IMPROVING UNIVERSAL PRECAUTIONS KNOWLEDGE THROUGH VIRTUAL CARE REALITY VIDEO 360° IN PPROFESSIONAL NURSE PROGRAM STUDENTS

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Abstract

Introduction: *Current learning methods are constantly evolving. Standard precautions in healthcare are fundamental guidelines designed to minimize the transmission of infectious agents. Virtual care reality video 360⁰ can be an alternative solution for students' actual and concrete learning methods. This study aimed to determine the effect of Virtual Care Reality Video 360⁰ on the universal precaution's knowledge of Professional Nurse Program Students.*

Method: *The Research design uses a quasi-experimental pre and post-test with the control group. The research sample consists of 38 students for the intervention group and 32 students for the control group. This study was conducted in two public universities in Indonesia in June-September 2022. The research instrument uses a universal precaution knowledge questionnaire. Researchers provide virtual care reality video 360⁰ intervention for 17 minutes at least three times in each video. VCR 360⁰ contains material on universal precautions consisting of proper hand washing, Personal Protective Equipment (PPE) use, safe injection practices, and handling of potentially contaminated equipment or surfaces in the patient's environment. Post-test measurement is carried out two weeks after the intervention. Data analysis uses paired t-tests and independent t-tests.*

Conclusion: *The results showed a significant increase in respondents' knowledge level after the intervention. The research results are expected to be applied in the learning process of Professional Nurse Programs in universities. In addition to future researchers, the VCR 360⁰ method is hoped to be used for other Professional Nurse Program learning themes.*

Keywords: *nursing students, universal precaution, video 360⁰, virtual care reality*

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INTRODUCTION

The current Covid-19 pandemic affects various aspects of life and requires massive and disruptive adjustments in the Professional Nurse Program. Professional Nurse Program students must consider authentic learning experiences while prioritizing competency achievements during this Covid-19 pandemic (Ilmy et al., 2020). Develop a comprehensive competency assessment framework specifically tailored to virtual care scenarios in the context of Covid-19. Ensure that assessments encompass a variety of skills and knowledge required for virtual patient care during the pandemic. Therefore, trying methods and learning media that are authentic in supporting skills is necessary to achieve competence in Professional Nurse Program. One of the essential competencies for Professional Nurse Program students is universal precautions. Universal Precautions is an approach to infection control designed to protect health workers and patients from spreading infectious diseases. Implementing Universal Precautions is very important during a pandemic to prevent the spread of COVID-19 and protect all individuals involved in health services.

Universal precautions must be applied in all healthcare centers, such as emergency rooms, action rooms, triage rooms, observation rooms, and laboratories (Wu et al., 2020). Various nursing procedures, both invasive and non-invasive, allow nurses to be exposed to germs from patients (Milla & Sitorus, 2014). All nurses must apply appropriate and consistent universal precautions when carrying out nursing actions for all patients. The application of universal precautions includes various procedures, including hand washing, use of personal protective equipment, management of needles and sharps, management of equipment (sterilization), and waste management and sanitation (Siregar, 2014). The application of universal precautions is one part of nurses' efforts to provide an infection-free environment and protect themselves and patients against disease transmission. The application of universal precautions prioritizes safety and infection control efforts in hospitals for all patients, so reasonable learning efforts are needed.

The quality of nursing learning is influenced by the quality of learning methods (Made and Putra, 2014). Laboratory practice is the primary method that can facilitate the comprehensive learning of nursing care skills, including cognitive, affective, and psychomotor domains (Juniarti et al., no date). The ideal practicum method must be supported by learning media with an authentic picture and sound instructional design (Oducado, 2017). Learning media with good instructional categories can provide an authentic learning experience similar to the actual setting (Permana et al., 2014a).

Virtual Care Reality in video 360^0 (VCR 360^0) is a recommended learning method for practicing clinical nursing skills. VCR 360^0 is a real-life image and objects projecting a three-dimensional (3-D) view that can be rotated 36^0 and uses stereo images to give a real sense of presence, that is, the feeling of being in a simulated environment. The VCR 360^0 environment can reproduce clinical settings where users can interact with patients and virtual resources and practice content as often as needed. Globally, Virtual Reality Simulation (VRS) is a practical learning method that can visually project the experience of practicing nursing care in almost real situations (Permana et al., 2014a). VRS is financially affordable and portable, allowing students to study anytime, anywhere (AIPNI, 2019). However, the application of VCR 360^0 in

nursing education in Indonesia still needs to be improved, and there is no VCR 360^0 technology specifically designed for nursing education. Therefore, it is necessary to research and develop a VCR 360^0 specifically designed for the nursing area in Indonesia. The use of VCR 360^0 is expected to answer the limitations of learning methods, especially in universal precautions that are more efficient, safe, and support experiential learning.

METHODS

Study Design

The Research design uses a quasi-experimental pre-post test with the control group. Research design measuring the effect of virtual care reality video 360^0 on the universal precautions knowledge of professional nurse program students at Jenderal Sudirman University for the intervention group and the University of Indonesia for the control group. Both state universities have nurse professional education study programs with superior accreditation from the Independent Accreditation Institute for Higher Education Health. They are active members of the Association of Indonesian Nurse Education Institutions. This university seeks to produce competent nurses with the knowledge, skills, leadership, and clinical practice of developing nursing technology. This university is ranked first in the national best in the Indonesian Nurse Competency Test. The study will be conducted in June-September 2022.

Population, Samples and Sampling

The population of this study is 164 professional nurse program students of the second semester at X University and the Y University. The research sample consists of 38 students for the intervention group and 32 students for the control group. They determined the number of samples using the sample calculation formula, considering the difference in the standard deviation of 6.36 and the mean difference of 4.69 in previous similar studies (Purnami et al., 2014). The Random sampling technique uses a lottery. The inclusion criteria are active professional nurse program students at X and Y University. The exclusion criteria are students who unfollow professional nurse practice in hospitals.

Instruments

The research instrument uses a universal precaution knowledge questionnaire. The universal precaution knowledge questionnaire consists of 18 items using a Likert scale with correct, incorrect, and do not know answer choices (Al-rawajfah and Tubaishat, 2015; Ningtyas, 2019). This instrument assesses knowledge of using syringes, hand scoops, masks, and isolation gowns, the importance of universal precautions, the right time to perform universal precautions, and the use of disposable patient equipment. The results of measuring the knowledge variable are described in terms of mean and standard deviation.

Procedure

VCR 360^0 intervention is applied to the intervention group for 17 minutes (Permana et al., 2019) at least three times in each video. Video VCR 360^0 contains material on universal precautions, namely hand washing, Personal Protective Equipment (PPE) use, safe injection practices, and handling of potentially contaminated equipment or surfaces in the patient's environment. Post-test measurements are carried out two weeks after the VCR 360^0 intervention for the internalization phase first (Kusumawardani,

2018). The control group will be given VCR 360^0 after the post-test is carried out following research ethics.

Data Analys

The analysis of research is univariate and bivariate analyses. The univariate analysis describes the characteristics of professional nurse program students consisting of gender, program, work experience as a nurse, experience in studying infection control, history of hepatitis B vaccination, and experience reporting work accidents in frequency and percentage. Age, knowledge, and compliance variables are described in terms of mean and standard deviation. The researcher conducted a homogeneity test using the Lavene test of 0.224 (p>0.05) and a normality test using the sapphire wilk of 0.89 (p>0.05) to ensure that the intervention and control groups had the same variance to minimize bias. The two-mean difference test of each intervention and control group is analyzed using paired t-test, and the intervention effect (independent variable) on the dependent variable is analyzed using the independent t-test. Researchers used computer software to analyze research data. Table 2 shows the gender majority of respondents were women 94.3%, the majority of respondents had never been nurses 94.3%, the majority of respondents had studied infection control 98.6%, most of the respondents had not received Hepatitis B vaccine 87.1%, and the majority of respondents had never reported the incidence of needle sticks by 60%.

Ethical Clearance

This research passed the ethical feasibility test at the Research Ethics Committee of the Faculty of Health Sciences, Jendral Sudirman University, with the number 788/EC/KEPK/VI/2022, on 17 June 2022.

RESULTS

Characteristics of the Respondents

Table 1. requency distribution of respondents by age (n=7 0)

Catrgory	Median	Min-Max
Age	22	21-31

Based on table 1 explains that the data on the age of respondents were not normally distributed. Respondents in this study ranged in age from 21 to 31 years, and the median value of the respondents' age was 22 years.

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The analysis results show an increase in the average knowledge before and after the intervention in the intervention group of 2,06. The statistical test results significantly changed the respondents' knowledge after the intervention (p-value < 0.05). The mean knowledge in the control group also increased by 0.47. However, further analysis showed no significant change in respondents' knowledge before and after the intervention in the control group (p-value> 0.05).

The analysis results in Table 4 show that the mean of respondents' knowledge after the intervention group intervention was 33.82, with a standard deviation of

Table 2. Frequency distribution of respondents by gender, previous experience as a nurse, studied infection control, received hepatitis B, and reported needle sticks (n=70)

Characteristics	Total	
	f	%
Gender		
Man	4	54.7
Woman	66	94.3
Previous experience as a nurse		
Yes	4	54.7
No	66	94.3
Have studied infection control		
Once	69	98.6
Never	1	1.4
Received Hepatitis B		
Once	9	12,9
Never	61	87.1
Reported a needle stick incident		
Once	28	40
Never	42	60

Table 3 Analysis of changes in knowledge scores (n=70)

Knowledge	Before		After		Different mean	p-value
Intervention	mean	SD	mean	SD	2,06	0.001
Control	31.76	2,745	33,83	2,358	0.47	0,360

Table 4 Analysis of differences in respondents' knowledge after the intervention between the intervention group and the control group (n = 70)

Variable	Group	mean	SD	p-value*
Knowledge	Intervention	33,82	2,358	
	Control	31,41	2,326	0.001

2.358. The mean of knowledge in the control group without intervention was 31, 41 with a standard deviation of 2, 326. The results of the further analysis showed a significant difference in knowledge after the intervention between the intervention group and the control group (p-value <0.05).

DISCUSSION

Respondent Characteristics

The results showed that the average age of respondents was 22 years, with an SD of 1,378, which was in the late teens. The early adolescent phase is the stage of individual development into more mature humans, starting to learn to be responsible (Nur, 2021). At the stage of late adolescence, a person's cognitive abilities are in prime condition, which makes it

easier for them to learn, understand, think creatively, and there has not been a decline in memory function (Potter & Perry, 2015). Adolescent age affects the level of knowledge and compliance with the use of PPE in dental students at RSGM Unsoed (Dewi, 2019).

In addition to age, this research described gender women dominated. Similar to the research results on knowledge and compliance with the use of PPE, most medical and nursing students are women (Dewi, 2019). The nursing profession is a profession whose type of work requires precision, art, and aesthetics which are owned mainly by women (Dewi, 2019). Health workers should have a maternal instinct to carry out their duties.

The results showed that almost all students had studied material on infection control. Nursing professional education is the level of education taken by students after completing the Bachelor of Nursing education level. Therefore students have received material on primary infection control during undergraduate nursing education. Based on (AIPNI, 2021), the material on primary infection control is part of the skills course in nursing. One of the learning outcomes of this course is that students can apply the principles and procedures of infection control and patient safety. The Indonesian Ministry of Health establishes guidelines for infection prevention and control in healthcare facilities to support the implementation of quality and professional health services, especially infection prevention and control efforts in healthcare facilities. Infection .

Prevention and Control (PPI) is an effort to prevent and minimize the incidence of infections in patients, staff, visitors, and the community around healthcare facilities. PPI is implemented by applying the principles of universal precautions based on transmission and the wise use of antimicrobials and bundles. The PPI coaching and supervision process is carried out through advocacy, socialization, technical guidance, training, and capacity building for human resources, monitoring, and evaluation (PMK No. 27 concerning Guidelines for Infection Prevention and Control in Health Facilities, 2017). Students as components of the resource in question should receive training and technical guidance on IPC to minimize the occurrence of healthcare-associated infections. This infection occurs because of the work of hospital health workers and health workers related to the process of health services in healthcare facilities. Each hospital has a policy of implementing basic IPC training for all health workers, including students as practitioners at the hospital.

Almost all students had never received the hepatitis B vaccine. Viral hepatitis is an infectious disease that is a public health problem, and efforts need to be made to overcome it through prevention, control, and treatment so that the impact of illness, death, and the resulting socioeconomic can be minimized. One of the preventions of viral hepatitis is through immunization activities. Giving active hepatitis B immunization must be given to newborns immediately after birth. Passive hepatitis B immunization is given to newborns from mothers with hepatitis B immediately after birth (PMK No. 53 on the Management of Hepatitis Virus, 2015). Based on the results of primary health research in 2018, the number of hepatitis cases in Indonesia reached 1,017,290.

Students were in the adult age range if it is associated with the prevalence of hepatitis by age group; the number of hepatitis cases in the 15-24 year age group

was 165,644 cases (38%), and the education level, namely, had graduated from high school was 210,746 cases (41%) (Kemenkes RI, 2019). Currently, no regulation requires health workers in Indonesia to undergo hepatitis B vaccination before working in health care settings. Based on previous research, only 50% of health workers had complete hepatitis B vaccination, 32.5% were incomplete, and 17.5% had never had hepatitis B vaccine. The immunity profile against the hepatitis B virus in health workers was still low, indicated by incomplete vaccination. Hepatitis B and the proportion of health workers with protective anti-HB titers were still low (Bastiangga & Hapsari, 2019).

The majority of students had never reported a needle stick incident. Needle stick injury is an accident due to being pierced by a needle during the injection process, closing the syringe, taking blood, infusion, or disposal, and being at risk of being contaminated with blood or body fluids (Mallapiang et al., 2019). Needle stick injury could have an impact on the incidence of infection. Factors influencing the incidence of needle sticks include training on the correct use of syringes and the specified work standards (Herlinawati et al., 2021). Good knowledge of students encourages students to be able to evaluate an unwanted event. The work standards set by healthcare facilities are also a guide to achieving effective and efficient goals so that they are consistent and safe in meeting the applicable standards. Training is a supporting factor in reducing the incidence of needle sticks when performing invasive procedures on patients (Herlinawati et al., 2021).

Changes in Respondent Knowledge Before and After Intervention between the Intervention

Group and the Control Group

The results showed that the average knowledge of universal precautions in the intervention group was higher than in the control group. The intervention group received a 360o VCR intervention for 17 minutes at least three times for each video. This video contains material on universal precautions consisting of proper and proper hand washing, use of PPE, safe injection practices, and handling of equipment or surfaces in the patient's environment that were at risk of contamination. VCR 360o displayed natural objects by projecting a three-dimensional view and could be rotated 360 o using stereo images to give an accurate impression. The VCR 360o environment could produce a clinical setting following reality so that health professionals could interact with patients, virtual resources, and practice content as often as needed. Virtual Reality Simulation (VRS) can visually project the practical experience of providing nursing care that is close to reality, affordable, and accessible anywhere and anytime by students (Permana et al., 2014).

Previous research stated that the use of this technology could increase students' knowledge so that they can achieve learning outcomes and subjects. One of the studies was conducted in Korea, comparing VR applications with conventional learning procedures. The intervention group shows higher knowledge, self-confidence, and performance scores than the control group (Kang et al., 2020). A study (by Vaughn et al., 2016) states that VR positively increased students' self-confidence because this

technology allowed students to repeatedly practice technical skills such as sterile technique and emergency response skills at a self-regulated pace and time. Another study states that clinical virtual simulations increase knowledge retention, clinical reasoning, and student learning satisfaction (Padilha et al., 2019).

Literature reviews were conducted to determine the effectiveness of VR in the learning process in Indonesia. Virtual Reality influences and impacts students' ability to conduct clinical simulations following the actual setting, increasing knowledge and skills (Rizky Rachmatullah, 2020). Other literature reviews also conclude that VR is a suitable method to improve student competence further and has a more profitable cost than conventional methods(Puspitaningrum et al., 2019).

The Theory of Virtual Care Reality (VCR) revolves around the integration of virtual technologies and simulated environments to replicate real-world healthcare scenarios, fostering experiential learning and enhancing competencies among healthcare professionals (Padilha et al., 2019) . This theory is particularly significant in the context of evolving healthcare landscapes, especially during situations like the Covid-19 pandemic, where virtual care has become increasingly essential. The Virtual Care Reality holds immense promise in healthcare education, particularly in nursing, by leveraging virtual technologies to create immersive and effective learning environments (Permana et al., 2019). It addresses the need for authentic learning experiences while prioritizing competency development, ultimately enhancing the preparedness of healthcare professionals for real-world healthcare challenges.

Virtual reality requires high motivation and interest from Nurse students to participate in training programs. This limitation can affect the participation and level of student involvement in research. Researchers need to pay attention to the extent to which the level of motivation and interest can affect research results. Research may be conducted on only a few nursing students or at two educational institutions. This research may limit the generalizability of the research results to the population of Nursing students. In order to obtain more representative results, it is advisable to involve a more extensive and diverse sample.

CONCLUSION

The statistical test results show a significant increase in respondents' knowledge after the intervention (p-value < 0.05). The research results are expected to be applied in the learning process of nurses in universities. In addition, the VCR 360^0 method is hoped to be used for other Professional Nurse Program learning themes.

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CONFLICT OF INTEREST

authors declare no conflict of interest.

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