



### Original Research Article

## Effect of Training on Awareness about Pep against HIV, HBV & HCV, Among Dental and Nursing Students

Authors

**Dr Ravindra Kshirsagar<sup>1</sup>, Dr Vivek Pande<sup>2\*</sup>**

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor

Department of Medicine, N.K.P. Salve Institute of Medical Sciences and Research Centre, Nagpur  
Maharashtra, India

\*Corresponding Author

**Dr Vivek Pande**

Associate Professor, Medicine Dept, NKP Salve Institute of Medical Sciences and Research Centre,  
Nagpur 440 019 India

### **Abstract**

**Background:** All health care workers (HCWs) including Doctors, Dentist and Nurses are likely to get exposed to needle stick Injuries (NSIs) and blood & body fluids (BBFs) of patients. This exposure makes them more prone to acquire Human Immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections. Hence all HCWs must be trained for practicing, universal precautions (UPs) and to know about post-exposure prophylaxis (PEP) guidelines.

**Aims and Objectives:** To assess effectiveness of training program about PEP and UPs for Nursing and undergraduate Dental students.

**Methodology:** The present study was a cross sectional and interventional study carried out after obtaining permission of institutional ethics committee. 467 willing nursing and dental students were asked to answer to 22 pre validated, multiple choice questions before and after training session in 2016-2017.

**Results:** Overall results indicated improvement in percentage of correct answers after training in 20 out of 22 questions, as compared to, before training. Improvement in 19 out of 20 questions was statistically significant.

**Discussion and Conclusion:** Possibility of Exposure to BBFs and NSIs is a lifelong professional Hazard for all HCWs. Habit of adopting universal precautions and awareness of PEP guidelines, is likely to reduce chances of acquiring HIV/ HBV/HCV infections during performance of professional duties.

**Keywords:** Post Exposure Prophylaxis, Health Care Workers, Universal Precautions, Needle Stick Injuries.

### **Introduction**

During professional training and career, nurses and dentist are exposed to NSIs &BBF of patients, which make them at risk of acquiring HIV, HBV & HCV infections.<sup>(1)</sup>

Risk of exposure to BBF is more during (i) withdrawing blood sample (ii) giving intra venous injections (iii) recapping needles after use (iv) splash of BBFs on damaged skin or mucus membrane etc.

Occupational exposures (OEs) occurs commonly due to NSIs. OEs is exposure to BBF of patients during performance of professional duties. First documented case of occupational transmission of HIV Infection to HCW is on 1984<sup>(2)</sup>. 94 confirmed and 170 possible cases were reported world-wide until 1997<sup>(3)</sup>.

Contaminated NSIs carry risk of acquiring infections like (a) HBV 9.3% (b) HCV 3% & (c) HIV 0.3 %.<sup>(2&3)</sup>

Failure to report exposure to BBFs and NSIs increases possibility of acquiring HBV, HCV and HIV infections<sup>(4)</sup>. Despite guidelines by National A.I.D.S Control Organization [NACO] and training & teaching in a college, NSIs remain ongoing problem<sup>(5)</sup>.

Lower incidences of reporting NSIs, should not be interpreted, as that NSIs is less serious issue<sup>(6)</sup>. Viswanathan et al and Camila R. investigated knowledge of PEP and NSI amongst HCWs.<sup>(7,8)</sup>

Occupational exposures can be reduced by observing (UPs) at work place. This is especially important because in a study, self-disclosure of HIV status by HIV infected patients is about 53% to dentist and 89% to physicians<sup>(9)</sup>. Knowledge of PEP in HCWs was also studied by other authors.<sup>(10-13)</sup>

Chances of self-disclosure about HIV status, being positive, is likely to be less to nursing students. Therefore Centre for Disease Control [CDC] advised universal precautions to reduce OEs<sup>(14)</sup>.

The knowledge, attitude and practices regarding PEP, NSIs& UPs vary widely among HCWs. The guidelines of NACO about PEP and Ups are included in syllabus of nursing and dental students. Despite teaching them, HCWs may take inadequate measures during conduct of professional tasks.

With this background, the present study was planned to find out improvement in knowledge about safe practices, Ups, NSIs and PEP amongst nursing and under graduate dental students after training sessions of these subjects.

### **Aims and Objectives**

To assess effectiveness of training program about PEP for nursing and under graduate dental students

### **Materials and Methods**

**Study Site:** N.K.P. Salve Institute of Medical Sciences (NKPSIMS) and dental & nursing colleges, Hingna Road, Nagpur 440 019.

**Type of Study:** Cross sectional and Interventional study. The study started after approval of Institutional Ethical Committee of NKPSIMS.

### **Inclusion Criteria**

Willing nursing and undergraduate dental students.

In 2016-2017, total 406 nursing students (GNM and B.Sc and M.Sc nursing students) and 61 dental under graduate students were included in this study. Students were asked to give answer to 22 multiple choice pre-validated questions [MCQ], before training program. The 22 MCQ in questionnaire were pertaining to knowledge, attitude, safe practices about Ups, NSIs and PEP were pre-validated. Willingness of all 467 students were obtained before study.

After training session conducted by authors, students were again asked to answer, these 22 MCQ. Their reply before and after training was compared by EPI-Info software version-7.

**Performa using 22 MCQ is as under:-**

Name: -----Designation: -----Date: -----

## MCQs

1. Heard about PEP?

- a) Yes                      b) No

2. What is full form of PEP?

- a) Pre Exposure Prophylaxis                      b) Pre Exposure Preference  
c) Post Exposure Prophylaxis                      d) Post Exposure Preference

3. When do you think PEP should be indicated?

- a) When the source patient is at high risk for HIV.  
b) When the patient is known to be HIV positive.  
c) When the HIV status of the source patient is unknown.  
d) For any needle stick injury in the work place  
e) All of the above.

4. Contact with following body fluids poses a risk for HIV transmission in health care settings except --

- a) Blood                      b) CSF                      c) Saliva                      d) Amniotic fluid

5) Risk of acquisition of HIV by receptive penile - vaginal intercourse in absence of STI (sexually transmitted infections) is --

- a) 1.0%                      b) 1.5%                      c) 2.0%                      d) 2.5%

6) Risk of acquisition of HIV by needle stick exposure is--

- a) 30%                      b) 3%                      c) 0.3%                      d) 0.03%

7) Risk of acquiring \_\_\_\_\_ is maximum by needle stick exposure.

- a) HIV                      b) HBV                      c) HCV

8) On needle stick injury one should --

- a) Wash the site with soap and running water.  
b) Wash the site with soap and running water and clean with alcohol/bleach / iodine.  
c) Wash the site with soap and running water and squeeze the wound.  
d) All of the above

9. What is the best time to start PEP after exposure?

- a) Within an hour or 2hrs                      b) After 6hrs  
c) After 12hrs                      d) After 72hrs

10) PEP is efficacious, if initiated within--

- a) 48hrs                      b) 72hrs                      c) 96hrs                      d) 120hrs

11) What is the recommended duration of PEP for occupational exposures to HIV

- a) 14 days                      b) 21 days                      c) 28 days                      d) 120 days

12) What is the effectiveness of PEP?

- a) 100%                      b) 80-100%                      c) 60-70%                      d) 30-50%  
e) 20-30%

13) Have you attended any training about PEP?

- a) Yes                      b) No

14) Do you know about the PEP guidelines?

- a) Yes                      b) No                      c) Partially yes

15) Do you know institutional protocol &amp; whom to contact on occupational exposure?

- a) Yes                      b) No

- 16) Have you ever had needle prick or any other occupational exposure before?  
a) Yes                      b) No
- 17) After completion of PEP , what is the correct timing of testing, to confirm that HCW is not infected following exposure to HIV – infected material?  
a) 1 ½ month                      b) 3 months                      c) 6 months                      d) 12 months
- 18) Newer test for early detection of infection by HIV.  
a) HIV1                      b) HIV2                      c) NAAT                      d) Western blot
- 19) What should be advised to a health care worker, who is vaccinated against Hepatitis B gets needle prick injury from a source patient who is HBsAg positive?  
a) Find the anti HBs antibody titer of the source patient.  
b) Find the anti HBs antibody titer of the health care worker.  
c) a & b [ both]                      d) None of the above.
- 20) What should be advised to a health care worker, who is not vaccinated against Hepatitis B & gets needle prick injury from a source patient, who is HBsAg positive?  
a) Give HBIG (Hepatitis B Immunoglobulin) vaccine to the HCW.  
b) Start Hepatitis B (active) vaccine and complete course of 3 doses as per recommended schedule.  
c) a & b [both]                      d) None of the above
- 21) What should be advised to a health care worker who is vaccinated against Hepatitis B gets needle prick injury from a source patient who is HBsAg negative ?  
a) Vaccinate the source patient.  
b) Vaccinate the HCW.  
c) Do not offer vaccination to the patient.  
d) Do not offer vaccination to the HCW.
- 22) What should be advised to a health care worker, who is not vaccinated against Hepatitis B, who gets needle prick injury from a source patient who is HBsAg negative?  
a) Vaccinate the patient.  
b) Vaccinate the HCW.  
c) Do not offer vaccination to the patient.  
d) Do not vaccinate the HCW.

Signature\_\_\_\_\_ Name\_\_\_\_\_ Date\_\_\_\_\_

Statistical analysis was carried out by using EPI-INFO-Software Version-7

The questionnaires were distributed to all 467 students, before and after training session, and all students participated in study. Overall results and p-value indicates improvement of knowledge about PEP [Refer table 1 &2]. Results of questions number 1,13,14,15 &16 are elaborated in table number-3, where answer can only be yes or no . Answers before and after training were compared and statistically significant

improvement was detected in answers to question number 1, 2, 4 to 15 and 18-22. The improvement also detected in answer to question no.16, but this is not statistically significant. After training, there was reduction in percentage of correct answer to (a)question number 3, but this reduction is not statistically significant & (b) question number 17 & reduction of percentage of correct answer is statistically significant (refer Table 1 & 2).

Table 1

Question	Pre Session		Post Session		P value
	Yes Response	%	Yes Response	%	
Q1	201	44.9	391	87.3	<0.001
Q13	69	15.4	342	76.3	<0.001
Q14	72	16.1	401	98.5	<0.001
Q15	190	42.4	368	82.1	<0.001
Q16	132	29.5	161	35.9	0.007

Table 2

Question	Pre Session		Post Session		P value
	Correct Response	%	Correct Response	%	
Q2	194	43.3	367	81.9	<0.001
Q3	39	8.7	34	7.6	0.103
Q4	80	17.9	170	37.9	<0.001
Q5	83	18.5	232	51.8	<0.001
Q6	57	12.7	274	61.2	<0.001
Q7	72	16.1	126	28.1	<0.001
Q8	115	25.7	372	83	<0.001
Q9	221	49.3	395	88.2	<0.001
Q10	168	37.5	375	83.7	<0.001
Q11	92	20.5	297	66.3	<0.001
Q12	136	30.4	230	51.3	<0.001
Q17	87	19.4	41	9.2	<0.001
Q18	63	14.1	204	45.5	<0.001
Q19	90	20.1	152	33.9	<0.001
Q20	165	36.8	182	40.6	<0.001
Q21	39	8.7	120	26.8	<0.001
Q22	134	29.9	205	45.8	<0.001

Table No. 03

Sr. No.	Question asked	Pre session - yes response in %	Post session yes response in %	No response even after training in %
1	Have you heard about PEP	44.9	87.3	12.7
13	Have you attended training about PEP	15.4	76.3	23.7
14	Do you know about PEP guidelines	16.1	98.5	1.5
15	Do You know institutional protocol about PEP	42.4	82.1	17.9
16	Have you ever had sustained NSIs	29.5	35.9	64.1

Table No. 04

Sr. No.	Question asked	Pre session correct answer in %	Post session correct answer in %	Wrong answer even after training in %
2	Full from of PEP	43.3	81.9	18.1
3	Indications for PEP	8.7	7.6	92.4
4	Severity of risk with exposure to various body fluids	17.9	37.9	62.1
5	Risk of unsafe , penile vaginal coitus	18.5	51.8	48.2
6	Risk of HIV infection due to NSIs	12.7	61.2	38.8
7	NSIs are most likely to transmit HIV or HBV or HCV	16.1	28.1	71.9
8	First aid for NSIs	25.7	83%	17%
9	Most appropriate time to start PEP	49.3	88.2	11.8
10	Maximum gap in hours,when PEP can be effective, after exposure	37.5	83.7	16.3

11	Duration of PEP	20.5	66.3	33.7
12	Affectivity of PEP	30.4	51.3	48.7
17	After completion of PEP, when HCW should get antibody tested to know whether HCW infected or Not.	19.4	9.2	91.8
18	New test for early diagnosis of HIV	14.1	45.5	54.5
19	Various clinical settings as elaborated in question number 19 to 22	20.1	33.9	66.1
20		36.8	40.6	59.4
21		8.7	26.8	73.2
22		22.9	45.8	54.2

Even after training, no answer to question number 1,13,14,15,16 indicates that question is not understood by 12.7%, 23.7%, 1.5%, 17.9% and 64.1% students respectively [ Refer Table 3]. After training, wrong response was given by 18.1%, 92.4%, 62.1%, 48.2%, 38.8%, 71.9%, 17%, 11.8%, 16.3%, 33.7%, 48.7%, 91.8%, 54.5%, 66.1%, 59.4%, 73.2% & 54.2% students, in response to question number 2 to 12, and question number 17-22 respectively, which indicates that question is not understood by them.

### Discussion

The present study included 467 nursing and undergraduate dental students. The 22 questions were based on PEP and NSIs, risk of transmission, high risk BBFs, first aid measures, indications and duration of PEP, newer test to diagnose HIV infection and four clinical settings.

#### Risk of transmission:

Viswanathan et al reported that (i) 22.35% post graduate (PGs) students were aware of this risk (ii) None of PGs dental students were aware of risk<sup>(7)</sup>. In our study 12.7% of students were aware of risk and this percentage increased up to 61.2% after training.

#### Identification of high risk fluids:

Viswanathan et al reported that 50.6% of PGs students identified all high risk fluids correctly<sup>(7)</sup>. In our study 17.9% students identified risk before training correctly and this percentage increased up to 37.9% after training.

Singh et al reported that 65.5% of HCWs had heard about PEP<sup>(10)</sup>. In our study 44.9% of students had heard about PEP before training and this percentage increased up to 87.3% after training.

**First Aid Measures:** Viswanathan et al reported that 23.5% PGs students knew about appropriate first aid procedure<sup>(7)</sup>. Guru Prasad Y. et al reported that only 12 % dental students stated that they will wash wound with water and soap immediately after OEs to BBF<sup>(11)</sup>.

Singh et al reported that (i) 68.6% HCWs knew that finger should not be put in mouth immediately after exposure. (ii) 93.6% HCWs knew that exposed parts should be washed with normal saline or soap water after needle stick injury or occupational exposure to BBFs. (iii) 75% HCWs knew that eye and/ or mouth should be washed with water or normal saline after exposure and (iv) 20.5% HCWs knew that antiseptics should not be used to clean wounds after NSIs or exposure to BBFs<sup>(10)</sup>. In our study 25.7% students knew first aid before training and this percentage increased upto 83% after training.

#### Knowledge about when to Initiate PEP:

Viswanathan et al reported that 50.5% of PGs students answered this question correctly<sup>(7)</sup>. Kasat et al reported that 20.4% dental interns and 42.2% PGs students knew, when to start PEP. This was comparable to that reported by Chacko J. Issac<sup>(15)</sup> among medical interns (31.6%) and Chen et al<sup>(16)</sup> among junior doctors (33%) and Khan et al<sup>(13)</sup> among medical staff (22.0%). In our study 49.3% students answered this question correctly before training and this percentage increased upto 88.2% after training.

#### Maximum Acceptable Delay to Start Pep for HIV

Singh et al reported that 23.2% HCWs knew about maximum acceptable delay to start PEP<sup>(10)</sup>. In our study 37.5% students knew about maximum

acceptable delay to start PEP and this percentage increased upto 83.7% after training.

#### **Duration of PEP**

Viswanathan et al reported that 30.6% P.G. students knew about correct answer about duration of PEP<sup>(7)</sup>. Singh et al reported that 52.7% HCWs knew about correct duration of PEP<sup>(10)</sup>. In our study 20.5% students gave correct answer to this question before study and this percentage increased up to 66.3% after training.

#### **Previous Exposure to NSIs**

Singh et al reported that 21.4% HCWs were exposed to BBFs or NSIs<sup>(10)</sup>. In our study 29.5% students confirmed that they were exposed to NSIs or BBFs before training and this percentage had increased upto 35.9% after training.

Kasat V.O. et al reported that duration needed to rule out infection to HCWs, following exposure to HIV infected materials and completing PEP regimen was known to 23.5% interns and 36.0% P.G. students in their study<sup>(12)</sup>. Khan et al reported that 49% medical staff knew about this duration<sup>(13)</sup>. In our study 19.4 % students knew about correct answer to this question before training and 9.2% students gave correct answer to this question after training. This indicates that this question was probably not understood by students. The difference in knowledge about PEP and NSIs and UPs found amongst participants of ours and other studies may be due to differences in

- i. Profession of participants
- ii. Years of clinical experience
- iii. Importance given to this topic in their curriculum
- iv. Grasping power of our nursing & dental students, as compared to participants of other study, which included P.G. students and HCWs.

For same reasons, results obtained in our study and other studies cannot be generalized to all HCWs and students of our country.

This study appears to be unique, because, we could not find such interventional study, where in responses of nursing and dental students before and after training were compared.

#### **Conclusions**

Viswanathan et al<sup>(7)</sup> and Singh et al<sup>(10)</sup> and Kasat V.O. et al<sup>(12)</sup> and our study revealed that knowledge about PEP and UPs is inadequate among students and HCWs. Properly designed educational program needs to be conducted regularly for students of every year batches, during their undergraduate and post graduate courses, for doctors, nurses and other HCWs.

This topic must be adequately covered in curriculum of theory and practical classes. Repeat classes and refresh courses on this topic must be frequently organized.

All Education and Training program must include following UPs and awareness about PEP.

- (a) Hand wash with water and soap immediately, if exposure with BBF or NSI occurs
- (b) Glove must be worn when, exposure to BBFs is expected. Double gloving may be considered in special situation.
- (c) Eye wear and face mask must be worn, if splashing of BBFs is contemplated.
- (d) To ensure calmness and focused approach during all procedures and during handling needle and sharp instruments.
- (e) Avoid recapping of needle
- (f) Needles must not be removed from syringes or broken or bent or manipulated by hands.
- (g) Disposable syringes and needles of scalpel blades or sharp items must be kept in puncture resistant container.
- (h) HCWs having wound and /or ulcer on skin or broken skin or dermatitis must not handle instruments and must avoid procedure having possibility of exposure to BBFs.
- (i) Follow all sterilization technique.
- (j) All spoiled BBFs and body substances/ tissue to be considered as potential source of contamination and must be disposed of accordingly.
- (k) All HCWs must receive Hepatitis –B vaccination.
- (l) All HCWs must immediately report occurrence of exposure to BBFs and / or NSIs to physician as per institutional policy.

- (m) All HCW must be provided chemo prophylaxis if indicated, by institution because many HCWs may not afford PEP, due to poor financial grounds.
- (n) All HCWs, who are exposed to BBFs/or NSIs must be provided psychological support, till such time, they are declared free from infections by appropriate investigations.

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### Reference

1. WHO, Health Report, BOX 4.4. Switzerland.2002 available from <<http://www.who.int./whr/2002> CHAPTER-4 /en/index8ht ml> [Google Scholar]
2. Acaba P.A. et al. Awareness & knowledge of H.I.V. Virus PEP amongst Nigerian Family Physicians. Niger Med. J. 2012;53:155-60 [PMC Free Article] [Pub Med].
3. Ippolito G. et al. Occupational HIV Infection in Health Care workers: Worldwide cases through Sept 1997. Clin. Infect. Dis. 1999;28:365-83 [Pub Med].
4. Art Guidelines for HIV infected, & for PEP May 2007 NACO, MHFHFV, Govt of India.
5. Sharma, A. et al, PEP for HIV Indian J. Sextransm Dis 2007; 28: 61.8
6. ZaidI M.A; et al, Blood and Body Fluids exposure related knowledge, attitude, and practices of Hospital based health Care Providers in UAE. Saf Health Work 2012;3:209-15 [PMC free article] [Pub Med] [Google scholar].
7. Saraswati Vishwarthan et.al Int. J. Med. Public health ([www.ijmedph.org](http://www.ijmedph.org)) April-June 2011/Vol1/ Issue-2.
8. Camila R. Needle Stick injuries & health care worker – the time to act now. Indian J. Med. RES.2010: 131:384-6 [Pub Med] [Google Scholar].
9. Perry s.w. et al. Self-disclosure of HIV Infection to dentist & physician. J. Am. Dent. Assoc. 1993; 124: 51-4 [Pub Med].
10. Singh R.K et al – Int. J. of Med. Sci and Public Health / 2015/Vol 4 / Issue<sup>7</sup>; P977 to P 981.
11. Guruprasad Y.et al. NAH. J. Maxillofac. Surg. [Serial online] 2011 [Cited 2016 July 17];2:152-5 Available from <http://www.NJMS.in/Text/ASP?2011/2/2/152/94470>
12. Kasat, V.O.et al “ Knowledge, Attitude and practices towards PEP Prophylaxis for HIV amongst Dental students in India” ANN Med Health Sci Res 2014 July – Aug; 4 (4); 543 to 548
13. Khan, AZ. et al. “Do we need to improve awareness about HIV PEP? ANN R Coll Surg Engl.2002; 84: 72-3 (PMC Free Article] [PubMed]
14. Nwankwo T.O; et al. “Percutaneous Injuries and accidental blood Exposure in Surgical Residents; Awareness and use of prophylaxis in relation to HIV. Niger J. Clin. Pract. 2011; 14;34>{Pub Med].
15. Chacko J. Issaac R. Percutaneous injuries among medical interns & their knowledge and practice of PEP for HIV. Indian J. Public Health. 2007;51; 127-9 [ Pub Med]
16. CHEM et al. PEP for HIV: Knowledge & experience in Junior Doctors. Sex Transm Infect 2001; 77: 444-5 [PMC Free article] [Pub Med].