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# Assessment on knowledge and practice of postexposure prophylaxis of human immuno-deficiency virus among staff nurses and paramedical workers at a tertiary care hospital in South India

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## Abstract:

**INTRODUCTION:** Adequate knowledge about the presence of postexposure prophylaxis (PEP) against human immuno-deficiency virus (HIV) is imperative for health-care workers. This study focuses on the evaluation of the present knowledge and practice of nurses and paramedical workers on the post exposure prophylaxis against HIV.

**AIM:** The aim of this study is to assess and compare the knowledge and practice of PEP against HIV among Staff Nurses and Paramedical workers.

**SUBJECTS AND METHODS:** A descriptive cross-sectional questionnaire study about the knowledge and practice of PEP against HIV among Staff nurses and Paramedical workers done at a tertiary care hospital in South India. The analysis of the data was performed using SPSS software version 24. The statistical tests used to compare the knowledge between nurses and paramedical workers was Chi-square test.  $P < 0.05$  was considered statistically significant.

**RESULTS:** About 339 nurses and 66 paramedical workers participated in the study. An overall of 65.4% of the study participants had a good level of knowledge, higher ( $P = 0.000$ ) among nurses (71.1%) compared to paramedical workers (36.3%). However, only 23% of nurses and 14.3% of paramedical workers received PEP after a needle prick injury.

**CONCLUSION:** This study revealed a low-level practice of HIV PEP among staff nurses and paramedical workers despite their good knowledge. This can be improved by providing formal training sessions to the health care workers.

## Keywords:

Human immuno-deficiency virus, nurses, paramedical workers, postexposure prophylaxis

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## Introduction

Human immunodeficiency virus (HIV)/ Acquired immuno-deficiency syndrome (AIDS) is one of the most serious public health challenge, and also a leading cause of mortality prevailing across the globe.<sup>[1]</sup> At the end of 2016, the WHO statistics highlighted that 36.7 million people are living with HIV.<sup>[2]</sup> Moreover, in the same year (2016), India was

declared to be the third-most HIV epidemic country having 2.1 million sufferers.<sup>[3]</sup> Of which 0.27% are residing in Tamil Nadu seen during 2014.<sup>[4]</sup> The Indian Centre for Disease Control has charted out the guidance to prevent the occurrence of new infection by providing technical assistance, as well as increasing the access to service for people who are living with HIV by strategies like strengthening laboratory systems and district-level capacity to address HIV.<sup>[5]</sup>

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World Health Report emphasizes that among the HIV patients, 2.5% have acquired owing to occupational exposure.<sup>[6]</sup> Over 90% of such occupationally acquired diseases occur in countries with low economic status.<sup>[7]</sup>

The incidence is mainly attributed to the higher prevalence and increased exposure to occupational hazards due to the lack of stringent safety procedures and standards at workplace.<sup>[8]</sup> Health-care workers, especially in the cadre of nurses and paramedical workers are potentially at a higher risk of exposure to needle stick injuries and percutaneous exposure to HIV transmission.<sup>[6,7]</sup> The average risk of acquiring HIV after a percutaneous exposure to blood is about 0.3% and 0.09% to mucous membranes.<sup>[7]</sup>

To prevent the transmission of the virus after exposure and to minimize the development of the disease subsequent to the exposure, postexposure prophylaxis (PEP) must be followed.<sup>[8,9]</sup> The PEP process includes first aid, counseling, risk management, relevant laboratory investigations, followed by a short course of antiretroviral therapy for 28 days along with follow-up evaluation.<sup>[8-10]</sup> PEP is said to prevent 81% of the seroconversion, and currently is the only resource available to reduce the risk of acquiring HIV.<sup>[10]</sup> However, the euro surveillance reports that between 1999 and 2002, there were 24 cases who were found out to be seropositive, even after PEP uptake.<sup>[11]</sup>

Recognizing this threat, adequate knowledge about the presence of PEP against HIV is imperative for Healthcare workers due to a higher risk of acquiring blood-borne infections.<sup>[6-10]</sup> Thus, this study focuses on to estimate and compare the difference in knowledge and practice of PEP against HIV among nurses and paramedical workers in a tertiary care hospital in South India.

## Subjects and Methods

### Methodology

A cross-sectional study was conducted between April 2018 and June 2019 among the staff nurses and Paramedical workers at a Tertiary Health Care Hospital in South India after obtaining prior Institutional Human Ethics committee clearance and as per GCP guidelines.

### Data collection and procedure

About 339 staff nurses and 66 paramedical workers employed at the tertiary care hospital were included in the study after obtaining consent from the participants. The confidentiality of the study participants was maintained. A pretested semi-structured questionnaire obtained from work done by Aminde *et al.* along with some questions designed in alignment with NABH guidelines on PEP against HIV was prepared by the

research team for data collection. Initially, a pretest was done among ten percent of the total sample size, which is not included in the present study. Following the test, the feedback was obtained from the participants about any problem in clarity or interpretation of questions and was revised. The validity of the contents of the questionnaire was evaluated and rectified further based on the feedback from a panel of experts.

The questionnaire included 16 questions on knowledge of the participants about the prevalence of PEP (questions like if they have ever heard of PEP; source of knowledge; if they ever had training on PEP; if they were aware of the hospital policy for HIV; what to do in case of exposure, indication, drugs and drug regimen for PEP for HIV) and 12 questions addressing their practice (whether they consider themselves to be at a risk of HIV acquisition at their workplace; if they ever had occupational exposure to HIV in the past; what type of exposure; how many exposures they had in 12 months; circumstances of the exposure; did screening/test for HIV; if no, why not; have they received PEP after exposure; what was the time-lapse from exposure to which PEP was received after exposure; reasons for not receiving PEP; postexposure screening of the source exposure; what was the HIV status of the exposure). The questionnaire does not include the name of the staff nurse or other personal identifiers.

### Scoring and knowledge of the participants

Each question contains equal marks, and the knowledge is judged on the following basis:

- More than or equal to 12 correct responses ( $\geq 75\%$ ) – Good knowledge
- 8–11 correct responses (50%–69%)– Average knowledge
- Less than or equal to 7 correct responses ( $< 50\%$ ) – Poor knowledge.

### Analysis

The data were analyzed using SPSS software version 24. The descriptive analysis was summarized as frequencies, percentages, mean, and standard deviation. The statistical tests used to compare the knowledge between nurses and paramedical workers was Chi-square test.  $P < 0.05$  was considered statistically significant.

## Results

Out of 405 participants, 339 (83.7%) were nurses and 66 (16.3%) were paramedical workers. The mean age was  $34.2 \pm 8.6$  years, with a range of 21 and 44 years. Most of the participants (65% nurses and 72.3% paramedical workers) were in the age group between 20 and 30 years. About 3/4<sup>th</sup> of the staff nurses (74.9%) and paramedical workers (75.8%) belonged to 1–5 years of the service period [Table 1].

**Table 1: Sociodemographic details**

Variables*	Nurses (n=339) (%)	Paramedical workers (n=66) (%)
Age (years)		
20-30	220 (65)	47 (72.3)
30-40	93 (27.3)	12 (24.1)
40-50	26 (7.7)	7 (4.6)
Sex		
Females	254 (75.8)	21 (31.3)
Males	81 (24.2)	45 (69.7)
Length of service		
6-12 months	74 (22.1)	10 (16.3)
1-5 years	216 (64.9)	38 (57.8)
>5 years	49 (13.5)	18 (27.2)
Marital status		
Married	91 (27.1)	17 (24.2)
Unmarried	248 (72.9)	49 (75.8)
Health insurance		
Yes	23 (7.4)	3 (4.5)
No	316 (92.6)	63 (95.5)
Socioeconomic status		
Middle class	294 (87.6)	57 (87.9)
Lower middle class	45 (12.4)	9 (12.1)

\*Values are expressed as frequency and percentages

Awareness of PEP was higher among the nurses (325 [95.9%]) than paramedical workers (56 [84.8%]). Majority of the study participants stated their source of knowledge to be PEP training and had a good knowledge about how soon PEP must be followed after a needle stick injury. All the nurses (100%) who participated in this study were aware about 'washing thoroughly with soap and water' as a first-aid measure after needle stick injury, while only 2 of the 66 paramedical workers answered otherwise. A large number of study participants had poor knowledge about the duration and the ideal drug regimen of PEP to be followed and about if antiseptics have to be used after exposure to needle stick injury. Among those who had answered correctly, the nurses were in majority compared to the paramedical workers [Table 2].

About 65.4% of the study participants had a good level of knowledge, higher among nurses (71.1%) compared to paramedical workers (36.3%). An overall significant difference ( $P < 0.001$ ) in Knowledge between the nurses and paramedical workers was present [Table 3].

Our study shows a higher incidence of nurses being susceptible for occupational exposure to HIV (52 [15.3%]) compared to the paramedical workers (7 [10.6%]). Approximately 85.3% of the nurses had encountered exposure through needle prick while giving injections. On the other hand, majority of the paramedical workers (57.1%) were exposed during the collection of blood samples. Out of which 12 (23.1%) of the nurses and 2 (28.6%) of the 7 paramedical workers had screened

for HIV. On questioning their reason for not screening for HIV, majority of these participants (26 [65%]) nurses and (4 [71.4%]) paramedical workers assumed the patient to be HIV negative [Table 4].

## Discussion

Abiding to universal health precautions and safe injection practices are pertinent in primary prevention against HIV among healthcare workers. However, the appropriate knowledge about the PEP regimen against HIV is crucial following occupational exposure. Periodic assessment about the knowledge about PEP among healthcare workers enables us to recognize the problems and efficient ways to improve.

Almost 3/4<sup>th</sup> of our participants had good knowledge about PEP against HIV, which was much higher compared to the study conducted among Rural Cameroonian Nurses, wherein only 1/4<sup>th</sup> of the participants had good knowledge about the same.<sup>[10]</sup> The majority of our study participants had known about PEP for HIV (95.9% nurses). PEP training (65.8%) was the main source of knowledge for participants in our study. This is at the variance of findings from a study conducted by Aminde *et al.*, whose participants learnt about PEP from ward rounds.<sup>[10]</sup> All but two nurses (99.4%) knew how soon PEP was to be initiated following needle stick injury. Our findings are higher than those obtained in a study carried out in Mumbai, wherein 64% of the participants correctly stated the time for initiation.<sup>[12]</sup> All the nurses who were part of our study identified the correct first aid method to institute following a needle prick injury, that is, to wash thoroughly with soap and water. This is much higher compared to findings of a study conducted amid interns of a medical college in West Bengal, wherein 84.6% of the study participants answered correctly.<sup>[13]</sup> The knowledge observed in our study is most likely due to regular NABH training sessions and lectures on occupational exposures held by the hospital management, their work experience gained through ward rounds and also to their self-awareness.

Despite regular training sessions, a large number of the nurses who participated in the study (64.9%) did not know antiseptics could cause more damage to the skin and, on the contrary, the interns who participated in the study in West Bengal had better knowledge in this regard.<sup>[13]</sup> This poor knowledge might be due to the informal source of information gained among the study participants.<sup>[10]</sup>

Although three-fourth of the participants were able to correctly identify breast milk as a high-risk fluid, they were not able to identify other nonblood high-risk fluids. Unlike results obtained in the study conducted

**Table 2: Knowledge about postexposure prophylaxis against human immuno-deficiency virus among nurses and paramedical workers**

Variables*	Responses	Nurses	Paramedical workers
		(n=339), n (%)	(n=66), n (%)
Have you ever heard about PEP?	Yes	325 (95.9)	56 (84.5)
	No	14 (4.2)	10 (15.2)
Source of knowledge (multiple responses)	Newspapers/journals	0 (0)	0 (0)
	Radio	0 (0)	0 (0)
	Television	0 (0)	0 (0)
	Seminar/workshop	22 (6.5)	4 (6.1)
	Ward rounds	260 (23.3)	14 (21.2)
	PEP training	223 (65.8)	38 (57.6)
Aware of hospital's PEP policy?	Can't remember	1 (0.3)	5 (7.6)
	Yes	328 (96.8)	61 (92.4)
Have you had ever had training on PEP?	No	11 (3.2)	5 (7.6)
	Yes	223 (65.8)	38 (57.6)
How soon after a needle prick injury should PEP be followed	No	116 (34.2)	32 (42.4)
	Within 1 h	337 (99.4)	64 (97)
	After 72 h	1 (0.3)	1 (1.5)
	Don't know	1 (0.3)	1 (1.5)
Which of the following fluids are at a higher risk of transmission of HIV? (multiple answers acceptable)	Breast milk	212 (62.5)	40 (60)
	Urine	21 (6.2)	5 (7.6)
	Peritoneal fluid	11 (3.2)	2 (30)
	Saliva	94 (27.7)	19 (28.8)
	Pleural fluid	07 (2.06)	1 (1.5)
	Cerebrospinal fluid	9 (2.6)	3 (4.5)
	Faces	3 (0.8)	1 (1.5)
	Synovial fluid	4 (1.1)	0 (0)
Indication for initiation of PEP (multiple answers acceptable)	Needle prick injury	308 (90.9)	60 (90.9)
	Splashing of blood/body fluid on Mucosa	33 (9.7)	5 (7.6)
	Rape	4 (1.2)	0 (0)
	Infants born with HIV	13 (3.8)	1 (1.5)
First aid measure to institute following a needle stick injury	Promotive active bleeding of the wound	0 (0)	2 (1.5)
	Wash thoroughly with soap and water	339 (100)	64 (98.5)
	Don't know	0 (0)	0 (0)
Are you supposed to apply antiseptics/skin washes after an exposure to clean the surrounding area?	Yes	220 (64.9)	42 (63.6)
	No	119 (35.1)	24 (36.4)
Are you supposed to squeeze the wound to let it bleed?	Yes	125 (36.8)	25 (37.9)
	No	214 (63.2)	42 (62.1)
What is the ideal HIV-PEP regimen following needle stick injury?	One drug regimen	51 (15)	10 (15.2)
	Two Drug regimen	57 (16.8)	9 (13.3)
	Expanded three drug regimen	173 (51)	33 (50)
	Don't know	58 (17.1)	13 (19.7)
Which of the following drugs are used in PEP? (multiple answers acceptable)	Zidovudine	261 (77)	50 (75.8)
	Glimepiride	0 (0)	0 (0)
	Jevirapine	31 (9.1)	6 (9.1)
	Lamivudine	64 (18.9)	10 (15.2)
	Levimasole	1 (0.3)	0 (0)
	Stavudine	0 (0)	0 (0)
	Famotidine	7 (2.1)	1 (1.5)
	Nevirapine	0 (0)	0 (0)
Duration of PEP	For life	11 (3.2)	2 (3)
	28 days	114 (36.6)	24 (36.4)
	8 weeks	0 (0)	5 (7.5)
	6 months	212 (62.5)	39 (59.1)

Contd...

**Table 2: Contd..**

Variables*	Responses	Nurses	Paramedical workers
		(n=339), n (%)	(n=66), n (%)
When is the expanded three drug regimen used?	When the status of the source is clinically symptomatic and it is a moderate to severe exposure	180 (53.1)	34 (51)
	When the status of the exposure is clinically asymptomatic and its a mild exposure	51 (15)	12 (18.2)
	Expanded 3 drug regimen is an ideal HIV-PEP regimen and should be given to anyone who is exposed to HIV	108 (31.9)	19 (28.5)
	When the source is unknown	0 (0)	0 (0)
What is the proportion of needle prick injury results in HIV?	1/100	33 (9.7)	7 (10.6)
	1/500	15 (51)	10 (15.2)
	3/1000	124 (36.6)	25 (37.9)
	Don't know	105 (31)	21 (21)
Should the source be screened for HIV?	Yes	295 (87)	57 (86.4)
	No	44 (13)	9 (13.6)

\*Values are expressed as frequency and percentages. PEP: Postexposure prophylaxis, HIV: Human Immuno-Deficiency virus

**Table 3: Level of knowledge and comparison about postexposure prophylaxis against human immuno-deficiency virus between nurses and paramedical staffs**

Level*	Nurses (n=339), n (%)	Paramedical workers (n=66), n (%)	Total (%)	P <sup>†</sup>
Good (≥75%)	241 (71.1)	24 (36.4)	265 (65.4)	0.000
Average (50%-75%)	74 (21.8)	28 (42.4)	102 (25.2)	
Poor (<50%)	24 (7.1)	14 (21.2)	38 (9.4)	

\*Values are expressed as frequency and percentages. †Chi-square test: P<0.05

amongst Cameroonian nurses, more than four-fifth of the participants in our study could not identify the high-risk fluids for HIV transmission correctly.<sup>[10]</sup> In our study, only one-third of the participants were able to identify the correct duration of PEP, whereas less than one-third of the participants in the Cameroonian study were able to identify the same.<sup>[10]</sup> These facts alert us to improve our training sessions on PEP against HIV to be in-depth and paced at regular intervals and to enhance their knowledge on antiviral drugs by the Hospital Antibiotic Policy Committee.

All the nurses considered themselves to be at risk of acquiring HIV at their workplace, with 52 of them (15.3%) admitted to have experienced such exposure in the past. This is lesser when compared to the 61% exposure reported in a study conducted in the Army college of Dental Sciences in India.<sup>[7]</sup> Thus, this may be attributed to a higher awareness or even low reporting rates due to high patient load, and long working hours may be the other contributing factor.<sup>[14,15]</sup>

Consistent with the findings of Chulalongkorn university and Gupta *et al.*, in India, the circumstances of exposure included recapping needles as well as setting up intravenous lines.<sup>[16,17]</sup> Although the rate of occupational exposure is low among our participants, only 12 (23.1%) out of the 52 exposed received PEP, which was similar

to the study conducted in Lagos University.<sup>[6]</sup> Two-third of the participants received PEP within 24 h, wherein in a study conducted by Aminde *et al.* only half of the participants received PEP within 24 h.<sup>[10]</sup> Among those exposed, 3/4<sup>th</sup> of the participants took PEP screening of the exposure which and in comparison, only 1/4<sup>th</sup> of participants took PEP screening for HIV in a study overseen by Prasuna *et al.*<sup>[18]</sup> The reason behind the majority of our study participants not screened for HIV following exposure are the sources of exposure were HIV negative and also negligence about the hospital protocol concerning PEP at that time.

Comparing previous studies wherein the knowledge regarding PEP for HIV was found poor, this study proposes novel inferences such as, despite the good knowledge, a low-level practice of HIV PEP among staff nurses and paramedical workers was observed. However, the limitations of the study may be attributed to the cross-sectional study design and the response bias involved due to the nature of self-report data. Further larger sample size, including health-care workers from diverse centers would provide a refined analysis for a more precise conclusion.

## Conclusion

The study revealed a huge gap between the knowledge and practice of PEP among nurses and paramedical workers. The practice of PEP against HIV can be improved by establishing strategies such as periodic training sessions on universal precautions and hanging posters in every ward regarding standard guidelines and policies toward urgent utilization of PEP in case of exposure and also to set up a round the clock PEP center to impart elaborate counseling and follow-ups.

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**Table 4: Practice of postexposure prophylaxis against human immuno-deficiency virus among nurses and paramedical workers**

Variables*	Responses	Nurses, n (%)	Paramedical workers, n (%)
Do you consider yourself to be at a risk of HIV acquisition at your workplace? (n=339, 66)	Yes	339 (100)	65 (98.5)
	No	0 (0)	1 (1.5)
Have you ever had occupational exposure to HIV in the past? (n=52, 7)	Yes	52 (15.3)	7 (10.6)
	No	287 (84.7)	59 (89.4)
What type was it? (n=52, 7)	Needle prick	49 (95.1)	6 (85.7)
	Splashing of blood/body fluid on mucosal surfaces	2 (2.8)	1 (14.2)
	Both needle prick and splashing of blood on mucosal surface	1 (2.1)	0 (0)
How many exposures have you had in 12 months? (n=52, 7)	1	38 (73.1)	6 (85.7)
	2-3	14 (26.9)	1 (14.3)
	>5	0 (0)	0 (0)
What were the circumstances of exposure? (multiple answers accepted) (n=52, 7)	Setting up IV line	20 (38.5)	0 (0)
	During surgery	8 (15.7)	0 (0)
	Giving injections	43 (84.3)	4 (57.1)
	Collecting blood samples	28 (53.8)	6 (85.7)
	Recapping needles	28 (54.9)	3 (42.7)
	During delivery	2 (2.8)	0 (0)
	Other	0 (0)	0 (0)
If you ever had occupational exposure to HIV, did you screen or test for HIV? (n=52, 7)	Yes	12 (23.1)	2 (28.6)
	No	40 (76.9)	5 (71.4)
If no, why did you not test for HIV? (n=40, 5)	Not aware	11 (27.5)	1 (20)
	Assumed patient was HIV negative	26 (65)	4 (71.4)
	Other reasons	3 (18.5)	0 (0)
Did you receive PEP after exposure? (n=52, 7)	Yes	12 (23.1)	1 (14.3)
	No	40 (76.9)	6 (85.7)
What was the time lapse from exposure to which PEP was received after exposure? (n=12, 1)	<24 h	8 (66.6)	1 (100)
	>24 h	4 (33.3)	0 (0)
Reasons for not receiving PEP? (n=40, 6)	Not necessary	6 (15)	1 (16)
	ARVs not available	0 (0)	0 (0)
	Source of HIV was negative	22 (55)	2 (33.3)
	Not aware of the need to take PEP after exposure	0 (0)	2 (33.3)
	Not aware of the hospital protocol concerning PEP at the time	12 (30)	1 (16)
Postexposure screening of source exposure? (n=52, 7)	Screened	34 (65.4)	3 (42.9)
	Not screened	18 (34.6)	4 (57.1)
What was the HIV status of the exposure? (n=34, 3)	Positive	12 (35.5)	1 (33.3)
	Negative	22 (64.7)	2 (66.6)

\*Values are expressed as frequency and percentages. PEP: Postexposure prophylaxis, HIV: Human immunodeficiency virus

## Conflicts of interest

There are no conflicts of interest.

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