



EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE REGARDING USE OF PERSONAL PROTECTIVE EQUIPMENTS

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INTRODUCTION: The protective equipment consists of garments placed to protect the health care workers or any other persons to get infected. These usually consist of standard precautions: gloves, mask, and gown. **MATERIAL AND METHODS:** In this study 100 samples were taken. Study was conducted to assess the effectiveness of structured teaching programme on knowledge regarding use of personal protective equipments among the nursing students. Online study tool was given to the student. First pretest was conducted online, after three days of pretest online STP was provided to the students and after three days of STP, online posttest sample was collected from the students by using the same knowledge-based questionnaire. Analysis of the study was done by using descriptive and inferential statistics. **RESULTS:** In this study maximum number of the respondents belongs to the age group of 20-22 years (70%) and majorities 58 % of respondents were female. In this study 25% of respondents were from each batch. Majority, 67% of respondents reside in urban area and 71% of the respondents were not having any family members working in health care setting. 95% of respondents were having previous knowledge regarding use of PPE and 53% of respondents had knowledge related to PPE from other sources. Post-test mean % (76.25%) showed that the students gained higher knowledge after STP which indicates the effectiveness of structured teaching programme. A significant association was found between the knowledge score and demographic variables like educational level, previous knowledge regarding PPE and family members in health care profession. **CONCLUSION:** on the basis of findings it was found that STP regarding use of PPE was effective and students gained knowledge from it.

Index Terms - PPE, Personal Protective Equipment, Structured Teaching Program Regarding Use of Personal Protective Equipments

I. INTRODUCTION

PPE IS COMMONLY USED IN HEALTH CARE SETTINGS SUCH AS HOSPITALS, DOCTOR'S OFFICES AND CLINICAL LABS. WHEN USED PROPERLY, PPE ACTS AS A BARRIER BETWEEN INFECTIOUS MATERIALS SUCH AS VIRAL AND BACTERIAL CONTAMINANTS AND SKIN, MOUTH, NOSE OR EYES (MUCOUS MEMBRANE). THE BARRIER HAS THE POTENTIAL TO BLOCK TRANSMISSION OF CONTAMINANTS FROM BLOOD, BODY FLUIDS, OR RESPIRATORY SECRETIONS. PPE MAY ALSO PROTECT PATIENTS WHO ARE AT HIGH RISK OF CONTRACTING INFECTIONS THROUGH A SURGICAL PROCEDURE OR WHO HAVE A MEDICAL CONDITION, SUCH AS AN IMMUNODEFICIENCY, FROM BEING EXPOSED TO SUBSTANCES OR POTENTIALLY INFECTIOUS MATERIAL BROUGHT IN BY VISITORS AND HEALTHCARE WORKERS. WHEN USED PROPERLY AND WITH OTHER INFECTION CONTROL PRACTICES SUCH AS HAND WASHING, USING ALCOHOL-BASED SANITIZERS, AND COVERING COUGHS AND SNEEZES, IT MINIMIZES THE SPREAD OF INFECTION FROM ONE PERSON TO ANOTHER¹. INFECTION PREVENTION AND CONTROL MEASURES INCLUDE HAND HYGIENE, PERSONAL PROTECTIVE EQUIPMENT AND WASTE MANAGEMENT MATERIALS. THE PROTECTIVE EQUIPMENT CONSISTS OF GARMENTS PLACED TO PROTECT THE HEALTH CARE WORKERS OR ANY OTHER PERSONS TO GET INFECTED. THESE USUALLY CONSIST OF STANDARD PRECAUTIONS: GLOVES, MASK, AND GOWN. IF IT IS BLOOD OR AIRBORNE HIGH INFECTIONS, WILL INCLUDE: FACE PROTECTION, GOGGLES AND MASK OR FACE SHIELD, GLOVES, GOWN OR COVERALL, HEAD COVER, RUBBER BOOTS². PPE IS EQUIPMENT THAT WILL PROTECT THE USER AGAINST HEALTH OR SAFETY RISKS AT WORK. IT CAN INCLUDE ITEMS SUCH AS SAFETY HELMETS, GLOVES, EYE PROTECTION, HIGH-VISIBILITY CLOTHING, SAFETY FOOTWEAR AND SAFETY HARNESSSES. IT ALSO INCLUDES RESPIRATORY PROTECTIVE EQUIPMENT (RPE)³. PERSONAL PROTECTIVE EQUIPMENTS ARE DESIGNED TO PROTECT HEALTH CARE PROVIDERS FROM SERIOUS WORKPLACE INJURIES OR ILLNESSES. PERSONAL PROTECTIVE EQUIPMENT PROVIDES A PHYSICAL BARRIER BETWEEN MICROORGANISM AND WEARER. IT OFFERS PROTECTION BY PREVENTING MICROORGANISM FROM CONTAMINATING HANDS, EYES, CLOTHING, HAIR AND SHOES. A BREACH IN INFECTION CONTROL PRACTICES FACILITATES TRANSMISSION OF INFECTION FROM PATIENTS TO HEALTH CARE WORKERS, OTHER PATIENTS AND ATTENDANTS⁴. PERSONAL PROTECTIVE EQUIPMENT (PPE) INCLUDES GLOVES, PROTECTIVE EYE WEAR (GOGGLES), MASK, APRON, GOWN, BOOTS/SHOE COVER, HAIR COVER. PPE SHOULD BE USED BY ALL HEALTH CARE PROVIDERS, SUPPORTING STAFFS, LABORATORY STAFFS, AND FAMILY MEMBERS WHO PROVIDE CARE TO PATIENTS IN SITUATIONS WHERE THEY HAVE CONTACT WITH BLOOD, BODY FLUIDS, SECRETIONS OR EXCRETIONS⁵.

II. NEED FOR THE STUDY

Every day, people touch and carry a range of potential pathogens, some of which will ultimately cause infections. This includes healthcare personnel (HCP) and patients in healthcare settings where there are frequent opportunities for close contact that can lead to transmission of organisms between HCP and patients. Unrecognized transmission of pathogens can lead to colonization and infection of both patients and HCP. While many pathogens can lead to harm to patients, a few also pose a high risk to HCP. Personal protective equipment (PPE) is an important component in infection control strategies to protect HCP. By preventing contamination of HCP hands and garments, PPE is intended to prevent infections in the individual HCP, as well as secondary spread to other HCP and to patients.⁵

The emergence of life-threatening infections such as severe acute respiratory syndrome (SARS) and re-emerging infectious diseases like plague and tuberculosis had highlighted the need for efficient infection control programs in all health care settings and research into standard precautions has been carried out in many countries.⁶

A cross sectional survey was conducted from September to October 2013 at Nizam's Institute of Medical Sciences, Hyderabad to assess the knowledge and awareness of standard precautions among health care workers that is doctors, nurses and technicians. The study findings showed that knowledge of standard precautions was highest among doctors (63.3%) followed by technicians (56.6%) and nurses (40%). There was a significant difference in knowledge and awareness of standard precautions among studied health care professionals.⁷

III. REVIEW OF LITERATURE

A pilot study was conducted to examine the feasibility of using a simulated health care environment to assess health care workers technique when implementing standard airborne and contact isolation precautions. Total 10 participants were assigned patient care tasks based on their specific professional roles and their encounters were digitally recorded during donning and doffing of PPE, as well as during interactions with the simulated patient. The pilot data result showed various inconsistencies in the health care workers PPE technique. Each of the 10 participants committed atleast one breach of standard airborne and contact isolation precautions.⁸

A study was conducted to assess PPE doffing practices of HCWs who cared for patients with viral respiratory infections at an acute care hospital from March 2017 to April 2018. A trained observer recorded doffing performance of HCWs inside the patient rooms using a pre-defined checklist based on the Centers for Disease Control and Prevention (CDC) guideline. Doffing practices were observed 162 times during care of 52 patients infected with respiratory viral pathogens. Out of the 52 patients, 30 were in droplet and contact isolation, 21 were in droplet isolation, and 1 was in contact isolation. The study findings revealed that deviations from the recommended PPE doffing protocol are common and can increase potential for contamination of the HCW's clothing or skin after providing care and therefore there is a clear need to change the approach used to train HCWs in PPE doffing practices⁹.

A study was conducted to assess the health care workers knowledge and confidence in PPE during the H1N1 pandemic in Israel. A validated questionnaire was distributed to 617 health care workers (nurses and physicians) in 21 hospitals and 40 primary care clinics in Israel at the peak of the A/H1N1 pandemic. The results showed that PPE confidence was higher among nurses

compared with physicians and among employees in hospitals compared with those in primary care clinics. The study findings revealed that high levels of PPE knowledge were significantly correlated to health care workers confidence in PPE and may help to increase PPE usage and reduce absenteeism.¹⁰

A study was conducted to assess the use of PPE among health care workers in a tertiary health institution at South East Nigeria during the pre Ebola period. Cross sectional method was used to obtain information from health workers working in tertiary institutions of south east Nigeria using semi structured questionnaire. The results showed that out of 511 health care workers, 59% were females, 69% were married and 41% were within the age range of 30 to 39 years. 40% of the respondents were nurses and 89% of the respondents had heard of PPE but only 38% could correctly define it. Although almost half 45% had received training on PPE; majority 96% had not seen any policy on PPE. The study findings revealed the need of development of health safety policies, regular training on PPE, provision of PPE and changing of health care attitude.¹¹

A study was done to assess appropriate use of PPE among three groups of health care workers to determine if the appropriate PPE were used by the different groups and to examine the factors that may determine inappropriate use. A self-administered questionnaire survey of 14554 health care workers in nine healthcare settings which included tertiary care hospitals, community hospitals and polyclinics was carried out in May- July 2003. The results showed that 32.5 % of doctors, 48.5% of nurses and 77.1% of the administrative staff agreed that paper or surgical mask were useful in protecting from contracting SARS.¹²

A study was done to assess the use of PPE among health care personnel using clinical observations and simulations at Presbyterian Hospital. The clinical PPE practices of 50 HCP from selected units at the University of Pittsburgh Medical Center (UPMC) Presbyterian Hospital were videotaped with HCP consent. For PPE simulation sessions (simple and full-body sets), 82 HCP were recruited throughout the UPMC system. Simulation practices were videotaped and examined using fluorescent powder with ultraviolet lighting. All participants completed an electronic survey. For a follow-up evaluation simulation, 12 HCP were recruited among simulation participants. Among 130 total sessions from 65 participants, contamination occurred in 79.2% of simulations during the doffing process with various PPE items: simple set (92.3%) and full-body set (66.2%). Among 11 follow-up evaluation participants, contaminations still occurred in 82% after receiving individual feedback, but the overall contamination level was reduced. The study findings revealed the need of devising better standardized PPE protocols and implementing innovative PPE education to ensure HCP safety.¹³

An observational study was conducted in a 781-bed tertiary hospital from July 2016 to March 2017 to assess the adherence to contact precautions by different types of health care workers. Total 1097 participants were observed while donning PPE by Infection control teams using video monitoring. Most of the staffs observed were nurses and nursing assistants (880/1097, 80.2%). The results showed that the overall adherence rate to appropriate PPE use was 34.0%. The adherence rate among nursing assistants was lower (239/858, 27.9%) compared with infectious disease doctors (18/18, 100%) and cleaning staff (42/49, 85.7%). The study findings revealed that adherence to contact precautions varied by occupation; however, overall adherence was insufficient and the lower adherence rate in nurses might be due to more frequent care visits¹⁴.

A Study was conducted to assess the effectiveness of alternate doffing strategies of PPE (hand hygiene on gloved hands and double gloving) to prevent self-contamination in the health care settings. A total of 51 participants were assigned to doff PPE following 1 of 4 specific strategies. Prior to doffing, PPE was "contaminated" with Glo Germ and fluorescing Staphylococcus epidermidis at the recommended level of 1.5×10^8 colony forming units/mL. After doffing, areas of self-contamination were detected using a black light. Cultures were taken from these areas using cotton swabs, inoculated onto blood agar plates, and incubated for 48hours. The results showed a breach in the use of PPE in only 5 of 51 doffs (10%). However, 46 of 51 (90%) had areas of self-contamination that was apparent by transfer of Glo Germ to skin or clothing. The Participants experienced self-contamination when doffing PPE with both a surrogate marker and live bacteria and therefore close attention to doffing technique is necessary for optimal results¹⁵.

IV. PROBLEM STATEMENT

A study to assess the effectiveness of structured teaching programme on knowledge regarding use of personal protective equipments among nursing students of selected college of Pune city.

V. OBJECTIVE OF THE STUDY

1. To assess the existing knowledge regarding use of Personal protective equipments among nursing students of selected college.
2. To evaluate the effectiveness of Structured teaching program on knowledge regarding use of Personal protective equipments among nursing students of selected college.
3. To find out the association between knowledge scores with selected demographic variables.

VI. HYPOTHESES

H₀: There will be no significant difference between the pre-test and post-test knowledge scores of nursing students of selected college with regard to use of personal protective equipments.

H₁: There will be significant difference between the pre-test and post-test knowledge scores of nursing students of selected college with regard to use of personal protective equipments

H₀₁: There will be no significant association between the knowledge scores of nursing students on use of personal protective equipments with selected demographic variables.

H₂: There will be significant association between the knowledge scores of nursing students on use of personal protective equipments with selected demographic variables.

VII. RESEARCH METHODOLOGY

In this study quantitative research approach and pre experimental research design (one group pre and posttest design) has been used to assess the effectiveness of structured teaching programme on knowledge regarding use of personal protective equipments among 100 nursing students of selected college of Pune city. Samples were selected through non probability purposive sampling technique.

VIII. TOOLS USED

Study tool was divided into two parts- demographic data and knowledge-based questionnaire.

a. Demographic data

Under Demographic data 7 questions were there related to age, gender, educational level, residential area, any family member in health care setting, previous knowledge regarding PPE and source of knowledge.

b. Knowledge-based questionnaire- it contains 20 knowledge-based questionnaires regarding the use of PPE. Marking criteria was 1 mark for correct answer and 0 marks for incorrect answer. So total score of knowledge-based questionnaire was 20,

IX. DATA COLLECTION

Study was explained and online Informed consent was taken from the participants. Online questionnaire was given to the students for submitting their response for the pretest and posttest questionnaire. First pretest was conducted online, after three days of pretest online structured teaching programme was provided to the students and after three days of STP online posttest data was collected from the students by using the same knowledge based questionnaire.

X. LIMITATION OF THE STUDY

- The small sample size, therefore generalization cannot be made.
- The time span of the study was short.

XI. DATA ANALYSIS

SN	Area	Maximum score	Pretest			Post-test			
			Mean	SD	Mean %	Mean	SD	Mean %	Difference in mean %
1	Knowledge based questionnaire	20	13.61	0.4	68	15.25	0.3	76.25	8.25

Comparison table of pre-test and post-test shows the effectiveness of structured teaching programme by (8.25%). As the post-test mean % (76.25%) shows that the students had higher knowledge than the pre-test mean score (68%) which indicates the effectiveness of structured teaching programme.

SN	Group	Mean Score	'Z' value	Level of significance
1	Pre-test	13.61	4.15	Significant
2	Post-test	15.25		

Table of Z value showing highly significant difference was found between pre and posttest knowledge score on personal protective equipment's.

SN	Variables	X ²	Level of significance
1	Age	1.26	Not significant
2	Gender	0.35	Not significant
3	Educational level	4.24	Significant
4	Previous knowledge regarding personal protective equipment's.	5.86	Significant
5	Source of knowledge regarding use of personal protective equipment	1.68	Not significant
6	Family members in Health care profession	4.8	Significant
7	Source of knowledge regarding use of personal protective equipment	3.24	Not significant

Table showing Chi square values to find out the association between the knowledge score and demographic variables of students. A significant association was found between the knowledge score and demographic variables like Educational level, Previous knowledge regarding personal protective equipment's and Family members in health care profession which were (X²= 4.24, 5.86 and 4.80) respectively.

XII. FINDING OF THE STUDY

- There was significant difference between the pre-test and post-test knowledge scores of nursing students with regard to use of personal protective equipments.
- There was significant difference between the pre-test and post-test knowledge scores of nursing students with regard to use of personal protective equipments
- There was significant association between the knowledge scores of nursing students on use of personal protective equipments with demographic variables i.e Educational level, Previous knowledge.

XIII. CONCLUSION

1. Most of the students were having previous knowledge regarding use of PPE.
2. Education level of the students affects the knowledge regarding the use of PPE.
3. After giving structured teaching programme regarding the use of PPE, posttest score of the students was higher than the pretest.
4. Structured teaching programme regarding the use of PPE has improved the student's knowledge regarding use of PPE.

XIV. RECOMMENDATIONS

- Same study can be conducted by using large sample size
- Similar study can be conducted in different settings.
- Similar study can be conducted in different streams of students and different population.
- The knowledge can be associated to many more other factors which are specific.

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