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Original Article

Effectiveness of Demonstration on Knowledge and Practice Regarding Donning and Removing of Selected Personal Protective Equipment Among First year Nursing Students at Selected Nursing Institutes

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Abstract

***Background*:** For health care workers, the main strategy for reducing physical exposure to highly infectious diseases is through personal protective equipment (PPE). PPE will only be effective if the equipment can form a barrier between the Health Care Worker(HCW) and the exposure to contaminated body fluids. Therefore, standards have been developed that, once complied with, guarantee that PPE is of sufficient quality to protect against biohazards. Probably the biggest risk of infection, in spite of using proper PPE, is associated with taking the PPE off, also called doffing in an improper way wherein the HCWs can contaminate themselves (Fischer 2014). Some types of PPE make donning and doffing more difficult and increase the risk of contamination (Zamora 2006). Therefore, specific guidance has been developed for donning and doffing PPE (WHO 2014).[1]

***Objectives*:** 1. To assess the pre test knowledge and practice regarding donning and removing of selected Personal Protective Equipment among First year nursing students in Experimental and control group. 2. To assess the post test knowledge and practice regarding donning and removing of selected Personal Protective Equipment among First year nursing students in Experimental and control group. 3. To evaluate the effectiveness of demonstration on knowledge and practice regarding donning and removing of selected Personal Protective Equipment among nursing students in Experimental and control group. 4. To find out association of knowledge and practice score with selected demographic variables in experimental and control group.

Methodology: A True experimental Pre test post test design was adopted for the study. It was conducted over 60 First year nursing students (30 in experimental groupand30incontrolgroup) by using random sampling technique (Lottery method). For experimental and control group two different Nursing Institutes were randomly selected. Pretest on knowledge was done by using structured questionnaire and practice was assessed by checklist in both experimental and control group. Same day demonstration on donning and removing of selected personal protective equipment was given to experimental group. Post test was done after seven days and analysis showed that there was significant increase in knowledge and practice score after Demonstration.

Result: The analysis reveals that, in experimental group mean difference of knowledge score

was 9.06 & SD 3.93 and in control group mean difference of knowledge score was 0.16 & SD 1.17 and calculated t value was 12.30 which was much higher than table value. In experimental group mean difference of practice score was 13.60 & SD 3.02 and in control group mean difference of practice score was 0.40 & SD 2.06 and the calculated t value was 19.75 which was much higher than table value. Thus the H_1 is accepted and H_0 is rejected. In experimental group there is significant association of knowledge score with course of instruction and age in years, whereas there is significant association of practice score with course of instruction. In control group there is a significant association of knowledge score with age in year, course of instruction and residential area, whereas there is significant association of practice score with family member working as health care provider.

Conclusion: Finding of the study shows that demonstration on donning and removing of selected personal protective equipment among first year nursing students in the experimental group was effective and there is significant increase in knowledge and practice in experimental group than in control group.

Keywords: Demonstration; Knowledge; Practice; Donning and removing of selected personal protective equipment(PPE); First year nursing students.

Introduction

An Infection is an invasion of the body tissue by microorganisms and their growth there. Such a microorganism is called an infectious agent. If the microorganism produces no clinical evidence of disease, the infection is called asymptomatic or subclinical infection.[2]

Worldwide, health-care workers are at risk for occupational exposure to blood-borne pathogens through contact with human body fluids. Although about 60 blood-borne infectious pathogens have been identified, including Epstein–Barr virus, most occupation-related, blood-borne infections are due to hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV).[3]

Nurses are directly involved in providing a biologically safe environment. Effective control of infection requires a nurse to remain aware of the mode of the transmission and way to control them.[4]

Personal protective equipment (PPE) continues to play an integral role in prevention of transmission of infection in the healthcare setting, researcher discover by looking back at the history of protection of healthcare workers (HCWs) and prevention of spread of infection, that the concept is several centuries old. [5]

Background of the study

Hinal Baria1(2016) conducted a study on Knowledge and practice of universal precautions among nursing staff, She said Health care providers are at an increased risk of exposure to various infections like HIV, Hepatitis B, Hepatitis C etc. Correct knowledge regarding universal precautions among nursing staff is still not of satisfactory level and training at repeated interval needs to be given to ensure correct knowledge as well as implementation of universal precautions.[6]

Kathleen B. Stoessel, (2009) said that Donning and Removing PPE for Infection Prevention importance of attention to personal protection cannot be underestimated. By way of example, a cluster of 17 SARS (severe acute respiratory syndrome) cases among Canadian HCP in 2003 was studied. Among their findings – 13 of those who fell ill (87 percent) were unsure of the proper order in which personal protective equipment (PPE) should be donned and removed.[6]

Need of the Study

Office of scholarship and research development New york- April 25, 2017-conducted a study on Student Nurses Want More Infection Prevention Education, Study Finds a national survey from Columbia University School of Nursing finds that almost 40 percent of nursing students say they feel they need more instruction on preventing and controlling infection, especially in busy healthcare environments, despite believing that their nursing program emphasizes the importance of infection prevention. More than half of respondents also report observing breaches in prevention practices during

clinical placements, yet have trouble addressing them because they feel unqualified or fear retaliation from others. The survey also found that 51% of respondents witnessed poor infection prevention and control practices during clinical rotations but often had difficulty addressing them. "A culture of safety depends on healthcare workers' ability to express their concerns, adding that "we need to empower nurses to speak up in order to improve patient care. That empowerment should start early in training, before nurses get their RN degree." The study's findings are particularly important, given the critical role that nurses play in preventing nosocomial infections, which contribute substantially to patient morbidity and mortality, as well as healthcare costs, Carter said. "It will take collaboration across disciplines and institutions to have discussions about how to best support student nurses, which will ultimately improve the care they provide as students and professional nurses.

Student nurses overwhelmingly reported that they knew when and how to use various infection prevention precautions, but acknowledged that it was often difficult to perform these practices when busy, which speaks to the complexity of the healthcare environment," said Columbia Nursing Assistant Professor Eileen J. Carter, PhD, lead author of the study. "Education is important but education alone is not sufficient."[8] Within healthcare settings, many microorganisms have the perfect living and breeding conditions, due to the numbers of susceptible patients gathered in an ideal environment. The student nurses are more prone to get the infection in the hospital settings due to lack of knowledge regarding safety precautions. One of the common and essential safety precaution to control infection is wearing personal protective equipment. First year nursing students are beginner in this profession to start to learn and acquire skills. So, the Researcher is interested to assess their knowledge and practice regarding use of personal protective equipment, to demonstrate the procedure on donning and removing of selected personal protective equipment and to again assess the effectiveness of demonstration by reassessing their knowledge and practice.

Statement of the problem

"An experimental study to assess the Effectiveness of Demonstration on knowledge and practice regarding donning and removing of selected Personal Protective Equipment among Firstyear nursing students at selected nursing institutes of the city."

Objectives

1. To assess the pre test knowledge and practice regarding donning and removing of selected Personal Protective Equipment among First year nursing students in Experimental and control group.
2. To assess the post test knowledge and practice regarding donning and removing of selected Personal Protective Equipment among First year nursing students in Experimental and control group.
3. To evaluate the effectiveness of demonstration on knowledge and practice regarding donning and removing of selected Personal Protective Equipment among nursing students in Experimental and control group.
4. To find out association of knowledge and practice score with selected demographic variables in experimental and control group.

Operational definition

Assess

In this study assess means, the organized systematic continuous process of collecting data from the nursing students regarding donning and removing of selected Personal Protective Equipment (PPE).

Effectiveness

In this study effectiveness means, the desired changes brought about by the Demonstration among nursing students regarding donning and removing of selected Personal Protective Equipment (PPE).

Demonstration

In this study Demonstration means, showing the proper technique of donning and removing selected Personal Protective Equipment.

Knowledge

In this study knowledge means, the information, understanding regarding donning and removing selected Personal Protective Equipment (PPE).

Practice

In this study practice means the students will be able to perform the steps of donning and removing of selected personal protective equipment (PPE) correctly and develop skills in clinical practice.

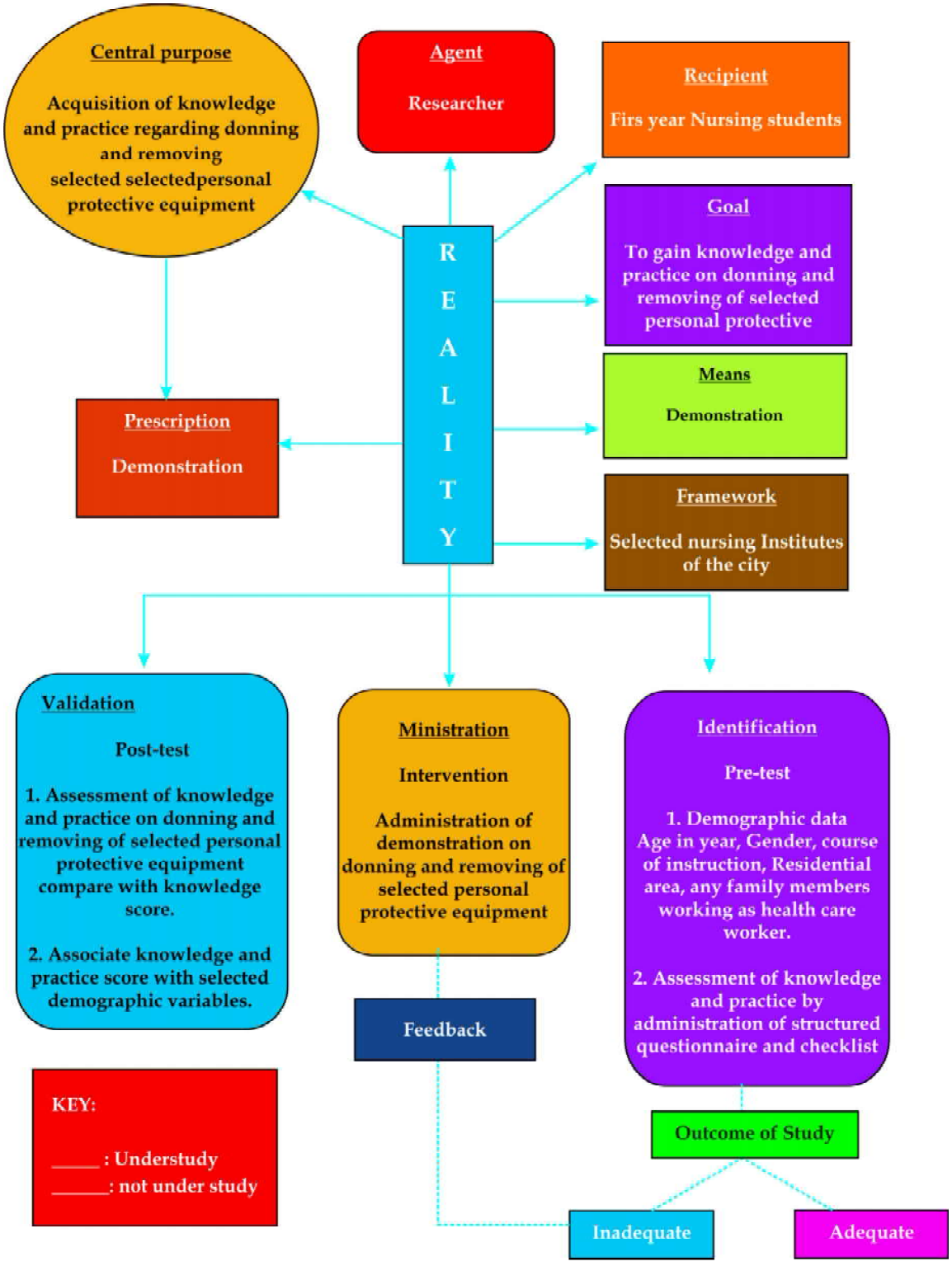

Fig 1.1: Conceptual Framework

Selected Personal protective equipment

In this study selected Personal Protective Equipment (PPE) is specialized equipment or clothing used to protect yourself and patients from germs. Selected

Personal Protective equipment are Gown, mask, goggle, gloves.

Donning

In this study donning means to put on or Steps to wear selected Personal Protective Equipment.

Removing

In this study removing means to take off or to remove the selected Personal Protective Equipment.

First Year Nursing students

In this study, First Year nursing students are Basic B.Sc Nursing Students and General Nursing and Midwifery students those who are studying in selected institute of the city.

Delimitation

This study is delimited to the first year Basic B.Sc. Nursing students and General Nursing and Midwifery student nurses studying in selected Nursing Institutes.

Hypothesis

Was tested at 0.05 level of significance

H_0: There is no significant difference in knowledge and practice regarding donning and removing of selected Personal Protective Equipment among First year nursing students in experimental and control group.

H_1: There is significant difference in knowledge and practice regarding donning and removing of selected Personal Protective Equipment among First year nursing students in experimental and control group.

Conceptual Framework

The conceptual framework selected for the study is based on Ersestine Wiedenbanch's "Perspective Theory.

Review of Literature

The Literature review is classified under following sections.

I. Literature related to Hospital acquired infection.
II. Literature related to knowledge and practice regarding use of Personal Protective Equipment among health care workers.
III. Literature related to effectiveness of demonstration.

Methodology

Research approach: In this study quantitative approach is used.

Research design: In this study the design used is True experimental Pre testpost test design.

Setting of the study: Total two nursing Institutes(1 for experimental and 1 for control group) were selected for the study.

Independent variable: Demonstration on donning and removing of selected personal protective equipment (PPE).

Dependent variable: knowledge and practice regarding donning and removing of selected personal protective equipment (PPE).

***Demographic variable*:** It includes age, gender, Course of instruction, residential area, any family member working as health care provider.

Population

The population in this study are all nursing students.

Target population: In this study the target population includes the all first year nursing students.

Accessible population

In the present study the accessible population selected for the study comprises of First year basic B.sc Nursing and General nursing and Midwifery students studying in selected nursing institute of the city and are available at the time of data collection and who were fulfilling the inclusion criteria.

Sampling

Sample: In this study, sample consisted of 60 first year nursing students (30 in experimental group and 30 in control group) studying in selected nursing institutes of the city who were available during the time of data collection.

Sample size: 60

Sampling technique: In this study simple random sampling technique(Lottery method) is used.

Sampling criteria

Inclusion criteria: In this study, inclusion criteria is,

- First year basic B.Sc Nursing and General nursing and midwifery students.
- Willing to participate in the study.
- Available at the time of data collection.

Exclusion Criteria

In this study exclusion criteria is,

- Post Basic B.Sc nursing students, M.Sc. nursing students.
- Students who are not willing to participate in the

study.

Description of tools

Section A – Demographic variables

Section B – Self structured knowledge questionnaire

Section C-checklist to identify the influence of participants clinical practice regarding donning and removing of selected personal protective equipment.

Validity

Content and construct validity of tool was determined by 27 experts including medical surgical nursing subjects experts, physician, English literature and statistician etc.

Reliability

Karl Pearson correlation coefficient formula was used. The correlation coefficient 'r' of the questionnaire was 0.99, which is more than 0.8. hence the questionnaire was found to be reliable. Reliability of checklist was done by using Inter-rater method, the reliability of the tool was 0.997, which is more than 0.8 and hence the tool was reliable.

Pilot study

Pilot study was conducted from 4th October 2019 to 11th October 2019 for a period of 7 days. The pilot study was feasible in terms of time, money, material and resources.

Table 1: Table showing Percentage wise distribution of first year nursing students according to their demographic characteristics

Demographic Variables	Experimental Group Frequency (f)	Experimental Group Percentage (%)	Control Group Frequency (f)	Control Group Percentage (%)
	Age in years			
17-19yrs	23	76.7	27	90
20-22yrs	7	23.3	1	3.3
=23 yrs	0	0	2	6.7
Gender				
Male	7	23.3	5	16.7
Female	23	76.7	25	83.3
Course of instruction				
B.Sc. Nursing	15	50	15	50
GNM	15	50	15	50
Residential Area				
Urban	19	63.3	23	76.7
Semi Urban	4	13.3	4	13.3
Rural	7	23.3	3	10
Family member working as health care provider				
Yes	9	30	15	50
No	21	70	15	50
If yes, specify				
	n=9		n=15	
Doctor	0	0	1	6.7
Nurse	7	77.8	11	73.3
Paramedical	2	22.2	1	6.7
Housekeeper	0	0	1	6.7
Any other	0	0	1	6.7

Data collection

The main study data was gathered from 4th November 2019 to 23rd November 2019. Permission was obtained from concerned authority. The samples were approached in small groups on a daily basis. Before giving the questionnaire self introduction was given by the investigator and the purpose of the study mentioned. Consent of the samples were taken. Pretest on knowledge was assessed by administering the structured questionnaire and practice was assessed by checklist in both experimental and control group. Same day demonstration on donning and removing of selected personal protective equipment was given to experimental group. Post test was conducted on 7th day in both experimental and control group knowledge was assessed by questionnaire and practice by checklist in experimental and control group.

Result

Section-I: Description on demographic variable of first year nursing students in experimental and control group.

Section-II: Description on pretest knowledge and practice score regarding donning and removing of selected personal protective equipment among first year nursing students in experimental and control group

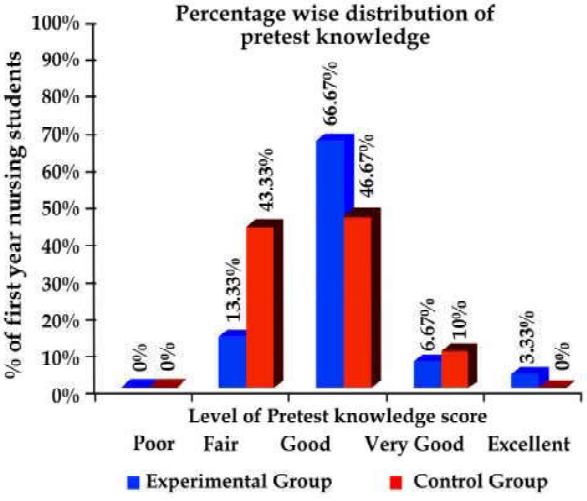

Fig. II (A): Bar diagram representing distribution of pretest knowledge score in terms of percentage in experimental and control group.

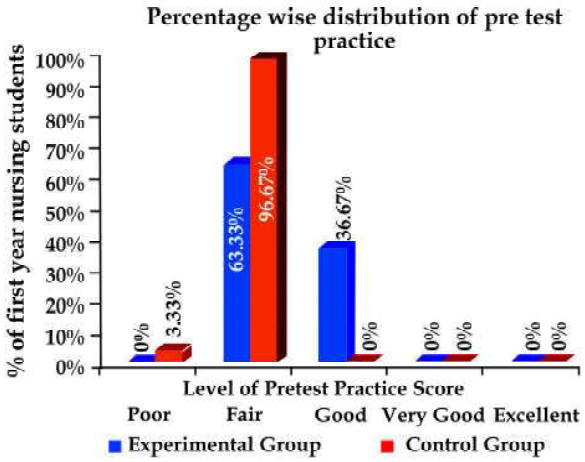

Fig. II (B): Bar diagram representing distribution of pretest practice score in terms of percentage in the experimental and control group.

Section-III: Description of post test knowledge and practice score regarding donning and removing of selected personal protective equipment among first year nursing students in experimental and control group.

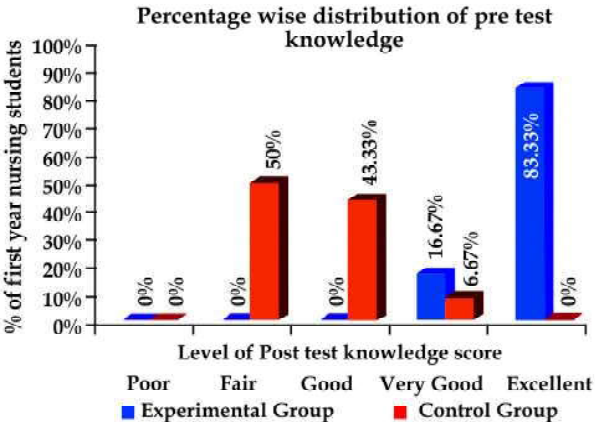

Fig. III (A): Bar diagram representing distribution of post test knowledge score in terms of percentage in the experimental group and control group.

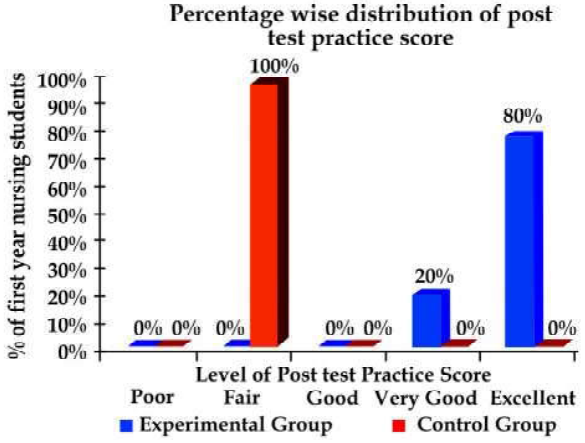

Fig. III (B): Bar diagram representing distribution of post test practice score in terms of percentage in the experimental and control group.

Section-IV: Description on the comparison of pretest and post test knowledge and practice score regarding donning and removing of selected personal protective equipment among first year nursing students in experimental and control group.

Table IV(A): Table showing the comparison of mean and standard deviation (SD) of knowledge score of first year nursing students in experimental group and control group.

Groups	Mean difference	SD	Calculated t-value	Df	Table Value	P Value
Experi-mental Group	9.06	3.93	12.30	58	2.00	0.0001,S
Control group	0.16	1.17				

***S- Significant**

The table IV(A) shows the comparison of difference in the knowledge score of experimental and control group in the pretest and post test of the first year nursing students in selected Nursing institutes of the city. Mean and standard deviation values are compared and student's unpaired 't' is applied at 5% level of significance. The degree of freedom n=(30-1)+ (30-1) i.e 58, the table value of df(58) is 2, the calculated 't' value is 12.30 which is much higher than the tabulated value at 5% level of significance which is statistically acceptable level of significance. Hence it is statistically interpreted that the research hypothesis $H_1$is accepted and H_0 is rejected. Thus, it is statistically interpreted that the demonstration regarding donning and removing of selected personal protective equipment was effective in the first year nursing students in the experimental group, and the level of knowledge is significantly increased in the experimental group as compared to the control group.

Table IV(B): Table showing the comparison of mean and standard deviation (SD) of practice score of first year nursing students in experimental group and control group

Groups	Mean difference	SD	Calculated t-value	Df	Table Value	P Value
Experi-mental Group	13.60	3.02	19.75	58	2.00	0.0001,S
Control Group	0.40	2.06				

***S- Significant**

The table IV(B) shows the comparison of difference in the practice score of experimental and control group in the pretest and post test of the first year nursing students in selected Nursing institutes of the

city. Mean and standard deviation values are compared and student's unpaired 't' is applied at 5% level of significance. The degree of freedom n=(30-1)+(30-1) i.e 58, the table value of df(58) is 2, the calculated 't' value is 19.75 which is much higher than the tabulated value at 5% level of significance which is statistically acceptable level of significance. Hence it is statistically interpreted that the research hypothesis H_1 is accepted and H_0 is rejected. Thus, it is statistically interpreted that the demonstration regarding donning and removing of selected personal protective equipment was effective in the first year nursing students in the experimental group, and the level of practice is significantly increased in the experimental group as compared to the control group.

Section-V: Description on association of knowledge and practice score with selected demographic variable in experimental and control group.

Analysis reveals that, in the experimental group, there is significant association of knowledge with age in years and course of instruction, whereas no association is found with gender, residential area, family member working as a health care provider and type of health care provider and in the control group, there is a significant association of knowledge with age in years, course of instruction, residential area, whereas no significant association found with the gender, family member working as a health care provider and type of health care provider.

Analysis reveals that, in the experimental group, there is significant association of practice with course of instruction, whereas no significant association found with the age in years, gender, residential area, family member working as a health care provider and type of health care provider and in the control group, there is a significant association of practice with family member working as a health care provider whereas no significant association found with the age in years, gender, course of instruction, residential area, and type of health care provider.

Discussion

Vidya Rajesh Gupta, Regina Dias (2012) conducted a study on Effectiveness of Simulated Demonstration regarding Defibrillation Technique on Knowledge and Practices among Nurses. The Study was aimed to assess Effectiveness of demonstration regarding defibrillation technique on knowledge and practices among nurses. The objectives were, To assess the knowledge and practice score of staff nurses regarding defibrillation technique before and after Demonstration. To determine the association between knowledge & practice score of staff nurses with selected demographic variable. Methodology used in the study was Quantitative research approach and one group pre-test and post-test design was used. Non-probability convenient sampling method was applied to select the 50 samples. Findings-majority 30 (60%) of the subjects were between the age group of 26 to 30 years and Majority i.e. 47(94 %) were females. While33 (66%) of the subjects were professionally qualified up to General nursing and midwifery Maximum i.e. 16 (32%) of the subjects have less than one years of ICU work experience, Maximum i.e. 34 (68%) of subjects had previous information acquired regarding defibrillation from other sources like books internet ET. Findings evident that the mean knowledge score of the nurses in pre test was 14.88 and SD 1.57, whereas mean knowledge score in post test was 45.7 and SD 14.6. The mean practice score of the staff nurses in pre test was 11.88 and SD 4.11, whereas mean practice score in post test was 21.1 and SD 2.88. The paired t test showed significant increase in the knowledge and practice score of the staff nurses after demonstration of defibrillation technique. Conclusion The results indicated positive response to the demonstration which was found to be really useful to them. This motivated staff nurses to take prompt decisions, perform defibrillation with confidence and save many lives of in-hospitals cardiac arrest victims.[12]

In the present study, the knowledge and practice regarding use of selected personal protective equipment was assessed by taking pre-test among first year nursing students in experimental and control group, followed by Demonstration of procedure in the experimental group and further reassessed the Knowledge and practice score in experimental and control group. Analysis revels that in Experimental group, the pre-test mean knowledge score was 13.03 & SD 3.03 and post test score was 22.10 & SD 2.23. Whereas, the mean practice score in pre-test was 11.83 & SD 2.30 and post test score was 25.43 & SD 2.36. In Control group, pre-test mean knowledge score was 11.50 &SD 2.86 and in post test 11.33 & SD 2.85. Whereas, the mean practice score in pre-test was 9.33 & SD 1.29 and post test score was 9.73 & SD 1.46. Mean difference for knowledge in experimental group was 9.06 whereas in control group it was 0.16 and for practice mean difference in experimental group was 13.60 whereas in control group it was 0.40.Thus, it is interpreted that the demonstration was effective among first year nursing students.

Implication of the study

The findings of this study have implications for

nursing practice, nursing education, nursing administration, and nursing research.

Nursing Practice

- Nurses have a crucial role to play in prevention and control of hospital acquired infection and to prevent exposure to occupational hazard. This study can be used as information illustration for nurses working in various clinical area.
- It will also help the nurses to keep update knowledge regarding various aspects of donning and removing of selected personal protective equipment.
- When professional liability is recognized, it defines the parameters of the profession and the standards of professional conduct. Nurses should therefore enhance their professional knowledge.
- The demonstration can be used for imparting knowledge and practice regarding donning and removing of selected personal protective equipment to health team members and would serve as a ready reference material for the health team members. The information is particularly useful for the nurses for educating health team members the benefits of proper donning and removing of selected personal protective equipment .

Nursing Education

- Nurse who are up to date with the knowledge and practice regarding donning and removing of selected personal protective equipment are the better person to impart their knowledge and practice to the nursing student which will ultimately decrease the mortality related to respiratory diseases.
- Now days, much emphasis is given on comprehensive care in the nursing curriculum. So this study can be used by nursing teachers as an informative illustration for nursing students.
- Demonstration could help educators to use it as a tool for teaching.

Nursing Administration

- Findings of the study can be used by the Nursing Administrator in creating policies and plans for providing education to the first year nursing students and health care professionals.
- It would help the nursing administrators to be planned and organized in giving continuing education to the nurses and to others for applying and updating the knowledge regarding donning and removing of selected personal protective equipment.

Nursing Research

- The findings of the study have added to the existing body of the knowledge and practice in relation with donning and removing of selected personal protective equipment which will enhance the knowledge and practice and would help to keep it updated.
- Other researchers may utilize the suggestions and recommendations for conducting further study.
- The tool and technique used has added to the body of knowledge and practice and can be used for further references.

Limitations

- The study was conducted only on first year nursing Basic B.Sc. nursing and General Nursing and Midwifery students of selected Nursing Institutes.
- The sample size was small to generalize the findings of the study.
- The tool for data collection was prepared by investigator herself. Standardized tool was not used.

Recommendation

- A similar study can be replicated on a larger population for a generalization of findings.
- A descriptive study can be carried out to assess the attitude of first year nursing students on donning and removing of selected personal protective equipment.
- A similar study can be carried out to evaluate the effectiveness of video assisted self instructional module on donning and removing of selected personal protective equipment.
- A comparative study can be done on demonstration versus video assisted teaching on practice regarding donning and removing of personal protective equipment.
- A comparative study can be done to assess the knowledge and practice regarding donning and removing of selected personal protective equipment among the first year and final year nursing students.

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