Impact Evaluation of Domains of Learning on Universal Work Precautions (UWP) Amongst Nursing Staff in a Tertiary Care Hospital, Western India

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ABSTRACT

Introduction: Second key strategy of National AIDS Control Program (NACP IV) is comprehensive care and support by providing quality services through zero stigma and discrimination. Quality of services can be improved by eliminating stigma and discrimination and making health care provider aware of associated occupational hazards. Nursing staff play crucial role and are more at risk therefore their understanding, perception and skill must be assessed in different domains of learning to improve the contents and methodology of trainings. Material and Methods: Total 85 nursing staff underwent 1 day training in 3 batches focusing on Universal Work Precautions (UWP), Post Exposure Prophylaxis (PEP) and sensitization of the participants towards PLHA (People living with HIV/AIDS). Their learning was evaluated under different domains (cognitive, psychomotor and affective) using structured questionnaire. Results: In pretest evaluation scores showed minor and statistically not significant variations in terms of participant’s gender, age, designation work experience and status of having received any similar training in the past. Impact of the training was visible as overall mean scores increased from 10.6 ± 2.7 to 13.8 ± 5.8; gain being statistically highly significant (P value < 0.001). Gain was highest in cognitive (from 58% to 77%) followed by psychomotor (from 48% to 62%) and minimal in affective domain (from 75% to 76%). Conclusions: After undergoing the training, participants were benefitted more in cognitive domain than psychomotor and affective domain. Acquired knowledge, skill and communication skill if evaluated as done in this study will improve the methodology of such trainings making them more effective.

Keywords: Domains of learning, nursing staff, post exposure prophylaxis (PEP), universal work precautions (UWP)

Introduction

Since reporting of first case of Human Immuno — deficiency Virus (HIV) in 1980(1) and first ever occupationally exposed case in 1984,(2) risk of HIV transmission through occupational exposure (percutaneous/mucocutaneous injuries/blood contact with non-intact skin) is perceived as relatively low.(3) Chances of accidental exposure are on rise due to increase in invasive procedures but due to inadequate surveillance, such exposures are under reported. Health Care Workers (HCWs) are exposed to blood/other body fluids with threat of acquiring infections; commonest being hepatitis B (9-30%) followed by hepatitis C (3-9%) and HIV (0.03%).(4-10) Globally 2.5% of HIV and 40% of HBV among HCW are attributed to occupational exposure with an overall incidence of occupational exposure to blood/body fluids among HCW as 32.3%.(11) Arrival of HIV in clinical settings has focused everyone’s attention towards Universal Work Precautions (UWP). In resource constrained settings,
where not all eligible People Living with HIV/AIDS (PLHA) have access to Anti Retroviral Treatment (ART), provision of Post Exposure Prophylaxis (PEP) means diversion of these drugs etc. which can be used for treatment.\(^{(3)}\) In view of non-availability of any vaccine for HIV and Hepatitis C, prevention of these two by adequate learning is most cost effective.\(^{(9)}\) Despite high risk of exposure, knowledge/understanding of HCWs especially nursing staff about UWP and PEP is not up to the mark.\(^{(6)}\) Hence present study was done as “Before and after study” following a sensitization training aiming to:

1. Study baseline knowledge,
2. Impact evaluation of training in terms of gain (if any) and
3. Find out core areas to improve the content/methodology of learning to make it more effective for future trainings.

This training was different from other such trainings because:
1. It dealt only with those actively involved in patient care and covered only absolutely essential (must know) areas.
2. Questionnaire designed for evaluation segregated different domains of learning (cognitive, affective and psychomotor).

Materials and Methods

Total 85 nursing staff (22 sisters in charge and 63 staff nurses) from a teaching hospital, underwent 1 day training in 3 batches during March 2013 focusing on UWP, PEP and sensitization towards PLHA. Trainers included technical expert from state AIDS Control Society, trained faculty from Community Medicine, ex medical officer at an ART centre and representative from the network of positive people. Pre Training assessment was done (just before training) using self administered structured questionnaire followed by post Training assessment (immediately after training). Same tool was used for both pre and post evaluation, however, participants had no knowledge that the same tool will be used for post evaluation as well. This questionnaire was developed by the faculty after extensive brainstorming and considering the contents of the training module. Questionnaire was pilot tested on 5 trainee of first batch for its feasibility and based on that it was suitably modified. For the ease of participants, questionnaire was designed and administered in local language (Gujarati). Prior informed oral consent was obtained from all participants after disclosing the purpose and assuring full confidentiality. Questionnaire originally contained 20 questions but one question was removed from analysis due to its ambiguous nature, therefore, total 19 questions from 3 domains of learning — cognitive or knowledge based (12), psychomotor or activity oriented (6) and affective or attitudinal (1) were included in the study. One mark was awarded for each correct response and 0 for every incorrect/unattended question. There was no dropout between pre and post training evaluations. Ideally speaking evaluation of psychomotor learning cannot be done through proforma and for that the participants need to be observed while they perform a particular task. But owing to the logistic limitations and feasibility, this has been done by asking questions.

Statistical analysis

Data was coded, entered in MS Excel 2007 and analyzed; statistical tests such as F test; Unpaired and Paired t-test, Z test were used to assess the significance of difference in the baseline learning of participants and the impact of training on learning.

Results

Participant’s profile

Out of total 85 participants, 75 (88.2%) were females (22 sisters in charge and 53 staff nurses) and rest (10) were males. Sister in charge (SI) being senior had higher mean age (41 ± 9.5 years) than female (28 ± 5.5 years) and male (27 ± 3.7 years) staff nurses. Being longer in job, sister in charge also had more work experience (16.8 ± 8.7 years) than female (5.7 ± 4.1 years) and male (5.1 ± 3.5 years) staff nurses. Staff nurses both female and male had comparable age and experience. Out of 85 participants, 48 (56.5%) underwent similar type of training in the past; proportion being more in case of female staff nurse (52.0%) than SI (39.6%) and male staff nurses (8.3%). Majority participants (82.4%) are actively involved with management of PLHA.

Baseline level of learning

In pre test assessment, baseline scores (mean and standard deviation) were calculated for participants based on their designation, previous training status and involvement in management of PLHA [Table 1]. Assessment scores were around 10 and showed minor variations, slightly high in those who were staff nurses, received similar trainings and males. Sister in charge also had more work experience (16.8 ± 8.7 years) than female (5.7 ± 4.1 years) and male (5.1 ± 3.5 years) staff nurses. Staff nurses both female and male had comparable age and experience. Out of 85 participants, 48 (56.5%) underwent similar type of training in the past; proportion being more in case of female staff nurse (52.0%) than SI (39.6%) and male staff nurses (8.3%). Majority participants (82.4%) are actively involved with management of PLHA.

| Characteristic | No. | Pre test score (Mean ± SD) | Statistical interpretation |
|---------------|-----|---------------------------|---------------------------|
| Designation   |     |                           |                           |
| Sister in charge (SI) | 22  | 10.0 ± 2.3                | F test = 0.5554            |
| Female staff nurse | 53  | 10.6 ± 2.9                | NS*                       |
| Male staff nurse | 10  | 9.9 ± 2.2                 |                           |
| Training status |     |                           |                           |
| Trained with similar training | 48  | 11.1 ± 2.70               | Z test = 1.89, NS*         |
| Did not receive similar training | 37  | 10.0 ± 2.61               |                           |
| Involvement in management of PLHAs |     |                           |                           |
| Actively involved | 70  | 10.9 ± 2.75               | t test = 1.99, df = 83; NS* |
| Not involved    | 15  | 9.4 ± 2.1                 |                           |

NS = Not significant at 5% level of significance
in the past and involved with management of PLHA but when tested the differences everywhere were statistically insignificant ($P > 0.05$) [Table 1].

**Impact of training on learning**
Post training assessment was done immediately after the training using the same tool. Drop out was nil, all present in pre training assessment (85) also participated in post training assessment. Overall impact of the training as assessed by gains recorded through post training scores. Mean score of participants increased from 10.6 ± 2.7 (pre training) to 13.8 ± 5.8 (post training), gain was statistically significant ($P < 0.001$). When viewed separately, gain was consistent among all participants irrespective of their designation or status of having received/or not similar training in the past. Gains as reflected by increase in scores, in all the categories were statistically significant ($P < 0.001$) [Table 2].

**Domains of learning**
One of the objectives of the study was to segregate the gains of learning into cognitive, psychomotor and affective domains. Total 19 questions asked, were from cognitive (12), psychomotor/affective (7) domains. Out of total scores obtained during pre and post evaluation, bulk was contributed by cognitive (6.9 and 9.3) followed by psychomotor (2.9 and 3.7) and affective (0.75 and 0.76) domains [Figure 1]. Out of 12 questions in cognitive domains, on an average 58% participants answered a question correctly; it rose to 77% during post evaluation. In psychomotor (6) it increased from 48% to 62% while in affective (1) the gain was minimal from 75% to 76%. Gain was more in cognitive domain than in psychomotor and when tested (paired t test), differences were statistically significant in both the cases; $P$ being less than 0.006 and 0.047 respectively. Similar statistical interpretation was not done for affective domain as there was only one question.

**Core areas of learning and action proposed**
Pre and post evaluation was undertaken to identify core areas of learning. Based on the initial scores and gain or loss (?) during post training evaluation, certain actions are recommended to make future trainings more relevant and effective [Table 3]. Except in question about most common route of HIV transmission, consistent gain in cognitive domain was observed. Highest gain (44.7%) was observed for PEP drug contraindicated during 1st trimester of pregnancy. Similarly in psychomotor domain except in 1 question about practices increasing risk of needle stick injuries, gains were consistent but lesser than cognitive (3.5% to 27.1%). Highest gain (23.7%) was observed for eligibility of UWP. Action proposed based on these findings in case of cognitive domain was for further improvement. Sessions should be objective based and framing of question for evaluation should be non ambiguous and appropriate to the target audience. For psychomotor learning, method should include more of demonstrations, group discussion and role play.

**Discussion**
Second key strategy of National AIDS Control Program (NACP) phase IV is comprehensive care and support by providing quality services through zero stigma and discrimination which essentially requires training HCP by giving right type of knowledge, skill and attitudes towards UWP, PEP and removing stigma and discrimination towards PLHA. All 85 trainees in our study were heterogeneous in terms of age, gender, work experience, designation and status of having received such training earlier but had little difference in their baseline knowledge. In such type of trainings, it is difficult to assess the psychomotor and affective domains but we tried to assess certain cognitive aspects of these domains. Learning in cognitive, affective and psychomotor domains provided in a focused training like this, in relation to UWP especially in context of HIV management in tertiary health care centre can have a profound impact on the quality care provided. Such information is essential for future planning of

| Table 2: Impact evaluation through pre and post training scores ($N = 85$) |
|---------------------------------|-----------------|-----------------|-----------------|
| Characteristics                | No. | Score (Mean ± SD) | Statistically interpretation (paired t test) |
|--------------------------------|-----|-------------------|---------------------------------------------|
|                                |     | Pre test          | Post test                                   | |
| Designation                    |     | t=5.0, df=21, $P<0.0001$ | t=7.26, df=9, $P<0.0001$ | |
| Sister in charge (SI)          | 22  | 10.8±2.4          | 13.5±2.1                                   | |
| Female staff nurse             | 53  | 10.6±2.9          | 13.8±2.8                                   | |
| Male staff nurse               | 10  | 9.9±2.2           | 14.4±2.2                                   | |
| Training status                |     | t=8.19, df=36, $P<0.0001$ | t=7.93, df=47, $P<0.0001$ | |
| Untrained                      | 37  | 10.0±2.61         | 13.5±2.61                                  | |
| Trained earlier                | 48  | 11.1±2.70         | 13.9±2.40                                  | |
| Total                          | 85  | 10.6±2.7          | 13.8±5.7                                   | |

**Figure 1:** Impact of training (mean scores) on various domains of learning ($N = 85$)
in-house training programs and also for improving quality of patient care with focus on reducing stigma/discrimination against PLHA and preventing needle stick injuries. Nursing staff sustain high burden of needle sticks injuries up to 60.6 percent. Participants in this study were younger with mean age of 41 years (sisters in charge) and 27-28 years (staff nurses), it was comparable to other studies done in India amongst HCW in Jamnagar as well as abroad in Egypt. Mean years of work experience in present study was much lower than in other studies.

Training young providers is cost effective as they are receptive to new learning and serve for longer duration. Pre training scores were low and had little variation in different sub groups including those who received similar trainings in the past. In a training of different cadre of HCW from Mysore also post evaluation scores for knowledge contents ranged between good to excellent but declined with passage of time.

Training mainly covered three areas: Basics of HIV/AIDS, UWP and PEP and post-test scores improved remarkably in all the domains. Surprisingly the knowledge level decreased in post training regarding the “most common route of HIV infection”. It happened so because in our training the two points of (1) commonest (sexual) and (2) strongest (blood borne) routes of acquiring HIV transmission were emphasized. Somehow it confused participants and as a result post training scores decreased marginally (from 60% to 58%). Therefore whenever such issues are discussed, we must recheck the understanding of participants. More than half of participants even before training were aware of basics of HIV, Hepatitis B and C and also various aspects of UWP, PEP and Hepatitis B immunization. Total 69.4% participants from present study (post workshop) knew regarding hepatitis B vaccination schedule; less than 75.9% amongst laboratory technician in another study also from Western India. Prior to this training, 60% were correctly aware of Do's/Don't of PEP while safe practices regarding needle stick injuries were low (32.9%). Knowledge and practice score of PEP elsewhere was only 31.9. The best practice identified in pre training assessment was that 78% of them were aware of using Personal Protective Equipment (PPE) for delivery of HIV positive women as a UWP; it increased further to 81%. Areas which had low score during pre-evaluation and warrant more attention were steps of hand washing, needle recapping practices etc. though these topics are adequately covered in their basic courses. All in - service trainings must focus on these areas with demonstrations and actual “hands on” training. Other

### Table No 3. Actions proposed as per core area in terms of domains of learning (N = 85)

| Core areas in different domains | Correctly answered (N = 85) | Action proposed |
|---------------------------------|---------------------------|-----------------|
|                                 | Pre test | Post test | |
| Cognitive(12)                   |          |          | |
| Strongest route of HIV transmission |          |          | There is gain in all areas, however, expected post evaluation shall be around 100%. Hence objective based lectures for further improvement required |
| Post exposure prophylaxis (PEP) reduces transmission of which infectious disease(s) |          |          | |
| Guiding principles while administering PEP |          |          | |
| Body fluid considered not risky for HIV transmission |          |          | |
| Vaccination schedule for HCW for Hepatitis B vaccine |          |          | |
| When the PEP (for HIV) be started |          |          | |
| Guidelines for starting PEP |          |          | |
| Drug of PEP contraindicated during pregnancy |          |          | |
| Blood borne infection against which no immunization available |          |          | |
| Blood borne infections preventable by Universal Work Precaution |          |          | |
| Maximum time for initiation of PEP |          |          | |
| Most common route of HIV transmission |          |          | Knowledge decreased (?). May be ambiguous question asked, needs to be covered with reinforcement and recheck understandings |
| Psychomotor/Affective(7)        |          |          | |
| Practices by which risk of needle stick injury increases |          |          | Also decreased (?). To be covered by Group discussions/demonstrations |
| Sequence of Steps of hand washing |          |          | Gain unsatisfactory when it is covered in basic trainings too. Actual demonstrations needed |
| How to disinfect used thermometer |          |          | |
| Actions required for accidental needle stick injury in a known patient of HIV + ve |          |          | |
| In whom universal work precautions are mandatory |          |          | |
| PPE required to conduct HIV positive delivery |          |          | Role play and case studies will be helpful |
| PEP counseling |          |          | |
areas requiring improvement were knowledge regarding PEP drugs and disinfection procedures. In view of this, periodic trainings supplemented with monitoring and supervisions of these practices are proposed actions. Such trainings must be done once in a year as suggested by Suchitra and Lakshmi[14] who demonstrated a progressive decline in the knowledge scores among different categories of HCW in absence of another similar training. Learners are expected to improve learning in all 3 domains and trainings which are largely lecture based improve cognitive domain and when knowledge (cognitive) is truly perceived will lead to improved skill (psychomotor) and attitudinal change (affective). Changes in affective and psychomotor domain are the real challenges to both trainers and trainee and must be a priority area for any training.[15]

It may be noted that any gain less than 100% in this training is unsatisfactory as all questions dealt with must know areas and with day to day working of participants.

Conclusions
To provide quality care by nursing staff without stigma and discrimination (for HIV) on one hand and avoidance of injuries leading to blood born infections amongst them on the other side, such trainings are of immense value. Trainings should have a proper mix of all domains and need to be evaluated to make them even more purposeful.

Limitations
Evaluation was done immediately after the training hence the settings were appropriate for evaluation of cognitive learning but not for other domains (psychomotor and affective). Proforma based evaluation is ideal for cognitive learning but is not appropriate for learning in other two domains. Cognitive learning is reduced in course of time so another evaluation after some time may give different results. Evaluation tool had more questions on cognitive than psychomotor and affective domains.

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