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EFFECT OF TRAINING ON KNOWLEDGE AND ATTITUDE TO STANDARD PRECAUTION AMONG WORKERS EXPOSED TO BODY FLUIDS IN A TERTIARY INSTITUTION IN SOUTH-WEST NIGERIA

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ABSTRACT

Introduction: **Standard precaution in the workplace reduces the risk of occupational hazards among workers exposed to body fluids of humans and animals. Training on standard precaution has been recommended as a strategy to improve knowledge, attitude and compliance to these guidelines. This study therefore determined the effect of training on knowledge and attitude to standard precaution among workers exposed to body fluids of humans and animals in the University of Ibadan, South-west, Nigeria.**

Methods: **This was an interventional study among workers exposed to body fluids of humans and animals. A total survey of all faculties where staff and student come in contact with human and animal body fluid was done. Selected staff were trained for two days on standard precaution. A self-administered questionnaire was used to obtain information on socio-demographic information, knowledge and perception of staff on standard precaution. The maximum obtainable knowledge and attitude scores were 27 and 6 points respectively. The mean knowledge and attitude score were determined at pre-test and post-test. Frequency, proportion, mean and standard deviation were used for summary statistics and an independent t-test was performed to test for association. Statistical significance was set at 5%.**

Results: **A total of 136 and 123 responses were obtained at pre-test and post-test respectively. A little over half of the respondents were females (51.5%) and below 40 years (54.4%). The mean knowledge score among the workers increased from 22.59 ± 3.4 at pre-test to 22.83 ± 3.2 at post-test, but it was not statistically significant. However, the mean post-test attitude score (5.10 ± 1.4) was significantly different from the pre-test attitude score (4.49 ± 1.5).**

Conclusion: **Training improved the knowledge and attitude of workers exposed to body fluids of humans and animals working in the University of Ibadan on standard precaution. Periodic training on standard precaution is therefore recommended to sustain a proper attitude to standard precaution guidelines.**

Keywords: Standard precaution, Infection control, Knowledge, Attitude, Body fluids

INTRODUCTION

Workers exposed to body fluids of humans and animals are at risk of infections transmitted through air, blood, faeco-oral routes or by direct contact through sharps injuries or body fluids at their workplace.[1–6] The high burden of infections like HIV, HBV and HCV among health workers can be attributed to occupational hazards like needle-stick injuries.[1,3]

Standard precautions (SP) are a set of guidelines, measures or processes to protect health care workers and even patients from infections by reducing the risk of transmission.[4] They are to be followed in the process of administering care to all patients irrespective of their infection status.[1,5,7,8] Standard precaution practice also applies to all workers exposed to body fluids of animals.[6]

In developed countries, there have been improvements in the risk reduction of occupational hazards among health workers. However, despite the introduction of standard precaution in healthcare settings in developing countries, the onus still lies with the workers to take measures at reducing exposures to occupational risks.[1,9] Knowledge and attitude of health care workers (HCWs) has been found to affect compliance to

standard precaution.[9–12] Poor knowledge of HCWs may be due to improper training, inability to comprehend concepts of standard precaution and lower educational status. Perceived insusceptibility and service delays in standard precautions are some of the attitudinal issues that affect compliance. Other reasons for non-compliance in developing countries include the unavailability of materials such as sterile gloves and nose masks due to poor funding of the health system and understaffing of health facilities.[11,13] Compliance to standard precaution by HCWs can be enhanced through training to improve their knowledge, attitude and skills, use of standard operating procedures, availability of protective instruments, unscheduled visits to monitor practice.[4,9,10,14] While several studies have been conducted in Nigeria to determine the knowledge, attitude and practice of health workers on standard precaution, few have been conducted to evaluate the effect of training on knowledge and attitude to standard precaution. This interventional study was conducted among HCWs to determine the effect of training on their knowledge and attitude towards standard precaution.

MATERIALS AND METHOD

Study settings

The study was carried out in the University of Ibadan (UI), the oldest university in Nigeria. It was established in 1948 and is now a designated post-graduate university training thousands of students to meet the needs of the labour market. The University consist of 13 faculties – Agriculture and Forestry, Arts, Basic Medical Sciences, Clinical Sciences, Dentistry, Education, Law, Pharmacy, Public Health, Sciences, the Social Sciences, Technology and Veterinary Medicine.[15] University of Ibadan has benefitted from several grants from various institutions and foundations across the world. This includes the MacArthur Foundation grants, the MacArthur Foundation Fanton Challenge with support from the Nigeria Higher Education Foundation (NHEF).

The university is affiliated with the University College Hospital (UCH) which was established in response to the need for training medical personnel and other healthcare professionals in the country.[16] The College of Medicine (formerly the Faculty of Medicine and the flagship medical college in the country) is an integral part of the University of Ibadan. It was one of the first faculties created when the University College, Ibadan came into being in 1948.[17] The College of Medicine administrative building and clinical science students' hostel are situated in University College Hospital, which is the teaching hospital for the University of Ibadan. The college consists of four faculties: Faculty of Basic Medical Sciences, Faculty of Clinical Sciences, Faculty of Public Health, and the Faculty of Dentistry.

Faculties whose staff and students are exposed to human or animal body fluids and are required to implement standard precautions in the University during the laboratory or clinical sessions are those of Agriculture and Forestry, Basic Medical Sciences, Clinical Sciences, Dentistry, Public Health, Sciences and Veterinary Medicine.

Study design

The study utilized a quasi-experimental design, with a baseline survey, health education intervention and a post-intervention survey.

Study participants and sampling technique.

This study was conducted among the staff of faculties that are exposed to infectious laboratory specimens from humans or animals. Using the sample size formula for comparison of means, mean knowledge of standard precaution among health care workers in Egypt [18], and attrition of 10%, the calculated minimum sample size was 127 participants. A total survey of all faculties where staff and students deal with human or animal body fluid was done. The 33 departments from all seven (7) faculties in the University where staff and students deal with human or animal body fluids were selected for this study. In each department, 5 members of staff in different cadre who had been exposed to human or animal specimen 6 months before the study were invited (selection of participants was decided by the various departments). Some departments however had less than five participants present for the study.

Data collection and Intervention

A pre-tested self-administered, semi-structured questionnaire which was adapted from the World Health Organization's (WHO) Practical Guidelines for Infection Control in Health Care Facilities [19] and the AVSC International Infection Prevention Curriculum Participants Handbook: Infection Prevention Assessment Survey[20] was used for the survey. Information obtained included socio-demographic characteristics, knowledge (27 items), attitude (6 questions) and perception (4 questions) of standard precaution among the workers exposed to body fluids of human and animals. The selected staff were grouped into three cohorts and trained for two days at the Faculty of Public Health lecture theatre. Facilitators and resource persons were lecturers from the Department of Microbiology and Parasitology, Community Medicine, Haematology and Health Promotion and Education. Training included didactic lectures, and practical demonstrations (hand washing and production of hand sanitizer). Baseline data were

collected on the first day of the training (before the commencement of any lecture) while post-intervention data were collected at the end of the last lecture on the second day (about 32 hours interval)

Data management

The knowledge, attitude and perception of participants' on standard precaution were assessed at baseline and post-intervention. Knowledge of standard precaution was assessed using a set of 27 questions. One point was awarded for each correct answer and zero for incorrect answers giving minimum and maximum aggregate scores of 0 and 27 respectively. For assessment of attitude, a three-point Likert scale ("disagree", "not sure", "agree") consisting of 6-items which were positively worded was used. One point was awarded for agreement to a positive attitude and zero for "not sure" or "disagree". The minimum and maximum obtainable scores were 0 and 6 respectively. The respondents' mean score and standard deviation were calculated for both knowledge and attitude. Participants perception on standard precaution was also assessed on a three-point Likert scale ("disagree", "not sure" and "agree") to four questions and thereafter dichotomized. Those that responded "disagree" or "not sure" to each question were categorized as "disagree" while response "agree" to each question was reported as such. Independent t-test was used to determine between-group comparisons for knowledge and attitude scores and chi-square test was used to compare their perception at baseline and post-intervention. Statistical significance for all tests was set at 5%.

Ethical Consideration

This study protocol was duly reviewed and approved by the University of Ibadan/University College Hospital (UI/UCH) Ethical Review Board as a part of the larger MacArthur Foundation sponsored project. Ethical approval for the study was also obtained from the Oyo State Ministry of Health Research Ethical Review Committee.

Informed verbal consent was obtained from respondents before administering questionnaires to them. The study was also conducted in accordance with the Declaration of Helsinki.

RESULTS

Socio-demographic characteristics

A total of 136 staff participated at the baseline survey and 123 participated in the post-intervention survey, hence, this study had an attrition rate of 9.6% About half of the respondents were below 40 years (54.4%) and females (51.5%). (Table 1).

Table 1: Socio-demographic characteristics of workers trained on standard precaution

VARIABLE (n=136)	Frequency	Percentage
Age		
Below 40 years	74	54.4
40 years and above	62	45.6
Sex		
Male	66	48.5
Female	70	51.5
Educational level		
Primary	1	0.7
Secondary	14	10.3
Tertiary	121	89.0
Occupation		
Clinical	45	33.1
Non-clinical	91	66.9

Knowledge of workers exposed to body fluids of human and animals on standard precaution

The mean knowledge score pre-intervention (22.59 ± 3.35) and post-intervention (22.83 ± 3.34**)** among the workers was not significantly different. However, the mean knowledge scores were found to be significantly higher among workers less than 40 years of age (23.75 ± 2.32) compared to those who were 40 years of age and above (21.70 ± 3.84); and clinical staff (24.29 ±2.28) compared to non-clinical staff (22.35 ± 3.38) at post-intervention (Table 2).

Table 2: Knowledge of workers on standard precautions pre-intervention and post-intervention

Variable	Baseline Mean (SD)	Post-intervention Mean (SD)
Age		
Below 40 years	23.21 (3.07)	23.75(2.32)
40 years and above	21.87 (3.54)	21.70(3.84)
t (p-value)	2.343 (0.021)*	3.638 (0.000)*
Sex		
Male	22.12 (3.54)	22.38 (3.40)
Female	23.02 (3.12)	23.24 93.06)
t (p-value)	-1.576 (0.117)	-1.486 (0.140)
Educational level		
Secondary school and below	20.73 (4.49)	20.30 (4.48)
Tertiary	22.82 (3.12)	23.13 (2.95)
t (p-value)	-2.315 (0.022)*	-3.073 (0.003)*
Occupation		
Clinical	24.42 (1.73)	24.29 (2.28)
Non-clinical	21.68 (3.59)	22.35 (3.38)
t (p-value)	4.844 (0.000)*	2.974 (0.004)*
Overall knowledge score	22.59 (3.35)	22.83 (3.24)
t (p-value)	-0.595 (0.553)	

Attitude of workers exposed to body fluids of human and animals on standard precaution

The overall attitude score post-intervention, (5.10 ± 1.44) was significantly higher than the baseline score (4.49 ± 1.52). However, there was no significant difference in the mean attitude scores at post-

intervention by age group, gender, educational level or occupation type (Table 3)

Perception of workers exposed to body fluids of human and animals to practising standard precaution before and after training

Before the intervention, 77.2% of the workers perceived they did not have enough information on controlling infection compared to 16.3% post-intervention ($p < 0.001$). There was a significant increase in the propotion of those that perceived others would emulate them if they comply with the guidelines from 71.3% at baseline to 85.4% post-intervention ($p = 0.006$) (Table 4).

DISCUSSION

Staff members exposed to human and animal body fluids were assessed on their knowledge of standard precaution before and after training. There were a total of 136 and 123 respondents for baseline and post-intervention survey respectively. About half (51.5%) of the particpants were females, this is contrary to the sex distribution of participants in the study on knowledge of infection transmission precaution conducted among healthcare workers at the University of Geneva hospital where a higher proportion of them were females.[13] While other studies were conducted among only hospital/clinical health care workers[2,14,18,21],

Table 3: Attitude of workers on standard precaution pre-intervention and post-intervention

Variable	Baseline Mean (SD)	Post-intervention Mean (SD)
Age		
Below 40 years	4.78 (1.39)	5.25 (1.37)
40 years and above	4,14 (1.61)	4.92 (1.52)
t (p-value)	2.470 (0.015)*	1.232 (0.220)
Sex		
Male	4.55 (1.45)	5.13 (1.40)
Female	4.44 (1.61)	5.07 (1.49)
t (p-value)	0.390 (0.697)	0.232 (0.817)
Educational level		
Secondary school and below	4.13 (1.55)	4.69 (2.18)
Tertiary	4.53 (1.53)	5.15 (1.34)
t (p-value)	-0.964 (0.337)	-1.090 (0.278)
Occupation		
Clinical	4.96 (1.38)	5.09 (1.79)
Non-clinical	4.26 (1.55)	5.10 (1.32)
t (p-value)	2.530 (0.013)*	-0.039 (0.968)
Overall attitude score	4.49 (1.52)	5.10 (1.44)
t (p-value)	-3.304 (0.001)*	

**-significant variable*

Table 4: Perception of workers exposed to body fluids of human and animals to practising standard precaution before and after training

Variable	Baseline (n=136) n (%)	Post-intervention (n=123) n (%)	Chi square (p-value)
Feel you have enough information on controlling infection			
Disagree	105 (77.2)	20 (16.3)	96.076 (<0.
Agree	31 (22.8)	103 (83.7)	
There are enough facilities to ensure all personnel comply			
Disagree	107 (78.7)	81(65.9)	5.337 (0.02
Agree	29 (21.3)	42 (34.1)	
Others will emulate you if you comply with guidelines			
Disagree	39 (28.7)	18 (14.6)	7.420 (0.00
Agree	97 (71.3)	105 (85.4)	
Having posters and reminders on infection control on wards would help			
Disagree	21 (15.4)	9 (7.3)	4.162 (0.04
Agree	115 (84.6)	114 (92.7)	

**-significant variable*

our study had just a third (33.1%) of participants being clinical HCWs.

The mean knowledge score at baseline was not significantly different from the post-intervention score in this study. This was different from a study conducted by Sadeghi and colleagues among nurses in Iran that reported a significant increase in the knowledge about standard precaution after a training intervention.[21] While this study used didactic and practical demonstration, Sadeghi *et al.* had 3 components made up of lecture, practical demonstration and group discussion. The group discussion component being a participatory method could have resulted in better understanding demonstrated by them even up to 3 months after the training. Although our study showed no significant difference in the overall baseline and post-intervention knowledge scores, there was significant difference across age, educational status and occupation type. Younger people tend to retain or are even more interested in learning new things while older people may be averse to learning new skills.[18,22] Furthermore, older workers perceive they are more experienced and maybe less receptive to learning things they perceive they know.[22,23] Also, clinical workers by treating the health problems associated with non-compliance to standard precaution tend to have more knowledge than non-clinical workers.[24] However, there are conflicting opinions from literature on the effect of knowledge on the practice of standard precaution.[10,11,25] While some have advocated that it enhances compliance to standard precaution among workers exposed to biological hazards, others have reported that knowledge in itself does not necessarily enhance compliance with standard precaution guidelines.[10,25]

The mean attitude score of workers in our study to standard precaution, at post-intervention, was significantly higher than at baseline. A similar improvement in attitude to standard precaution was documented among nursing students who were exposed to training intervention in Egypt.[9] Similarly, training on standard precautions have been found to improve compliance among health care workers who were trained on the guidelines in North Western Ethiopia.[26] This underscores the need for training aimed at modifying the attitude of workers exposed to body fluids since the poor attitude of health care workers towards standard precaution may explain the non-compliance to SP guidelines among HCWs in the developing world.[1] The proportion of respondents who perceived they had information on how to control infection (self-efficacy) and that IEC materials would help them remember to adhere to standard precaution (cues to action) increased significantly from baseline to post-intervention. This could be because the training either increased their knowledge or reminded them on what they could do to ensure they adhere to standard precaution. This was similar to the findings of Sadeghi *et al.*, who used the Health Belief Model to assess the effect of educational intervention on their respondents perceived barriers, self efficacy and cues to action regarding adherence to standard precaution.[21] Despite the difference in study population, the mean score of self-efficacy and cues to action were found to be significantly higher post-intervention compared to baseline.

A limitation of this study was that compliance was not accessed at baseline and post-intervention. However, there is adequate evidence from intervention studies that showed that improvement in attitudes of workers exposed to body fluids enhanced compliance and willingness to practice standard precaution guidelines.[21,27–29] While this study did not assess willingness or level of practice, improving the perception of workers may contribute to their willingness to practice and eventual compliance with standard precaution protocols. Another limitation of this study was not assessing the relationship between the level of exposure (to animal and human body fluids) and outcome.

CONCLUSION

Training on standard precautions significantly improved attitude towards standard precaution and perception to practising it. Periodic training should be conducted regularly among workers exposed to human and animal body fluids to enhance and sustain an appropriate attitude to standard precaution guidelines.

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