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Effectiveness of E-Learning on Knowledge of Standard Precautions Among Nursing Students

Priya R[1], Dr.Baba Vajrala[2]
[1]Principal, Savitri Jindal Institute of Nursing, Department of Obstetrical & Gyanaecological Nursing, Haryana.
[2]Principal, Birender Singh College of Nursing, Department of Mental Health Nursing, Haryana.

Abstract

- ***Aim:***

Health professionals should always take standard precautions and treat every patient as though they were possibly contagious or susceptible to infection. The goal of this study was to assess how well nursing students had learned about standard precautions using e-learning.

- ***Materials and procedures:***

The pre-test-post-test design with a quasi-experimental one-group (pre-test) sample size of 45 nursing students was used. The pre-test and post-test were evaluated, and an E-Learning educational intervention about standard precautions was given.

- ***Results:***

The mean knowledge score before the test was 15.24, and the mean knowledge score after the test was 21.82; the difference between the two, or the 't' value, between the two scores (21.82), shows that there were significant changes in knowledge ($p<0.05$). Age (3.15), income (7.85), and source of knowledge (0.67) were not associated with knowledge.

- ***Conclusion:***

The findings indicated that the E-Learning educational intervention increased nursing students' understanding of standard precautions, which will allow them to safeguard patients.

Keywords:- *Effectiveness, E-Learning, Standard precautions, Knowledge, Nursing students.*

I. INTRODUCTION

The two occupational exposures that health care employees encountered most frequently in the previous 12 months (85.93%) were psychosocial and organizational risks. Doctors (93.7%) and nurses (89.2%) made up the majority of occupational exposure fatalities in general.[1] Every time a health practitioner interacts with a patient, they should follow the guidelines of standard precautions and treat everyone as potentially contagious or susceptible to infection. The approach has been created to be used in providing care for everyone who visits healthcare institutions, including clients. By coming into contact with blood, bodily fluids, or contaminated items, both patients and healthcare professionals in a hospital run the danger of contracting and spreading illnesses. [2]

Needle Stick Injuries (NSIs) had a case incidence of 26.66%. The nurses' occupational category had the greatest incidence rate of NSI, at 63.9%. Additionally, the incidence rate of NSIs among Health Care Workers (HCWs) working rotating shifts was greater at 90.4% than it was for those on fixed shifts, who were primarily working nights at 9.6%. Splash 16.9% and NSIs 83.1% respectively were the most frequent forms of exposure. [3] Workload, employment in private hospitals, syringe and needle disassembling, excessive injection use, the use of general precautions, injection safety training, and infection prevention training were all linked to sharp injuries. Numerous medical practitioners are afflicted by blood-borne diseases. [4]

Sharps injury and needle stick injury prevalence over one year were 17.5% and 13.5%, respectively. Health Care Workers (HCWs) reported less than ideal behaviours and unfavourable attitudes about recommended safety measures like needle recapping (46.9%) and discriminatory attitudes toward HIV/AIDS patients (30.5%).[5] According to reports, 86% of occupational infections are caused by needle sticks worldwide.[6] and the annual illness burden attributable to percutaneous sharps injuries is 3 million infections.[7] According to reports, there are 500,000 and 100,000 needle sticks and other percutaneous injuries among health care workers (HCWs) in Germany and the UK each year, respectively.[8] Sharps injuries put health care workers (HCWs) at risk for contracting hepatitis B virus (HBV), hepatitis C virus (HCV), and HIV infections. [7,8,9] Needle stick injuries are the cause of about 40% of all HBV, 40% of HCV, and 4.4% of HIV/AIDS cases among HCWs.[7]

Only 156 (18.1%) of the 862 healthcare professionals who work outside the operating room (OT) and intensive care unit (ICU) used personal protective equipment (PPE) appropriately. It was highest among physicians (109, or 31.5%), then nurses (39, or 9.3%), and finally technicians (8, or 8.2%), with a statistical significance level of $p=0.0001$. 100% of the Health Care Workers (HSWs) working in OT used the proper gloves, mask, apron, gown, and hair cover. However, relatively few people actually used shoe covers and goggles. Lack of availability accounted for 562 (78%) of incorrect PPE use, followed by ignorance of the necessity of 77 (11%). The study highlighted the need for ongoing retraining by demonstrating incorrect use and a lack of adequate awareness of infection control practises. [10]

A total of 162 health care workers (HSWs) were enlisted for the study, and they reported varying levels of adherence to recommended safety measures. While the majority of them reported using hand sanitizer (95%) and gloves (77%), very few (22 and 28%, respectively) reported using protective eyewear and outer protective clothes. 8% of the HCWs had not finished the hepatitis B vaccination regimen despite a perceived risk of exposure to blood-borne diseases. Only 5.6% of those who had at least one needle stick injury in the previous year—about 17%—reported it to a doctor. Health care providers' subpar observance of recommended safety measures calls for additional training and monitoring techniques. The creation of a successful occupational health cell that includes these components and routine surveillance may be the solution. [11]

Standard precautions are the minimal infection prevention procedures that apply to all patient treatment, regardless of the patient's infection status (suspected or confirmed), in any environment where healthcare is provided, and they can prevent occupational hazards. Standard precautions include aseptic technique for parenteral medications, sterile instruments and devices, clean and disinfected environmental surfaces, use of personal protective equipment, cough etiquette, respiratory hygiene, and sharps safety.

Good hand hygiene is the most crucial step in limiting the transmission of illnesses among patients and healthcare professionals. While hands are obviously filthy after handling objects that are likely to have been contaminated by blood, saliva or respiratory secretions while barehanded, use soap and water to clean the hands when they are obviously dirty (blood, bodily fluids, etc.) or an alcohol-based hand massage if a health professional prefers. This should be done both before and after treating each patient. The medical hand wash should contain seven steps and last 60 seconds.

Wearable medical supplies known as personal protective equipment (PPE) are intended to shield healthcare professionals from coming into touch with or being exposed to infectious agents. PPE protects against skin and clothing that may have been contaminated by blood, saliva or other potentially infectious materials. These include of face shields, gloves, face masks, protective eyewear, and protective apparel (e.g., reusable or disposable gown, jacket, laboratory coat).[12] All medical professionals, support workers, lab personnel, and family members who offer care to patients in circumstances where they come into contact with blood, body fluids, secretions excretions should wear PPE.[10]

The prevention of infection through respiratory hygiene and cough etiquette aims to reduce the spread of respiratory pathogens via droplet or airborne routes. People with respiratory infection symptoms are advised to cover their mouth and nose when coughing or sneezing. Allow room and urge people who are experiencing respiratory infection symptoms to sit as far away from other people as feasible.

Burs, needles, and other sharp objects are the most common percutaneous injuries that medical professionals suffer, such as needlesticks and cuts from foreign objects. Scalpel blades, spent disposable syringes, and other sharp objects should all be put in the proper puncture-resistant containers close to the area where they are used. The proper disposal of sharps containers should be done in accordance with local and state medical waste regulations. Never recap used needles by directing the needle's point toward any area of the body using both hands or using any other method.

Safe injection practises are a set of guidelines that should be followed to administer injections in the most secure way feasible to protect patients. In a spotless environment, prepare injections using aseptic method. Even when acquiring further doses for the same patient, medication containers (single and multidose vials, ampules, and bags) are inserted with a new needle and new syringe. The contents of single-use vials should not be combined for future usage.

Items used in noncritical patient care are those that only come into contact with undamaged skin, such as a facebow, blood pressure cuffs, and radiograph heads. The risk of infection transmission is lowest with these things. Most of the time, cleaning is sufficient, or if it is obviously filthy, cleaning followed by disinfection using an Environmental Protection Agency (EPA) registered hospital disinfectant. Always clean the instruments to get rid of dirt and organic contamination before disinfecting or sterilising them. Blood, saliva, and other contaminating substances may act as a shield for bacteria and may interfere with the sterilisation or disinfection procedure if they are not eliminated. To increase cleaning efficiency and reduce worker exposure to blood, debris should be removed using automated cleaning equipment (such as an ultrasonic cleaner or washer-disinfector). Before being heated sterilised, dried instruments after cleaning should be examined, wrapped, packaged, or put into container systems. The steriliser utilised, the cycle or load number, the sterilisation date, and, if relevant, the expiration date should all be indicated on packaging. Clinical contact surfaces, such as commonly touched items like light handles, bracket trays, switches on dental equipment, and computer equipment in the patient-care area, should receive special attention when it comes to cleaning and disinfecting. [12]

II. MATERIALS AND METHODS

- *Setting of the study and sampling technique*

The study's quasi-experimental (one-group pre-test-post-test) methodology conveniently sampled 45 nursing students from the Savitri Jindal Institute of Nursing in Haryana. The dependent variable was the level of knowledge, while the independent variable was the E-learning on standard precautions. The demographic variables were age, income, and source of knowledge. Students who demonstrated nursing interest were included, whereas those who couldn't be reached for data collection were excluded.

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➢ *Description of the tool*

A self-structured English questionnaire was created based on the literature research and contains the following questions: Part I includes demographic information such age, income, and source of knowledge. There are 30 self-structured knowledge questionnaires in Part II (Multiple Choice Questions). The following sections of the questionnaire were used: hand hygiene, sharps safety, safe injection procedures, personal protective equipments, respiratory hygiene/cough etiquette, sterile instruments and devices, the surfaces of the surroundings. Scores for the right answer (01), and the wrong answer (02). (00). After being converted to a percentage, the degree of knowledge score is divided into three categories: inadequate (50%), moderately adequate (51–75%), and adequate (> 76%).

➢ *Validity and reliability*

Experts evaluated the content validity of the tool in light of the modifications and suggestions. Five nursing students who met the inclusion criteria participated in the pilot study to evaluate the instruments' viability and dependability. The Split-Half approach was also used to assess the knowledge instrument's dependability. The results were excellent (r = 0.98). The main study sample did not include any nursing students who had taken part in the pilot trial.

➢ *Ethical consideration*

The researcher received formal approval from the institutional ethics committee before starting data collection. All nursing students gave their consent after being told of the study's objectives and procedures by the researcher. They offered to join knowing they could leave at any time without facing any legal repercussions.

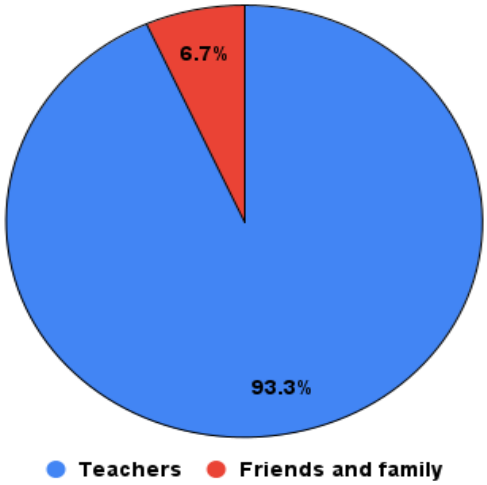
➢ *Description of the intervention*

The nurses' pre-test knowledge and competency were evaluated in an online questionnaire by the researcher on the first day by giving them demographic and 30 self-structured knowledge questionnaires over the course of 30 minutes. They were promised by the researcher that their responses would be kept private. Following the pre-test, emails and whats app were used to send the following E-Learning resources regarding hand hygiene, personal protective equipment, cough etiquette, sharps safety, safe injection techniques, sterile instruments and devices, and clean and disinfected environmental surfaces. On the seventh day, the post-test results were gathered.

III. RESULTS

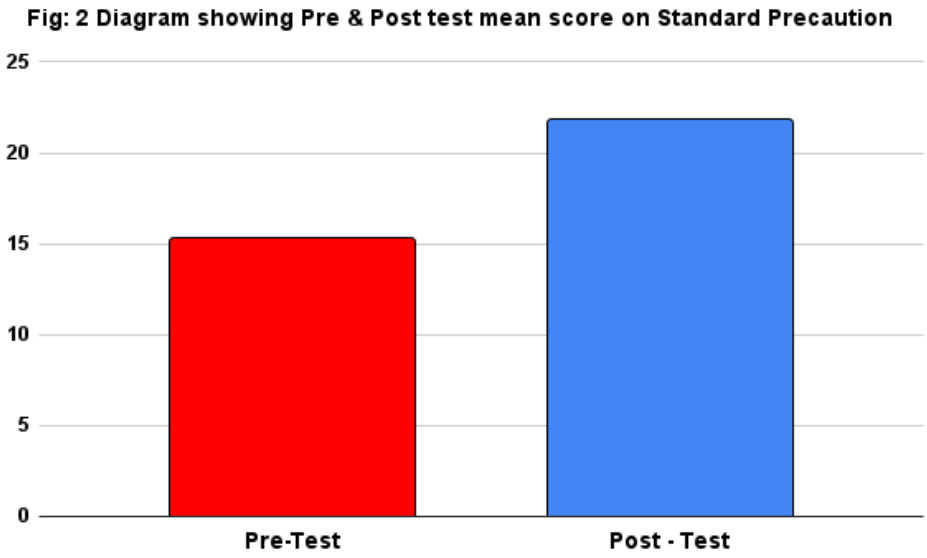
In terms of the frequency and distribution of demographic data by age, the majority of them, 37 (82.2%), belonged to the 17–21 year age group, six (13.3%) to the 22–26 year age group, and two (4.4%) to the > 26 year age group. In terms of income, 25 of them (55.6%) were between 10,000 and 15,000, 12 (26.7%) between 15,001 and 20,000, and eight (17.8%) were over 20,000. When it comes to the sources of information, 42 (93.3%) of them received from teachers, while 3 (6.7%) received from friends and family. (Figure 1)

Fig: 1 Diagram showing percentage distribution of source of knowledge in standard precaution



The majority of them, 33 (67.35%) had inadequate knowledge, 11 (22.45%) moderately adequate knowledge, and one (2.04%) adequate knowledge, according to the pre-test results. The majority of them 44 (89.8%) had adequate knowledge following the E-learning educational intervention, one (2.04%) had moderately adequate knowledge, and none of them had inadequate knowledge as determined by the post-test.

The pre-test knowledge mean score was 15.24, while the post-test knowledge mean score was 26.96, as shown in Figure 2. The knowledge 't' value between the pre- and post-tests is 21.82 indicating that there were substantial changes in the knowledge ($p<0.05$). The study found that E –Learning on standard precautions was effective and benefited to the nursing students.



The obtained chi-square value for the age (3.15), income (7.85) and sources of knowledge (0.67) indicate that there was no association between the above variables with standard precautions.

IV. DISCUSSION

The study's objectives were to evaluate nursing student's pre-test and post-test knowledge on standard precautions. The effectiveness of E-learning on educational interventions on the standard precautions and the significance of associations between pre-test knowledge with specific demographic variables like age, income and source of knowledge.

Included were 363 Health Care Practitioners s, 78.2% of whom were women. At Training Period (TP) 1 and 3, the video group outperformed both the Standard Operating Procedure (SOP) and the no-intervention group on the knowledge evaluation (TP1 p <.001 and 0.001, TP3 p = 0.036 and 0.048). Regarding satisfaction with the learning experience, the video received higher ratings than the SOP, and more video group participants said they would suggest their learning strategy to coworkers. [13]

V. CONCLUSION

According to the study's findings, qualified nursing students are at risk for non-sterile workplace injuries while undergoing practical training. Despite the rarity of documented bloodborne pathogen exposures, HBV, HCV, or HIV infection can seriously jeopardise a person's health, general wellbeing, and future professional prospects. The results of this study demonstrate the necessity of implementing a programme to increase awareness of standard precautions.

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