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Evaluation of participatory learning approach for developing competency of human immunodeficiency virus risk assessment skills among MBBS undergraduate students

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Abstract:

BACKGROUND: An Indian medical graduate needs to be competent in the diagnosis and management of human immunodeficiency virus (HIV) patients. This is crucial in terms of occupational safety. A participatory learning approach could be a possible way to change behavior and improve HIV risk assessment skills among medical students for better occupational safety and health care. The present study was planned to identify the need, provide different learning experiences for acquiring competency, and compare the effectiveness of participatory learning over traditional in developing HIV risk assessment skills.

MATERIALS AND METHODS: An educational interventional (randomized controlled trial) was carried out at GEMS and Hospital. Needs assessment survey was conducted, which identified HIV risk assessment as a key competency. For which the outcome-specific learning objectives were defined, two different learning experiences were employed. A pretest was conducted to assess the baseline knowledge and attitude (n = 92); they were then divided into two equal groups (A and B). "A" group was taught by participatory approach, whereas "B" by traditional techniques followed by posttest and objective structured clinical examination (OSCE) to assess their HIV risk assessment skills. Statistical analysis: Paired t-test for assessing knowledge and attitude within the same group and unpaired t-test for assessing skills between the two groups were used in this study.

RESULTS: Statistically significant improvement ($P < 0.001$) in knowledge and attitude scores was noticed that OSCE scores were significantly higher in the intervention group "A" ($P < 0.001$) as compared to "B" taught by traditional techniques.

CONCLUSION: Participatory learning effectively builds upon existing knowledge and attitude to develop better HIV risk assessment skills.

Keywords:

Competency-based medical education, human immunodeficiency virus risk assessment skills, medical students, outcome, participatory learning, traditional teaching approach

Introduction

Until recently, teaching–learning approaches to medical education in India have predominantly been passive. The students were considered as the receptacle of knowledge and the teacher as its source. The older curriculum, which focused on traditional teaching and assessment methods, is now being replaced by competency-based medical education, an active form of teaching and learning,

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which highlights a paradigm shift in approach toward learning and emphasizes competencies to be acquired by a medical student in India.[1] Participatory learning is one such active, student-centered teaching–learning technique. It prioritizes the student's participation in the teaching–learning process, with the teacher taking on the role of a guide or facilitator of knowledge. The participatory approach is established as per the constructivist theory of learning, which proposes that knowledge is actively constructed and not by merely transmitting to students. Students learn better by application of their knowledge to meaningful problems and by actively constructing their own understanding.[2] Participatory learning includes various methods to facilitate and help students to unite as a group (especially a small group) where they are able to share their ideas, understand the topic, explore, analyze, debate, construct, critique, and create knowledge.[3]

An Indian medical graduate (IMG) should be competent in assessing and managing a suspected case of human immunodeficiency virus (HIV). Besides, he/she should also be aware of all precautionary measures to be taken for making the workplace safe to avoid occupational exposure, and if accidentally exposed to take necessary precautions. Such competencies are crucial for achieving the Sustainable Development Goals of ending the global epidemic of HIV by 2030[4] and in meeting the global target of "90:90:90."[5] With a prevalence rate of 0.22,[6] it is estimated that around 2.1 million people living with HIV (PLHIV)[6] reside in India. Over the past decade, the annual incidence of HIV infection has declined by 26%.[7] However, as they age, it is estimated that about one-fourth of these PLHIV will need surgical and/or esthetic treatment in future.[8] The present policy does not mandate universal screening of a patient before any medical/surgical intervention; thus, an IMG is always at the risk of acquiring HIV infection while performing his/her duties.

Past studies on health professionals have highlighted gaps in the knowledge, attitude, and practice in matters concerning HIV and its control.[9-12] They also point out that a good knowledge does not necessarily transform into expected behavior, and had therefore recommended an alternative, strategic approach to teach in this matter. The present study explores the effectiveness of the participatory approach in developing the competency of HIV risk assessment skills.

Aim

The present study was planned to identify the need, provide different learning experiences for acquiring HIV risk assessment skills, and compare the effectiveness of participatory learning over traditional in developing HIV risk assessment skills.

Materials and Methods

Study design and setting

An educational interventional (randomized controlled trial) was carried out at GEMS and Hospital among 6th-semester MBBS students (92) from July 2019 to June 2020.

Sample size

Thesample size was calculated using a standard formula[13] as 92, keeping (α) at 0.05, the power (β) of the test at 0.8, effect size[14] ($d = \delta/\sigma$) of 0.6 and considering dropout rate of 5%. Students who consented to participate in the study and cleared all supplementary examinations were included. Ethical approval was taken by the Institutional ETHICAL committee (14/IEC/GEMS and H/2019).

Data collection tool and technique: prevalidated and semi-structured questionnaire

A needs assessment survey involving 100 undergraduate MBBS students was conducted using a self-administered questionnaire (25 questions) comprised of multiple choice questions covering student demographic details (3), knowledge on various aspects of HIV like risk factors (10), integrated counseling (pre- and post-HIV test) and testing services (7), universal precautions related to blood transfusion and safety (3) along with two open-ended questions on perception toward PLHIV patients, and views on teaching–learning of HIV risk assessment in undergraduate curriculum. The responses were evaluated by descriptive statistics and thematic analysis. The survey questionnaire was validated by piloting it on a group of 25 interns of the institute and further refined accordingly. Based on the literature search and the results of our needs assessment, five outcomes were identified for making an IMG competent enough to assess the risk in HIV patients.

The five outcomes were as follows:

1. Adequate knowledge on risk factors predisposing to HIV
2. Motivate the patient for voluntary HIV testing
3. Practice universal precautions and blood safety protocol while sample collection and testing in laboratory
4. Counsel the patient according to the test results and risks identified
5. Follow the universal precautions related to blood transfusion and blood safety protocol.

Each of these outcome-specific learning objectives was designed. For attaining these outcomes, students were approached through two different learning experiences, i.e., participatory learning and traditional approach. Ninety-two study participants were included, and

they were divided randomly into two equal groups of 46 each (Group A and Group B). Group A was taught by participatory learning, whereas Group B by usual traditional teaching methods [Figure 1].

The participants were assessed using the following tools:

1. A pretested and prevalidated questionnaire for assessing change in knowledge and attitude of the students. The questionnaire was validated by subject experts (10) and further modified and revised as per suggestions and recommendations. It had two sections:
   a. Ten multiple-choice question-based questions for assessing knowledge. Each right response was awarded 1 mark
   b. Ten five-point Likert scale questions to assess attitude. The highest score for a response was 5, and the lowest was 1.

2. Objective Structured Clinical Examination (OSCE) using simulated patient: Five OSCE stations were used to assess the five defined outcomes [Figure 2]. The OSCE questionnaire was validated by subject experts and its reliability was checked by Cronbach's alpha (0.76). The students' performance was assessed based on a checklist for each of the stations, and a global rating scale was used to give feedback to the students.

Intervention

Participatory learning is an approach where the learner goes through a planned sequence of activities which lead to attainment of the designed specific outcomes. Dewey describes participation is democratic when students construct purposes and meanings, they had to take part in making meaning, articulating purposes, carrying out plans and evaluating results.[15,16] The main idea of the participatory learning approach is that the students design questions, accomplish, and follow it up by assessing and grading their peer results[8] [Figure 1]. The teacher/mentor can help guide the learners in setting these objectives and facilitate them through the process of learning.

For providing this intervention, Group A was further subdivided into four subgroups, and each of these subgroups was tasked with designing a pro forma to assess a suspected HIV case and to manage the case based on the diagnosis or risks identified. The pro forma was also supposed to include a checklist of items required to make the workplace safe against blood-borne infections and steps to follow accidental needle stick injury (NSI). The students were given a free hand in choosing the contents and designing the pro forma. Each subgroup was allotted a mentor to guide and facilitate them in this task. The time allotted for the task was 2 weeks, after which each subgroup was asked to assess and grade the pro forma of the other group. At the end of the intervention, all the four subgroups through collaboration combined their individual pro forma to make one unified pro forma for assessing a suspected HIV case.

The other Group B was approached through traditional method. Various aspects of HIV infection, its control, were taught to the students in large-group lectures, small-group practical, and demonstration sessions. The total duration was 12 h spread over 2 weeks. To reinforce the knowledge, a class test on the same subject was conducted on the group after 1 week. It was followed up by posttest and Objective Structured Clinical Examination (5 OSCE stations) to assess the change in knowledge, attitude, and HIV risk assessment skills.

Statistical tests used

The data was collected and analyzed using the statistical software package (IBM SPSS Statistics V21.0). Paired

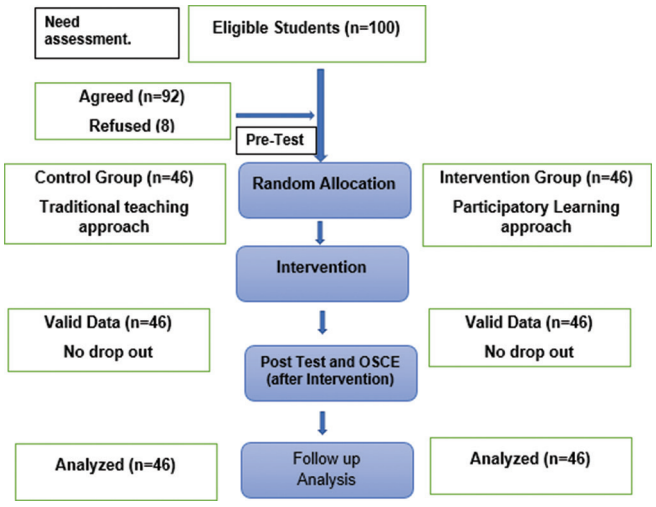

Figure 1: Consort diagram of the study

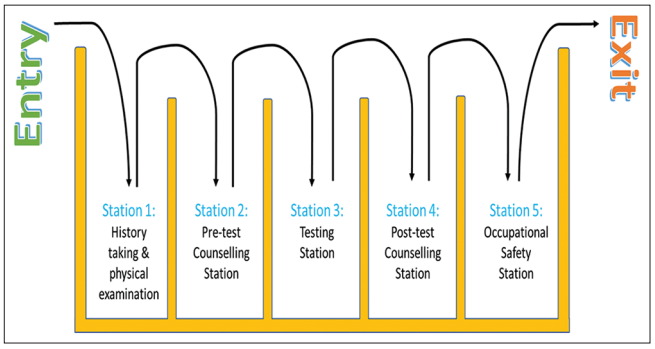

Figure 2: OSCE stations for assessment of human immunodeficiency virus risk assessment skills 5 OSCE stations to assess outcomes of human immunodeficiency virus risk assessment skills. Twenty-one questions in total (4 in each station except 3rd having 5 questions). The maximum score was 63 and minimum 21

t-test (where α was 0.05) was used for assessing changes in the knowledge and attitude within the same group and unpaired *t*-test (where α was 0.05) for assessing the difference in HIV risk assessment skills between the two groups.

Results

A total of 100 students took part in needs assessment survey. The data on knowledge on various aspects of HIV, perception towards PLHIV and views on T/L of HIV risk assessment skills in medical curriculum was collected [Table 1].

From the survey, we identified several gaps in knowledge in terms of occupational safety from blood-borne infection, adherence to recommended protocols, and incomplete knowledge regarding HIV. The qualitative data obtained through open-ended questions was analyzed by thematic analysis which showed 2 important categories, one being limited role of a doctor in managing the PLHIV patients with themes like supervisory, administrative and advisory role only where as other health professionals such as laboratory technicians, nurses, and counselors providing the bulk of the health care. The other category being lack of focus on teaching and learning (T/L) of HIV risk assessment skills in undergraduate curriculum with emerging themes like T/L limited to PowerPoint lectures, visits and observations only without any actual participation.

Table 1: Needs assessment survey: Knowledge on risk factors, integrated counseling and testing services, universal precautions related to blood transfusion, and safety in people living with human immunodeficiency virus (*n*=100)

Knowledge on (*n*=100)	Frequency (%)
Persistent fever for 1 month	18.5
Persistent diarrhea for 1 month	18.5
Persistent cough for 1 month	19.5
History of drug abuse	19.5
Weight loss	50
Occupational history	100
History of recurrent infection	100
Generalized pruritic dermatitis	18.5
Tuberculosis	85.5
Genital lesions and weight loss	54
Function of an ICTC center	86
ELISA as a screening test	76
Process of pretest counseling	59
Nonprovision of antiretroviral drugs at ICTC	38
Postexposure prophylaxis within 72 h of exposure	78
Drugs used for postexposure prophylaxis	9
Process of posttest counseling	12
Drawing and testing a sample	9
Diseases screened before blood transfusion	76
Precautions to avoid needle stick injury	9

ICTC=Integrated Counseling and Testing Center

HIV risk assessment was therefore conceived as a crucial competency that an IMG should possess, to address the gaps identified in this survey. We also identified five key outcomes based on this survey and literature search to inculcate HIV risk assessment skills in an MBBS undergraduate.

A total of 92 study participants were enrolled for the study, 55 (59.8%) of whom were female and 37 (40.2%) were male. Group A ($n = 46$) consisted of 28 females and 18 males, with mean pretest knowledge and attitude scores of 7.19 ± 1.08 and 35.8 ± 3.80, respectively. Group B consisted of 27 females and 19 males with mean pretest knowledge and attitude scores of 7.36 ± 1.17 and 35.6 ± 4.85, respectively. Both the groups were comparable to each other before the intervention.

The average posttest knowledge scores were higher than pretest scores in both the groups [Table 2]. This difference was found to be highly statistically significant Group A ($t = 7.522484$, $P < 0.001$) compared to Group B ($t = 2.196$, $P = 0.03$).

The mean attitude scores of Group A students improved significantly following the intervention [Table 2]. This difference was found statistically significant ($t = 4.93$, $P < 0.001$). However, no such statistically significant improvement was noticed in Group B ($t = 0.30$, $P = 0.76$).

The average OSCE scores were significantly higher in Group A, taught by the participatory learning techniques compared to Group B (42.43 vs. 50.06, $t = –7.80$, $P < 0.001$) [Figure 3].

Discussion

Shen *et al*.[3] have mentioned two important stages in the participatory approach:

- The designing stage: Where the students blueprint the specific questions or projects and implement them
- The evaluating stage: Where the students assess and grade their peer design.

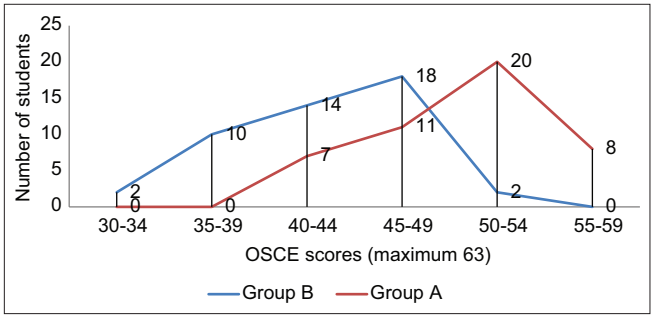

Figure 3: Comparison of OSCE scores of two groups on human immunodeficiency virus risk assessment skills. Average OSCE scores were significantly higher in Group A (participatory learning) as compared to Group B (traditional teaching–learning) (42.43 vs. 50.06, $t = –7.80$, $P < 0.001$)

Table 2: Mean knowledge and attitude scores of the study participants (*n*=92)

Scores Groups	Mean±SD (%)			
	Pretest scores		Posttest scores	
	Knowledge	Attitude	Knowledge	Attitude
Group B (*n*=46) Intervention: Traditional teaching–learning	7.36±1.17 (73.6)	35.6±4.85 (71.2)	7.82±1.23 (78.2)	35.86±3.80 (71.72)
Group A (*n*=46) Intervention: Participatory learning	7.19±1.08 (71.9)	35.8±3.80 (71.6)	8.60±0.95 (86)	40.50±3.72 (80.66)

SD=Standard deviation

Designing problems challenges the students to critically assess understanding of a subject by their peers. This encourages students to analyze course materials and determine the most important aspects for this assessment. Evaluating solutions challenges students to assess how fully a set of materials fits their understanding of the field as well as the problem posed.

In the present study, students were asked to design a pro forma to approach and manage a suspected HIV case based on the risks identified (designing stage), followed by peer assessment where one group would assess the pro forma of the other group (evaluating stage).

Epstein *et al*.[17] by using the principles of active participation, clinical simulation, and academic detailing noticed a significant improvement in the HIV risk assessment skills among the physicians. Many other studies had utilized the concept of participatory learning in improving the knowledge of the learners.[18,19] However, we had scant literature in the field of medical education, studies aiming at skill improvement of students. Ramesh Bogam *et al*.[18] utilized the technique of participatory learning where they made the undergraduate medical student design different modules for community health workers and found significant improvement in knowledge following this intervention. Besides the gain of knowledge, participatory learning was also effective enhancing the attitude and behavior of the students as found in the present study. Rubio *et al*.[19] used participatory teaching methods to change the perceptions of their students toward epidemiology and statistics, where the student's perception of their ability in statistics and epidemiology improved significantly after the intervention, along with perception toward the usefulness of these subjects. Similarly, studies have shown that theory of planned behavior-based educational intervention improved women's perception significantly about health-care empowerment and problem-based learning health literacy along with practice of real-life scenarios was successful in improving the adolescent lifestyle.[20,21]

Literature shows that the likelihood of HIV infection through a NSI ranges between 0.3% and 0.03%, and through a mucous membrane, exposure is approximately 0.09%.[22] The prevalence of NSI among health-care workers in India has been documented to range between 53% and 76%.[23-25] Case reports of occupationally acquired HIV infections among health-care workers in India also attribute it to NSI, not followed by postexposure prophylaxis (PEP) due to lack of knowledge or carelessness on part of health worker.[26,27] Most individuals who were diagnosed with AIDS displayed high-risk behaviors resulting in HIV infection.[28] The finding is similar in health-care workers as well, wherein those with unsafe behaviors resulted in 95% of HIV infections, and the exact cause of HIV for the reminder percentage has not been established.[28]

The possible reasons for these "risky behaviors" among health professionals in Indian circumstances could be due to lack of knowledge, deficient attitude, faulty practices, or a combination of all three factors. Previous studies[9-12] on the knowledge, attitude, and practice of Indian medical students show that in general, they have a good knowledge and attitude in certain aspects of HIV and its control. Puri *et al*.[11] observed that while the students had excellent knowledge about causative agents (100%), modes of transmission (100%), prevention (100%), and testing (88%), only 29% of sexually active students stated that AIDS information had influenced their sexual behavior, with none of them regularly using a condom. Doda *et al*.[9] too observed that while their study participants (MBBS students) had good overall knowledge and attitude scores (65% and 68.67%, respectively), they had huge gaps in knowledge regarding PEP. Only 20% of their study participants were aware of it, whereas 16% knew about the duration of PEP. Similarly, regarding practice, only 42% of them were confident in handling a sample from a suspected patient, and only 18% were confident in carrying out the test. We drew similar conclusions from our needs assessment survey.

The present study found that the knowledge and attitude of students were good concerning certain theoretical aspects of HIV but poor regarding certain key aspects such as PEP, suspecting a person to have HIV, testing and counseling, etc., Similarly the "risky behavior" was also noticed among health professionals.[28] The authors mention that undergraduate medical students

and paramedics have a limited knowledge regarding HIV infection and mention that this lacuna must be overcome by including this topic extensively in the medical curriculum.[28] They have also recommended educational and behavioral interventions tailored around the risks identified. The present study has shown that the participatory learning approach was successful in bridging the gap between knowledge and practice leading to change of behavior and improvement of HIV risk assessment skills among medical students for better occupational safety and health-care outcomes.

Limitations and recommendation

Small sample size, only one phase of medical students involved, limited content of the topic (HIV) covered, time constraint.

As there is a gap between knowledge and practice of HIV risk assessment skills, likewise, disparity between demand (educational need of medical students) and supply (traditional teaching techniques) in medical education system, leading to occupational safety concerns and poor health care. Thus, the study recommends the use of participatory learning approach among medical students for developing the HIV risk assessment skills to become a competent physician of the advancing health system in future.

Conclusion

Based on the needs assessment survey, we identified HIV risk assessment as a crucial competency for all IMGs. To acquire the competency, students were approached through two different learning experiences, and it was found that participatory learning approach effectively builds upon the existing knowledge and attitude to deliver better HIV risk assessment skills compared to traditional teaching–learning approach.

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Conflicts of interest

There are no conflicts of interest.

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