

Healthcare Workers Adherence to Occupational HIV Post-Exposure Prophylaxis and Seroconversion Rate in a Tertiary Health Facility, Southwestern Nigeria

Fatai O. Olanrewaju^{1*}, Muphy M. Oripelaye¹, Atinuke A. Ajani¹, Olufikemi T. Fabusuyi², Sally J. C. Chuhwak³, Olufemi M. D. Ologun⁴, Toyin Obafemi⁴, Oluwatobiloba A. Sobayo⁵, Olatunde P. Olanrewaju⁶

¹Department of Dermatology/Venereology, Obafemi Awolowo University, Ile-Ife, Nigeria

²Department of Internal Medicine, Futa Teaching Hospital, Akure, Nigeria

³Department of Medicine, Federal University of Health Sciences Teaching Hospital, Otukpo, Nigeria

⁴Department of Dermatology, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria

⁵Department of Medical Rehabilitation, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria

⁶Department of Medicine/Surgery, Bowen University Teaching Hospital, Ogbomosho, Nigeria

Abstract

Human Immunodeficiency Virus (HIV) transmission remains a global public health challenge particularly among healthcare workers (HCWs). HCWs are susceptible to occupational exposures because they often handle blood and body fluids or contaminated materials. This retrospective cross-sectional study aimed to determine the HCWs' HIV exposure characteristics, adherence to occupational postexposure prophylaxis (PEP) and seroconversion rate. Information was extracted from all the 114 medical records of HCWs who sought for PEP at the Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria, between 2011 and 2023. The data comprised sociodemographic details, exposure characteristics, adherence to PEP and seroconversion rate at 6 months. The HCWs age ranged from 20 to 59 years with a mean age of 32.34 ± 8.757 years. The females were 51.8%. Medical doctors (30.7%) were the most exposed to HIV, followed by the laboratory scientists 15.8% and nurses 14.9%. Types of exposure were mostly needle stick injury (80.7%), blood/body fluid splashes (14.9%), and cuts from sharps (4.4%). Majority of these exposures were high risk, 79%. High proportion of HCWs 85.1% started PEP within the recommended 72 hours. The study showed low adherence rate of 67.5%, and poor post-PEP HIV screening. No seroconversion was observed among the HCWs who completed follow-up. Dolutegravir-based regimen showed significant association ($p=0.026$) with improved adherence to PEP. The flaws noticed in this study should provide bases for the stakeholders and hospital policy makers to formulate policies that will improve HCWs safety. Hospital administrators should create more awareness about hospital policies and procedures when HIV exposure occurs.

Keywords: Adherence, Healthcare, Occupational, Post-Exposure Prophylaxis, Seroconversion.

Introduction

Human immunodeficiency virus (HIV) exposure and transmission are still global challenges of public health concern especially when that occur among the dwindling health care workforce [1]. Despite decades of global response, funding and advances achieved in HIV management to reduce transmissions, healthcare workers (HCWs) still have about 3 million HIV exposures and 170,000 seroconversions [1, 2, 3]. This is quite disturbing, considering how funding cuts recently complicated the global response, consequence of which negatively impacted availability of antiretroviral (ARVs) medications and other preventive services [4, 5]. As a result, it has been projected that HIV transmission and HIV/AIDS-related deaths may rise especially in low-income and middle-income countries (LMICs) [4, 5]. This will further increase HCWs susceptibility to acquiring HIV since occupational postexposure prophylaxis (oPEP) supply chain is going to be affected due to these compromised HIV preventive and interventional services. HCWs risk is not only due to the fact that they are particularly prone to accidental exposures to HIV and other blood-borne pathogens such as HBV and HCV due to the nature of their work but because it also has impact on depleting health workforce especially [1, 3].

Globally, WHO reported 40% decline in the incidence of people who acquired HIV in 2010 from 2.2 million [1.7–2.8 million] to 1.3 million [1.0–1.7 million] in 2024 [3]. People living with HIV at the end of 2024 were estimated to be 40.8 million [37.0–45.6 million] [6]. Sub-Saharan Africa (SSA) despite being made up of only 12% of the world's population is the worst hit by the scourge carrying 70% of the global burden of the disease, estimated to be 26.3 million people living with HIV as at 2024 [6, 7]. Regrettably also, more than two-thirds of HIV/AIDS-related deaths also occur in SSA [8]. Nigeria also shares a high proportion of this scourge, with a prevalence of 1.4% estimated to

be about 1.7 million people living with the virus as of 2020 [9]. The high HIV burden in SSA are compounded when HCWs have occupational exposure or infected with HIV at their workplace making them not available or accessible to care for their patients. The rate of HIV occupational exposures varies from region to region but has been shown to be generally high and in some cases, greater than 50% of the health workforce [10-14]. However, the rate of seroconversion was relatively low in occupational exposure depending on many factors like high or low risk exposures. Examples of high-risk exposure include HIV-positive sources, sources with unknown HIV status, large-bore needles, and large-volume body fluid exposure. In contrast, the client was classified as low-risk exposure when post-exposure prophylaxis is not advocated. This category of exposure is observed in solid needle stick injury, superficial exposure on intact skin, a small volume (drops of blood) on mucous membranes or non-intact skin exposures, and a negative source [15].

Before the introduction of oPEP, HIV transmission to HCWs was 0.3% after percutaneous exposure to HIV-positive blood, and 0.09% after a mucous membrane exposure [16, 17]. With the introduction of antiretroviral (ARVs) medications as means of preventive strategy, rate of seroconversion among exposed HCWs has been reduced to 0% in the majority of cases [16, 18]. However, to reduce the rate of transmission of HIV in HCWs, completion of 28 days ARVs and total adherence to all other postexposure preventive strategies must be strictly complied with. These preventive strategies include the initial response following HIV exposure which should include proper institution of first aid for the exposed and must include washing of the site with water, pretest and post-test counselling, risk assessment for eligibility of both exposed and source person, necessary laboratory investigation, provision of antiretroviral therapy for 28 days, monitoring and follow-up planning [17, 18]. As part of the

pragmatic approach to reduce HIV exposure, HCWs must be aware of PPE and use them, injection safety protocol must be complied with, wearing of barriers, and observe universal precautions in body fluid handling. Healthcare facility must make adequate provision for safety equipment and enforce their usage. The present research aims at documenting the HCWs pattern of exposure, adherence to occupational postexposure prophylaxis, and rate of seroconversion among exposed HCWs.

Definition of Terms

Occupational HIV exposure occurs when HCWs are exposed to potentially HIV infected body fluids within the healthcare settings in the course of performing their health related duties [15]. Occupational postexposure prophylaxis is the initiation of antiretroviral medications following occupational HIV exposure as soon as possible, ideally within 72 hours of the exposure for 28 days. Adherence to ARVs (PEP) means starting the right dose of PEP exactly as prescribed, and at the right time. Adherence to PEP must be total for it to be effective in reducing HIV transmission and to reduce the risk of viral resistance.

Materials and Methods

Research Design and Settings

A retrospective cross-sectional descriptive study was utilized for this research. The study was conducted at the Virology Research Clinic (VRC) at the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State, Nigeria. OAUTHC is a government-run specialist centre that provides services to an ethnically diverse population. VRC is a specialised clinic in OAUTHC providing comprehensive and multidisciplinary HIV care including prevention, diagnosis and treatment.

Data Collection Method and Instrument

Data collection was carried out using the medical records of all the 114 HCWs who

sought for HIV occupational postexposure prophylaxis (oPEP) following exposure to potentially infected body fluids from January 2011 to 31st December, 2023, a period of 12 years. The data was collected using a proforma designed by the investigators. The information extracted with the proforma from the medical records included: sociodemographic data, exposure characteristics of both the HCWs and the source - date and time of exposure, types of exposure, risk of exposure, the delay between exposure and initiation of ARVs, HIV status of the source and the HCWS, identity of the source, antiretroviral therapy regimen (PEP), number of days ARV was used, follow-up HIV screening at 12 and 24 weeks.

Inclusion Criteria

Only HCWs with complete information were collected for the study.

Exclusion Criteria

Medical records with missing data were excluded from the research.

Data Analysis

Data were input into IBM Statistical Package for Social Science (version 25) and subsequently cleaned before analysis. The results were presented using descriptive statistics such as frequency, percentage, and mean. Association between two categorical variables of interest was determined using chi-square and the level of significance was set at $p < 0.05$. Logistic regression analysis was used to find association between sociodemographic profile and adherence of HCWs to postexposure prophylaxis.

Ethical Approval

Ethical clearance for the study was granted by the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife. (Registration Numbers: International - IRB/IEC/0004553, National - NHREC/27/02/2009a). The proforma and data

entry were anonymous to ensure confidentiality. The data was protected from unauthorized individuals using a password-protected computer.

Results

Sociodemographic Characteristics of Healthcare Workers Exposed to HIV at Workplace

A total of one hundred and fourteen (114) HCWs presented for HIV postexposure prophylaxis through various healthcare-related sources. The participants' age ranged from 20 to 59 years with majority within the age of 20-

29 and 30-39 years. Mean age of the HCWs was 32.34 ± 8.757 (Mean \pm SD). The female clients were 51.8% (59/114). Among the HCWs who sought for occupational PEP, medical doctors were the most exposed affecting 35 (30.7%) while the least exposed to HIV were the pharmacists with only 2 (1.8%) affected and sought for PEP. Majority of the HCWs 109 (95.6%) are educated up to tertiary levels. Half 57 (50%) of the participants were married while the remaining half were single. More than 98% of the health care workers agreed to be screened at presentation before the commencement of ARVs. (Table 1).

Table 1. Sociodemographic Characteristics of Healthcare Workers Exposed to HIV at Workplace

Healthcare Workers variables	Sex N (%) = 114 (100.0)		Total	Statistics
	Male n (%) = 55 (48.2)	Female N (%) = 59 (51.8)		
Age Group				
20-29 years	17 (14.9)	32 (28.1)	49 (43.0)	X ² =9.581, p =0.022
30-39 years	29 (25.4)	16 (14.0)	45 (39.5)	
40-49 years	7 (6.1)	6 (5.3)	13 (11.4)	
50-59 years	2 (1.8)	5 (4.4)	7 (6.1)	
Mean Age	33.16 \pm 7.25	33.16 \pm 7.25	32.34 \pm 8.757	
Occupation				
Medical doctor	20 (17.5)	15 (13.2)	35 (30.7)	LR=8.254, p =0.220
Nurse	5 (4.4)	12 (10.5)	17 (14.9)	
Lab scientist	10 (8.8)	8 (7.0)	18 (15.8)	
Allied Health worker	10 (8.8)	6 (5.3)	16 (14.0)	
Pharmacy	1 (0.9)	1 (0.9)	2 (1.8)	
Students (Health-related)	2 (1.8)	7 (6.1)	9 (7.9)	
Others	7 (6.1)	10 (8.8)	17 (14.9)	
Ethnicity				
Yoruba	45 (39.5)	50 (43.9)	95 (83.3)	LR=1.501, p =0.472
Igbo	8 (7.0)	5 (4.4)	13 (11.4)	
Others	2 (1.8)	4 (3.5)	6 (5.3)	
Educational				
Secondary	4 (3.5)	1 (0.9)	5 (4.4)	FE= 0.195, p =0.161
Tertiary	51 (44.7)	58 (50.9)	109 (95.6)	
Marital status				
Single	27 (23.7)	30 (26.3)	57 (50.0)	X ² =0.035, p =0.851
Married	28 (24.6)	29 (25.4)	57 (50.0)	

LR=Likelihood Ratio, X²= Chi square, FE = Fixed Effects, p=p-value

Healthcare Workers' Exposure and Occupational PEP (ARVs) Adherence Characteristics

Table 2 and table 3 showed the HCWs exposure characteristics. The most common type of exposure was needle stick injuries (NSIs) seen in 92 (80.7%) HCWs. The doctors and the health workers (cleaners, health attendants and refuse disposal officers) were more exposed to needle stick injury. Ninety (79.0%) and 24 (21.1%) were classified as high and low risks respectively. Ninety seven (85.1%) HCWs presented within the recommended 72 hours. Among these HCWs, only 34 (29.8%) of them sought for occupational PEP within the golden first 2 hours when ARVs is most effective. Less than 9.7% presented beyond 72 hours. The mean hours of presentation for both males and females were 27.44 ± 51.96 and 33.90 ± 51.67 respectively. Eighty (70.2%) of the sources of exposure were screened for HIV and nearly half

56 (49.1%) were found to be HIV positive. The HIV status of the source were not available for screening in 34 (29.8%) of the cases.

The overall HCWs adherence/ARVs completion rate of 67.5% was observed in this study. The adherence rate was not statistically significantly related to the sex of the HCWs. The mean adherence (days) for all HCWs in the study was 22.84 ± 8.32 (mean \pm SD). Of the 30 (26.3%) HCWs with poor adherence to oPEP (ARVs), 28 (24.6%) was attributed to default and 2 (1.8%) were due to side effects of the ARVs. Reasons for non-adherence is statistically significantly varied between males and females ($p < 0.05$). Only a third 38 (33.3%) of the study population returned for post-PEP HIV screening, and majority 25 (21.9%) of whom were females. All the 38 (33.3%) HCWs who had post-PEP HIV screen done were found negative at 3 and 6 months given a seroconversion rate of 0%. Post-PEP screening was statistically significantly associated with the sex of the HCWs ($p < 0.05$).

Table 2. Healthcare Workers' Exposure and Occupational PEP (ARVs) Adherence Characteristics

Variables	All HCW (114)	Males	Females	Statistics
	N (%)	N (%) = 55 (%)	N (%) = 59 (%)	
Types of Exposure				
Needle stick injury	92 (80.7)	44 (38.6)	48 (42.1)	X ² = 1.922, p = 0.589
Blood/body fluid splashes	17 (14.9)	8 (7.0)	9 (7.9)	
Cuts from sharps (blades)	5 (4.4)	3 (2.6)	2 (1.8)	
Risk of Exposure				
High risk	90 (79.0)	46 (40.4)	44 (38.6)	X ² = 1.406, p = 0.236
Low risk	24 (21.1)	9 (7.9)	15 (13.2)	
HCW Exposure to ARVs Initiation				
≤ 2 hours	34 (29.8)	18 (15.8)	16 (14.0)	LR = 1.510, p = 0.912
3 – 72 hours	63 (55.3)	29 (25.5)	34 (29.9)	
>72 hours	11 (9.7)	5 (4.4)	6 (5.3)	
No ARVs	6 (5.3)	3 (2.6)	3 (2.6)	
Mean (Hours)	30.79 ± 51.68	27.44 ± 51.96	33.90 ± 51.67	
HIV Status of the Source				
Positive	56 (49.1)	31 (27.2)	25 (21.9)	LR = 2.491, p = 0.290
Negative	24 (21.1)	9 (7.9)	15 (13.2)	
Unknown (Not available)	34 (29.8)	15 (13.2)	19 (16.7)	
HIV Status of the HCWs				
Negative	112 (98.3)	54 (47.4)	58 (50.9)	p = 0.960

Positive	0	0	0	
Unknown	2 (1.8)	1 (0.9)	1 (0.9)	
HCWs Adherence/Completion Rate for 28 days Regime				
No (< 28 days)	30 (26.3)	14 (12.3)	16 (14.0)	X ² = 0.006, p = 0.939
Yes (28 days)	77 (67.5)	38 (33.3)	39 (34.2)	
No ARVs	7 (6.1)	3 (2.6)	4 (3.5)	
Mean Adherence	23.00 ± 8.16	23.16 ± 8.07	22.84 ± 8.32	
Reasons for HCWs non-Adherence to ARVs				
Default	20 (17.5)	13 (11.4)	7 (6.1)	LR = 10.811, p = 0.004
Side effects	2 (1.8)	0	2 (1.8)	
Undisclosed	8 (7.0)	1 (1.8)	7 (6.1)	
No ARVs	7 (6.1)	3 (2.6)	4 (3.5)	
Seroconversion Rate of HCWs at 3 & 6 Months				
No screening	76 (66.7)	42 (36.8)	34 (29.8)	X ² = 4.497, p = 0.0034
Negative	38 (33.3)	13 (11.4)	25 (21.9)	
Positive	0	0	0	
ARVs Used by the HCWs				
3TC/AZT/EFV	13	8	5	X ² = 9.270, p = 0.159
TDF/3TC/EFV	39	21	18	
ABC/3TC/AZATANAVIR	1	0	1	
ALLUVIA/AZT/3TC	1	1	0	
TDF/3TC/DTG	48	20	28	
AZT/3TC	5	5	0	
No HAART	7	3	4	

NB: ARVs – Antiretrovirals, AZT- Zidovudine, 3TC – Lamivudine, EFV – Efavirenz, TDF – Tenofovir, ABC – Abacavir, DTG – Dolutegravir.

Table 3. Other Healthcare Workers’ Exposure and Occupational PEP (ARVs) Adherence Characteristics

Variables	All Healthcare Workers N = 114						
	Doctors N = 35 n (%)	Nurses N = 17 n (%)	Lab. Sci. N = 18 n (%)	H. W. N = 16 n (%)	Pharmacist N = 2 n (%)	Students N = 9 n (%)	Others N = 17 n (%)
Time							
72 hrs or less	30 (26.3)	15 (13.2)	16 (14.0)	13 (11.4)	2 (1.8)	7 (6.1)	2 (1.8)
Greater than 72 hrs	3 (2.6)	1 (0.9)	2 (1.8)	3 (2.6)	0 (0)	0 (0)	2 (1.8)
No oPEP	2 (1.8)	1 (0.9)	0 (0)	0 (0)	0 (0)	2 (1.8)	1 (0.9)
Type of Exposure							
NSI	25 (21.9)	13 (11.4)	15 (13.2)	16 (14.0)	2 (1.8)	7 (6.1)	14 (12.3)
Cuts	2 (1.8)	1 (0.9)	1 (0.9)	0 (0)	0 (0)	0 (0)	1 (0.9)
Body fluid	2 (1.8)	1 (0.9)	1 (0.9)	0 (0)	0 (0)	1 (0.9)	2 (1.8)
Blood splash	6 (5.3)	2 (1.8)	1 (0.9)	0 (0)	0 (0)	1 (0.9)	0 (0)
Status of the Sources							
Positive	25 (21.9)	7 (6.1)	13 (11.4%)	4 (3.5)	0 (0)	2 (1.8)	5 (4.4)
Negative	7 (6.1)	3 (2.6)	3 (2.6%)	2 (1.8)	0 (0)	4 (3.5)	5 (4.4)

Unknown or Not Available	3 (2.6)	7 (6.1)	2 (1.8%)	10 (8.8)	2 (1.8)	3 (2.6)	7 (6.1)
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H. W. = Health Workers (cleaners, health attendants, refuse disposer officers)

Assessment of the Predictors of Adherence to Occupational PEP (ARVs)

In table 4, several predictors of adherence were analysed and only sex of the participants

and use of Dolutegravir (DTG) based regimen were found to be statistically significantly predict adherence to ARVs. Sex of the HCWs was found to be statistically significantly predict post-PEP HIV screening $p < 0.05$.

Table 4. Assessment of the Predictors of Adherence to oPEP services

Predictor variables	p -value	OR (adjusted)	95% CI	
			Lower	Upper
Predictors of Adherence (non-completion of PEP Treatment) n=107				
Sex of Respondents	0.775	1.196	0.352	4.060
Age Bracket				
20 – 29 years	0.228	0.350	0.063	1.929
30 – 39 years	0.973	0.968	0.147	6.377
40 years and above				
Occupation				
Doctors	0.570	1.561	0.336	7.254
Nurses	0.657	0.671	0.115	3.917
Laboratory scientists	0.982	1.019	0.195	5.324
Others				
Level of Education	0.756	0.677	0.058	7.938
Type of Risk	0.490	1.864	0.318	10.931
HIV Status of Source	0.545	1.527	0.388	6.016
Type of Exposure	0.138	3.159	0.690	14.463
Regimens				
Efavirenz based regimen	0.854	1.260	0.107	14.823
Dolutegravir based regimen	0.026	0.032	0.002	0.657
Others based regimen	0.153	0.327	0.071	1.515
Predictors of Early Presentation vs Late Presentation (<72 hrs)				
Sex of Respondents	0.409	1.642	0.506	5.327
Age	0.164	1.915	0.768	4.775
Occupation	0.958	0.987	0.600	1.624
Level of education	0.231	0.291	0.039	2.188
Type of risk	0.309	2.326	0.458	11.824
HIV status of source	0.790	1.095	0.562	2.132
Type of exposure ²	0.998	0.000	0.000	-
Marital status	0.970	0.972	0.224	4.223
Predictors of Post Exposure Screening Test				
Sex of Respondents	0.028	2.973	1.089	0.494
Age bracket	0.279	0.642	-0.444	0.410
Occupation	0.447	1.167	0.155	0.203
Level of education	0.774	0.696	-0.362	1.257
Type of risk	0.151	0.414	-0.881	0.614

HIV status of source	0.142	0.626	-0.468	0.319
Type of exposure ²	0.635	1.407	0.341	0.719
Marital status	0.852	0.892	-0.114	0.608
Completion of treatment	0.001	16.204	2.785	0.819

NB: Those not on occupational PEP (ARVs) n = 7 were excluded from this particular analysis

Figure 1 showed non-linear progressive increase in seeking occupational PEP by the HCWs between 2011 and 2017 with increasing number of adherence from 2018 to 2023 when

single daily dose combination of DTG was introduced into Nigeria regime (dotted red line in Figure 2).

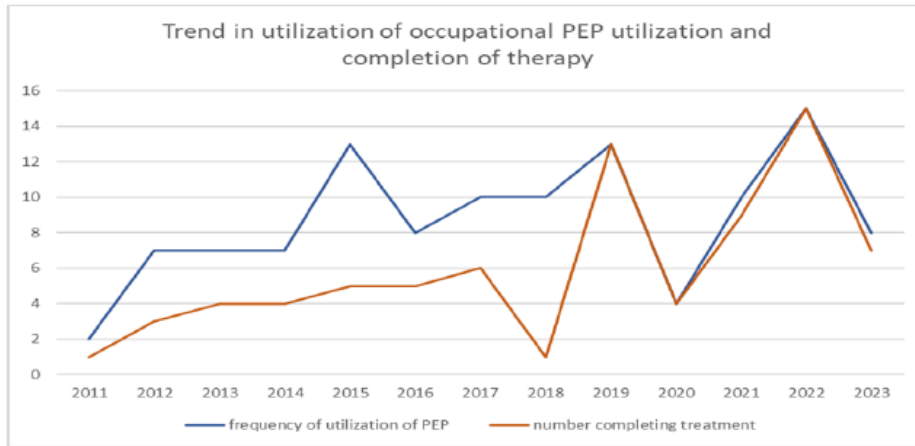


Figure 1. Twelve years Trend of Utilization of Occupational PEP and Adherence to 28 Days Therapy

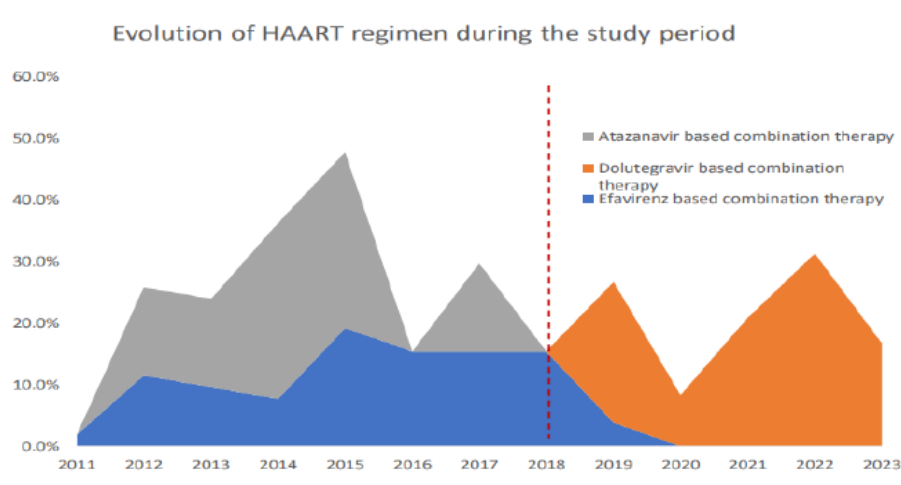


Figure 2. Evolution of Occupational PEP (ARVs) Regimen During the Study Period

Discussion

HCWs are well known to be susceptible to blood-borne pathogens and other infectious agents especially HIV while performing their legitimate duties of caring for patients [19]. These occupational exposures are not only due to inability to observe standard (universal) precautions or carelessness but multiple factors

such as non-use of PPE, barriers, inadequate HCWs staffing and overwork [20]. This is particularly concerning in LMICs where HIV occupational exposures are very rampant but under-reported [19, 21, 22]. HCWs unwillingness to report HIV exposures may be due to the inadequate knowledge, high level of stigmatizations and discriminations in SSA [8, 19, 20, 23]. This attitude may unfortunately

increase HIV transmission among HCWs. Hence, this study met the principal objective of documenting the characteristics of exposures, adherence to ARVs and rate of seroconversion among exposed HCWs, with a view to suggesting policies that will improve PEP services.

In this present study, most of the HCWs who presented for oPEP were medical doctors, laboratory scientists, and nurses in that order. In contrast, other studies have noticed nurses, health attendants and cleaners as most affected by occupational hazards [2]. The higher proportion of these categories of HCWs who sought for oPEP was in agreement with many previous studies [1, 24, 25]. This may be due to the fact that the laboratory scientists handle a lot of blood/body fluids while doctors and nurses involved in both invasive and non-invasive procedures that put them at higher risk of HIV exposures [1, 24]. The mean age of presentation for oPEP was 32.3 years with majority belong to the young adult age group similar to other studies [25, 26]. The females were slightly more than their male counterparts. Our study is similar to studies in Nigeria and Serbia where female preponderance were also reported [27]. Majority of the HCWs in the study were married and Yoruba tribe, reflecting the dominant tribe in the study location in consonance with study by Aluko et. al. [20].

The type of exposure explored in our study indicated that needle stick injuries (NSIs) (80.7%) were the most common among the HIV exposed HCWs with doctors and other health workers (cleaners, health attendants, waste disposal officers) mostly affected. The high proportion of NSIs as the most common type of exposure has been similarly reported in previous studies [17, 25, 27, 28]. This has been attributed to HCWs non-adherence to standard precautions, institutional and psychosocial factors [20]. Many HCWs do not comply with healthcare facility safety protocols like standard (universal) precautions. Other factors that may be responsible are absence of personal

protective equipment (PPE), inadequate staffing leading to excessive workload, inadequate knowledge of HIV oPEP, recapping of needles, and lack of safety materials, especially in developing countries [1, 20]. Majority of our cases under review were high risk (79%) exposures which warranted them to be commenced on oPEP with 3-drug standard regimen PEP protocol according to Nigerian national guideline [29, 30]. The prevalence of high risk exposures noticed in this study has also been observed by other researchers [31].

An indispensable aspect of PEP is the time of initiation of antiretroviral medication following HIV exposure which must be within 72 hours for PEP to be effective. Our study showed that less than one-thirds of the HCWs initiated oPEP within the first 2 hours of exposure when oPEP is most effective. Onyedum et. al. [30] also reported significant number of HCWs presented within 24 hours, however, non-occupational PEP were included in their study. It is noteworthy that greater proportion 84.1% presented within 72 hours as recommended by the Nigeria national guideline in agreement with earlier studies [1, 29, 30]. These may be due to increasing awareness of occupation hazards by health workers as majority of them were graduates [20, 30].

Our study revealed that almost all the HCWs (98.3%) who presented for oPEP were screened for HIV as an essential part of PEP services and were HIV negative making them eligible for oPEP. However, the source HIV screening is still poor as slightly less than half (49.1%) were available for screening, similar to low HIV screening of the source reported in previous studies [32, 33].

This study showed the adherence to oPEP (ARVs) to be slightly above average, similar to study done by Tetteh et. al. in Ghana, another developing country, in which both studies were less than 100% adherence recommended for effective HIV PEP [34]. Other developed countries have similarly reported moderate to low adherence to oPEP following HIV

exposures [35]. Side effects, defaults and fear of stigma and discrimination have been associated with poor adherence to PEP and low rate of follow-ups (33.3%) [8, 31, 34, 35]. Follow-up as low as 0% has previously been documented [32]. It is heartwarming to note from our study that, despite many high risk exposures, positive HIV sources and low to moderate adherence, seroconversion rate was 0% which is in agreement with other studies emphasizing the effectiveness of ARVs in preventing HIV transmission [25, 28, 34].

Dolutegravir based regimen, often comprising TDF/3TC/DTG, were found to be significantly predict adherence to ARVs because of increased tolerability, convenient dosing and lesser side effects compared to efavirenz-based regime. Being female HCWs was found to be significantly predict post-PEP follow-up screening $p < 0.05$. This is probably reflecting better health-seeking behavior of females [30]. In the twelve years under review of our occupational services (Fig. 1 & 2), atazanavir and efavirenz were the mainstay of oPEP before 2019 and a subsequent shift to dolutegravir based therapy in 2019. The shift resulted in non-linear progressive increase in utilization of PEP services over the years as well as progressive improvement in completion rate (adherence) in patients accessing occupational PEP starting from 2019 upwards. This improvement in adherence to oPEP (ARVs) may be partly due to dosing convenience with dolutegravir-based combination [30].

Conclusion

The shortcomings observed from this study has demonstrated that occupational PEP services is still a great concern that needs urgent attention as the results have not shown significant improvement from what was obtained in the past. The study still showed high risk exposures especially NSIs, low HIV screening of the sources, presentations beyond recommended 72 hours, low adherence rate and

poor follow-up visits. HCWs should therefore be empowered through training, awareness campaigns and availability of safety equipment, with a view to improving the compliance to safety protocols at workplace. Healthcare facility managers should formulate policies that will address the flaws found from this studies.

Strengths of the Study

This study is one of the few occupational PEP research among healthcare workers in this environment that study the exposure characteristic, use of oPEP, shortcomings of PEP services and seroconversion rate. The 12 years of study gave an insight into the trend in the oPEP services and revealed flaws that may need improvement. The study also provided relevant evidence-based data from a tertiary health facility, a model of best practices in health care, [20] which can be relied upon, with a view to using the data for optimising oPEP services and for policy making.

Weaknesses of the Study

The study was a retrospective study and documentation may be inadequate. The exact hours between HIV exposure and initiation of oPEP may be inaccurate due to recall bias by the HCWs and low level of awareness about institutional policies and procedures following occupational HIV exposure [35]. Despite almost half of the sources were positive, information about their viral load and ARVs medications were not available. The study is a single tertiary facility-based study, exposure characteristics could have been worse elsewhere at lower or community health facilities. The reported outcome of no seroconversion could have been different also if majority had presented for post-PEP HIV screening. Adherence to ARVs though the mainstay of PEP was self-reported and not objectively assessed, therefore prone to errors and bias. The specific side effects developed by HCWs were unavailable in the medical records. These gaps noticed from this study can be a

very useful tool for future research and to improve on PEP services, as we encourage more data from other regional HIV/PEP treatment centres across the country.

Conflict of Interest

There is no conflict of interest to declare.

Acknowledgement

We acknowledge all the health care workers at the Virology Research Clinic of Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun state, Nigeria for their support in the course of this study. We also specially acknowledge the contributions of our administrative staff, Mrs Adewuyi Bukola all through the years of this study.

Funding

This study did not receive any grant or funding from any individual, public, commercial, or non-profit organisation.

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Data Availability Statement

The data produced for this study are available and can be requested from the corresponding author upon request.

Author's Contribution

Fatai O. Olanrewaju conceptualized, designed, and wrote the first draft of the manuscript. Muphy M. Oripelaye also engaged in conceptualizing, study design and supervision of data collection. Atinuke A. Ajani designed, data curation and formal analysis of the data. Olufikemi T Fabusuyi, Sally J. C. Chuhwak, Olufemi M. D. Ologun, Toyin Obafemi were collaboratively involved in critically reviewed, proofreading, editing, drafting of table 3. Oluwatobiloba A. Sobayo, and Olatunde P. Olanrewaju were involved in data collection, data entry and management. All authors reviewed, edited and approved the final manuscript.

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