systematic review and meta-analysis) tool was used for the review process and results. The search was conducted twice with the help of the NWU-based librarian through databases/search engines, and this was followed by a manual search of reference list of eligible studies. The titles, abstracts, methods, and results of different studies were screened by the investigators independently for inclusion of potential articles as well as to remove duplicates. The PRISMA flow diagram was used as a guidance tool for the systematic review [22].

Study selection

The study selection was accomplished by using the PRISMA flow diagram of 2009 to identify data included and excluded, and their rationale for exclusion. Initially, all studies were screened using their titles and abstracts. Furthermore, the studies, which could not be excluded from this review had their full texts evaluated. In order to achieve this, all selected items had their full texts sought, with their eligibility in terms of inclusion criteria double-checked. The evaluation of titles, abstracts, and full texts as well as manual searches from selected articles' reference list was performed between September and October 2018, with the last search on the 18 October 2018 with the help of a librarian. All studies selected did not need approval from the authors for use as they were available publicly. Only the full text of the selected studies that met the inclusion criteria were subjected to quality appraisal (Figure 1).

Appraisal of selected studies

Appraisal of results was conducted using the Critical Appraisal Skills Programme, a cohort study checklist to assess the articles thoroughly and systematically, in order to ensure their relevance and trustworthiness [23]. Seven studies were assessed to confirm their relevance; the results are conveyed in Table 1.

Results

The total search results screened were 18,111, with 79 duplicates. Results that were relevant to the topic by title and abstract were 111. Screening of titles and abstracts were conducted independently by the researchers after removing duplicates. Full-text articles that were considered to meet the inclusion criteria were 23 in total. Articles that were included for the review were seven. Some articles were relevant, but not included as some of them were: not published in English, older than 10 years (not relevant to the 2008-2018 era), and not relevant to the keywords that were used in the study. Articles that were considered for review for the evaluation of the articles needed to describe/fulfill the following terms: knowledge and post-exposure prophylaxis/PEP. Table 2 provides the characteristics of the selected studies.

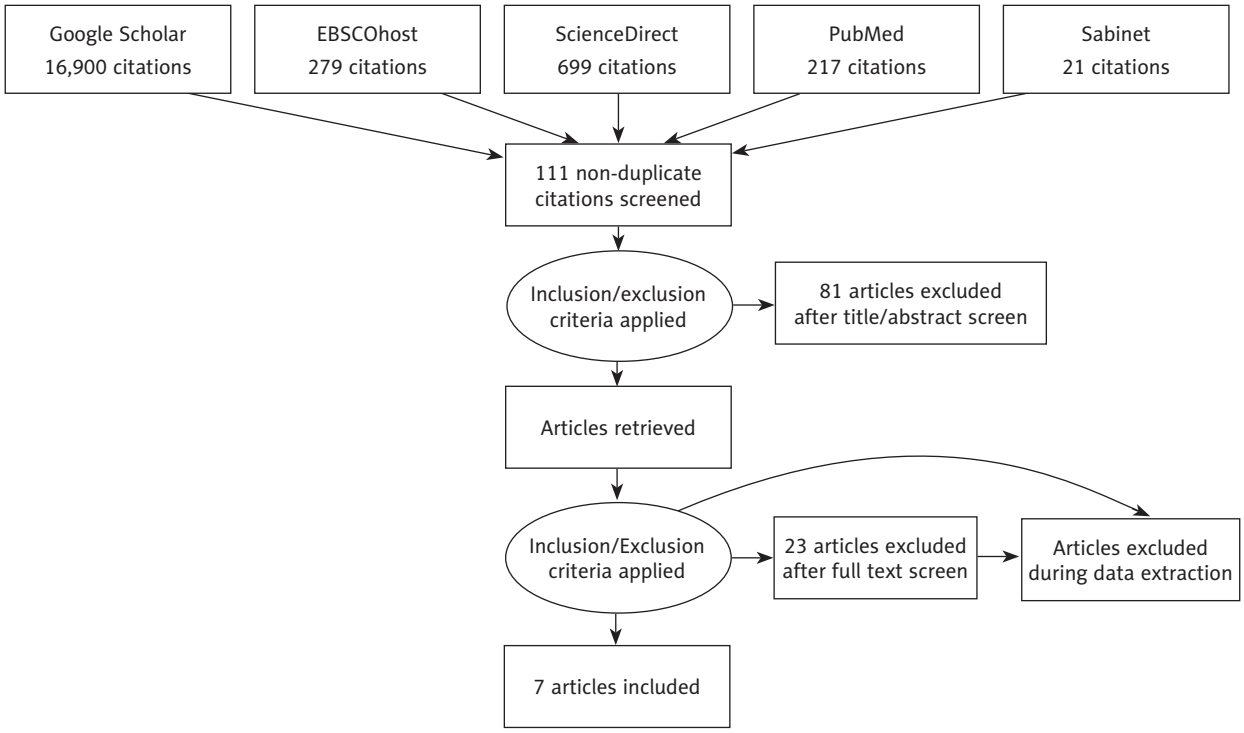

Figure 1. PRISMA flow diagram

Table 1. Appraisal of studies using CASP

Authors and year	Study design	Assessment of studies
Aminde *et al.*, 2015	Cross-sectional study	6/10 (60%)
Dhital *et al.*, 2017	A descriptive design	5/10 (50%)
Lamichanne *et al.*, 2012	Descriptive cross-sectional research design	5/10 (50%)
Mabina *et al.*, 2018	Cross-sectional descriptive study	7/10 (70%)
Makhado *et al.*, 2016	Cross-sectional descriptive design	8/10 (80%)
Olowabi *et al.*, 2012	Cross-sectional study design	6/10 (60%)
Sendo *et al.*, 2014	Cross-sectional descriptive study	8/10 (80%)

Thematic evaluation to pick out commonalities of the applications covered in this review have been achieved. The themes identified from the review were:

- level of knowledge regarding PEP ($n = 7$) [2, 4, 6, 8, 24-26],
- receiving training on PEP for HIV ($n = 4$) [4, 6, 8, 25],
- immediate steps to take after exposure to infected blood ($n = 2$) [6, 8],
- exposure to HIV and not taking PEP ($n = 5$) [2, 4, 24-26].

Level of knowledge regarding post-exposure prophylaxis

Poor information concerning PEP suggest that there will be excessive possibilities of poor adherence as well as seroconversion of HIV. If there is little understanding regarding PEP, there will also be an increase in mortality and morbidity rates, particularly in developing countries. Poor knowledge regarding PEP means that nurses may have little or no information regarding PEP and as a result, nurses may not take PEP (due to lack of knowledge) and this may place them at risk of transmitting HIV. In a study that was conducted in Cameroon, 73.7% of the nurses had a lack of information concerning PEP [4]. From a study conducted Bharatpur, a sample of 50 nurses were used and from the sample, out of which 40% did not know the correct meaning of PEP and most of the participants not knowing the correct regimen for PEP (46%); 50% of the participants did not know of the duration of PEP and 66% of participants had pre-knowledge on PEP [8]. Research conducted in Nepal concluded that nurses only sought information regarding PEP by self-learning, with 78% on a sample of 425 nurses, 48% through co-workers, and 11% based on working experience [6]. About 68% of participants had fair level of knowledge on PEP [6]. On the contrary, a study

Table 2. Characteristics of the included studies

Authors and year	Objectives/ aim of the article	Country	Study design	Population and sample size	Documented outcomes	Limitation of the study
Aminde *et al.*, 2015	To assess the knowledge and practices of nurses regarding post-exposure prophylaxis for HIV and their determinants in Cameroon	Cameroon	Cross-sectional study	The population was divided into two groups: participants with poor knowledge and those with average-to-good knowledge; sample population consisted of 80 nurses	In all, 73.7% of the participants had poor knowledge about post-exposure prophylaxis for HIV	The authors acknowledged the cross-sectional study to be a limitation in their study
Dhital *et al.*, 2017	To determine the knowledge level about post-exposure prophylaxis of HIV among nurses	Bharatpur	A descriptive design	The study populations were either proficiency certificate-level nurses or post-basic bachelor of nursing (PBBN) nurses working at BPKMCH; sample population consisted of 50 nurses	The study showed that 48% of respondents had knowledge on the meaning of post-exposure prophylaxis	Not included
Lamichanne *et al.*, 2012	To assess the nurses' knowledge regarding post-exposure prophylaxis of HIV in medical colleges of the Chitwan district	Nepal	Descriptive cross-sectional research design	The population of the study was the 425 nurses who were working at the Chitwan Medical College Teaching Hospital (CMCTH-161) and College of Medical Sciences Teaching Hospital (CMSTH264), Bharatpur, Chitwan, Nepal, irrespective of their professional educational background; sample consisted of 65 nurses	The finding of this study revealed that out of 65 respondents, only four (6%) respondents had a good level of knowledge, with a mean knowledge score of 23, while 44 (68%) respondents had a fair level of knowledge with the mean knowledge score being 17 and 17 (26%) respondents had a poor level of knowledge with the mean knowledge score of 10	Not included
Mabina *et al.*, 2018	To determine and to describe TB/HIV exposure among nursing students in the clinical practice environment	South Africa	Non-experimental, cross-sectional descriptive study	Population consisted of nursing students from first-to-fourth level of study; sample was 151 students, first year (n = 46), second year (n = 36), third year (n = 26), and fourth year (n = 44)	The study was among nursing students on their knowledge regarding post-exposure prophylaxis. First year students had 63.0% of knowledge, second year students had 20.6% of knowledge, third year students had 96.2% of knowledge and fourth year students had 44% of knowledge on post-exposure prophylaxis. The rate for students who had no knowledge on post-exposure prophylaxis was 3.8% to 37%	The findings cannot be generalized to other NWU campuses as only one campus was used for data collection. Time constraints and exams prevented other nursing students to participate in the study

Table 2. Cont.

Authors and year	Objectives/ aim of the article	Country	Study design	Population and sample size	Documented outcomes	Limitation of the study
Makhado and Davhana-Maselesele, 2016	To determine knowledge, insight and uptake of occupational post-exposure prophylaxis amongst nurses caring for people living with HIV	South Africa	A cross-sectional descriptive design	Sample of 240 nurses	Approximately 40% did not know what post-exposure prophylaxis is, and 22% did not know or were not sure if it was available in the hospital	The findings of the study cannot be generalized to other regional hospitals in the province as only one regional hospital was used
Olwabi *et al.*, 2012	To assess the knowledge and practice of post-exposure prophylaxis against HIV infection among healthcare providers at the University of Abuja Teaching Hospital (UATH)	Nigeria	Cross-sectional study design	Healthcare providers working at the University of Abuja Teaching Hospital (UATH), Gwagwalada, Abuja; 230 healthcare providers (comprising of 92 doctors, 127 nurses, 9 laboratory scientists, and 2 others) were used as a sample	Majority (97.0%) of the respondents have heard about post-exposure prophylaxis, but only a few (30.9%) of them could correctly identify the drugs used and duration of post-exposure prophylaxis treatment. Of the 13 respondents that were exposed to HIV-positive patients, only 3 (23.1%) received and post-exposure prophylaxis, while the majority of 10/13 (76.9%) did not receive post-exposure prophylaxis despite their exposure to HIV-positive sources	Not included
Sendo *et al.*, 2014	To assess the level of knowledge and practice of nursing and midwifery students regarding post-exposure prophylaxis for HIV at Hawassa University, College of Medicine and Health Science in Ethiopia	Ethiopia	Cross-sectional descriptive study	All second year and higher nursing/midwife students were eligible to participate in the study; sample included 185 students (comprising of 136 nursing and 49 midwifery)	Among all of the respondents, 54 (29.2%) were exposed to HIV risky conditions and of the exposed respondents, the majority (32) (59.3%) started post-exposure prophylaxis	Not included

in the south African context also highlighted that 40% of nurses did not know what PEP is, which proves that only 60% of the participants were familiar with PEP [2]. A Nigerian study reported that 95.3% of nurses were acquainted with PEP [25], while another Ethiopian study indicated that 49.2% of student nurses and 17.8% of midwives were aware of PEP, with approximately 63% of inadequate knowledge on PEP [26]. A study among nursing students on their knowledge regarding PEP revealed that first year students had 63.0% of knowledge, second year students had 20.6% of knowledge, third year students had 96.2% of knowledge, and fourth year students had 44% of knowledge on PEP [24]. The number of students who had no knowledge on PEP ranged between 3.8% and 37%, respectively. This indicates that knowledge of nurses regarding PEP varied between different cadre of nurses and context.

Receiving training on post-exposure prophylaxis

Training nurses on PEP may assist them to enhance and transfer their knowledge to others. This approach might motivate the majority of nurses to consider opting for PEP after HIV exposure in a healthcare setting, for example via a needle stick injury. Receiving training on PEP includes: first aid, assessment of risk, counselling, HIV testing on informed consent, confidentiality, and providing psychological support. Thorough training on PEP may enhance adherence as well as disease prevention. Although the number of PEP training differed across study sites, it was evident from two studies that 12.5% and 44.8% nurses had received training on PEP, which leaves 87.5%. and 56.2% remaining untrained, respectively [4, 25]. This was also highlighted and emphasized through two studies, which indicated that nurses did not receive any training on PEP [6, 8].

Immediate steps to take after exposure to infected blood

Following basic steps after exposure is crucial to reduce the rapid transmission of the HIV pathogen in the bloodstream. This can be achieved by rinsing the exposed part of the body with running water. This approach does not reduce the risk of HIV transmission, but it is a basic step to take after exposure to an infected patients' blood or bodily fluids, i.e. amniotic fluid. Some nurses may not have adequate knowledge on how to take immediate steps after exposure to infected blood. This was evident from two studies that 39.9% and 48% reported that the exposed site is washed with soap and water, respectively [6, 8], and 94.5% reported that the exposed areas should be rinsed with water or normal saline [8].

Exposure to HIV and not taking post-exposure prophylaxis

When one is exposed to HIV and does not sought PEP as a preventative measure, the risk of transmission will be great. Additionally, it will also increase the rate of morbidity and mortality in the continent. Majority of nurses are exposed to HIV, but are failing to take PEP due to various reasons, which include inadequate knowledge regarding PEP, and some are reluctant to take PEP due to the perceived side effects. About 18% of the respondents who were exposed to HIV did not receive PEP because their source of HIV transmission was negative [4]. There were about 37% of participants who did not receive PEP when they needed it, and 42% participants who did not seek PEP because they did not want it, 16% did not have enough information about PEP, 12% did not know where to go, and 20% were afraid of the process [2]. Nurses and co-workers usually share their experiences; those who are inexperienced, for instance, (in this case) those who never took PEP, may be afraid of the side effects of PEP or the outcome of the treatment. This statement is supported by reviewed studies where about 20% of the participants were afraid of the outcome of PEP [2], 45.5% of respondents were concerned about the side effects of PEP [26], while 6.5% to 36.8% of respondents were afraid to go through the process [4]. Some nurses are unaware of the hospital policy that highlights the necessity to take PEP after occupational exposure, thus 15.9% and 86.4% of participants were unaware of the hospital policy for PEP, respectively [4, 26]. Some nurses assume that the source is HIV-non-reactive and they decide to not take PEP, as 17% of participants who were exposed to HIV did not seek PEP due to assuming that the source is HIV-negative and 10% believed that they can never be infected with HIV [25].

Discussion

Nurses offer a baseline care to patients; as a result, they are the healthcare workers who are at the greatest risk of occupational exposure, especially through needle pricks. There is a way to reduce the likelihood of HIV transmission after exposure, but most nurses have little knowledge on this aspect, while some have knowledge but opt to not seek PEP as they are afraid to go through the treatment process.

The studies included in this paper revealed that nurses had inadequate knowledge regarding PEP [2, 4, 6, 8, 24-26]. Despite varied level of knowledge nurses have regarding PEP, PEP remains the only ARV treatment regimen intended to reduce the occupational transmission of HIV [7]. It is vital to educate nurses on PEP for successful prevention of HIV in the workplace [5]. Many respondents were aware of PEP, but still have inadequate information regarding PEP; for instance, many nurses can define PEP, but may not know the initiation period, the duration of taking the regimen as well as the type of antiretroviral drugs used [1, 19].

Although precautionary measures to prevent exposure to infected blood via safe practices are in place, occupational exposure still occurs and are mostly underreported [27]. An increase in the numbers of exposed healthcare workers attending health facilities as patients was evidenced by HIV sero-prevalence rates and healthcare workers have justified concerns about the risk of accidental exposure [10]. Deter-

mining the knowledge and practice of PEP among healthcare workers would identify their needs and the next line of action when exposed to HIV [15].

Four studies have conveyed that nurses have limited knowledge on PEP, with a few who are aware of PEP [6, 8, 24, 26]. Although the percentage of people who have knowledge about PEP were above average in some studies, it is worrying as, regardless of percentage, it is a high number of affected nurses in the midst of inadequate workforce. This exemplification of nurses having little knowledge regarding PEP may lead to high seroconversion of HIV and therefore, promote an increase in mortality and morbidity rates among nurses in the African context. Nurses need to be educated on PEP to prevent transmission of HIV in the workplace as well as to be able to seek PEP in due course and for 100% adherence.

Four other studies indicated that nurses had training on PEP at a rate of 0% to 48% [4, 6, 8, 25]. A conclusion may be drawn from these statistics that nurses who have received training on PEP are in minority. As a result, nurses will not be able to implement the accurate procedure when managing an individual exposed to HIV and this may lead to poor adherence as well as defaulting from the PEP treatment, while in turn, there will be high seroconversion among nurses [1, 2]. Such procedures that require training on PEP comprise of counselling, HIV screening, first aid, risk assessment, HIV testing, established informed consent of the exposed individual as well as maintaining confidentiality of the findings and to offer continuous counselling and support to promote adherence [9, 13, 15, 18, 27]. Nurses need to be trained on PEP, so that they can acquire relevant knowledge and skills on the management thereof.

According to seven reviewed studies, most nurses knew the immediate steps to be taken after exposure to HIV, which included rinsing the exposed site with soap and water, squeezing the exposed site for blood in case of needle prick injury as well as to rinse the eye with water or normal saline in case of blood splash or body fluids in the eye [2, 4, 6, 8, 24-26]. These precautionary measures after exposure to HIV are very beneficial to the healthcare workers as they may reduce the likelihood of transmission of the pathogen in the bloodstream, although they may not prevent the transmission of HIV. Furthermore, though many nurses know the immediate steps to take after exposure to infected blood or body fluids, more information on universal precautionary measures should be stressed to all those who have pre-knowledge and students or newly qualified nurses [1, 12, 20, 27].

It is evident that few nurses seek PEP, but most do not take PEP because they assume that the source is negative; they believe they will not get infected, they are afraid to go through the process, they are not aware of the hospital policy regarding PEP, and some just reported that they do not need PEP after exposure [2, 4, 24-26]. Respondents had varying reasons with regard to not seeking PEP, but the origin of the problem lies with fact that they do not have the adequate and relevant knowledge regarding PEP. Failure to take PEP within 72 hours after exposure places one at a higher risk of seroconversion or at danger of contracting HIV. The importance of taking PEP after exposure should be enforced to all nurses and should be compulsory, if the healthcare system needs to keep and promote a healthy workforce [9, 18]. Furthermore, extra monitoring and follow-ups should be maintained to promote adherence throughout the course of PEP [4]. This can be achieved by in-service training, posters on health facilities, and regular reviewing of PEP policy at health facilities.

Limitations

The review was only limited to studies done in Africa and cannot be generalized to other contexts outside Africa. It should also be noted that some of the reasons provided for not taking PEP were not followed up by the reviewed studies, which limited further explanation in this review.

Conclusions

Knowledge regarding PEP is essential amongst nurses, as it provides a baseline of treatment to individuals who are exposed to HIV. Many nurses are aware of PEP, but do not exactly have the relevant knowledge regarding PEP. Additionally, training is very limited amongst nurses and in some countries, nurses do not receive training for PEP at all. The psychological factor of nurses needs also to be taken into account, as they are afraid to go through the process of PEP and are afraid of the results. Provision of counselling as well as offering the support to those that are exposed should be taken into consideration to enhance 100% adherence. There is a need to increase awareness and knowledge regarding PEP as well as implementing training programs to train nurses on the process of PEP in healthcare settings to increase knowledge on PEP, and thereby decreasing the level of seroconversion of HIV.

Recommendations

- Guidelines and policies should be reviewed and implemented for the management of PEP to provide standards and direction for the knowledge and use of PEP.
- PEP services should be available 24/7 and there should be access to health facilities at any time of the day, for example, access to PEP at night or over weekends as PEP should be initiated within 72 hours after exposure and it is always best to start PEP within one hour after HIV exposure.
- There should be compulsory use of protective equipment in healthcare facilities and there should be an appointed person or team who monitors the use of protective equipment or clothing among nurses and healthcare workers to reduce the incidences of occupational exposure.
- Nurses should be educated and trained on PEP in order to possess the necessary knowledge and skills aimed at the management when one is exposed to HIV.

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Conflict of interest

The authors declare no conflict of interest with respect to the research, authorship, and/or publication of this article.

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