VIVA MEDIKA
Jurnal Kesehatan, Kebidanan, dan Keperawatan

Homepage: http://ejournal.uhb.ac.id/index.php/vm
P-ISSN: 1979-2026 E-ISSN: 2656-1034
DOI: 10.35960/vm.v17i2.1526

Effectiveness of Paul Model Critical Thinking Training on Nurses' Knowledge and Skills: A Quasi-Experimental Study in a Type C Hospital

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ABSTRACT

Low knowledge and competence in implementation are thought to be the cause of the low quality of nursing care. Paul's model of critical thinking training is carried out to improve the quality of nursing care. The aim of the research is to analyze the influence of Paul's model of critical thinking training on the knowledge and competence of nurses in implementing nursing care. The research used a quasi-experimental approach with a pre-test and post-test nonequivalent control group design, the sample size was 33 intervention groups and 33 control groups with a purposive sampling technique. Bivariate analysis used the Wilcoxon and Mann Whitney tests because the data distribution was not normal. The research results showed that the average knowledge in the intervention group increased by 32% and the average skills increased by 48%, while in the control group the average knowledge and skills only increased by 24%. There was a significant difference between the intervention group after training and the control group given the module ($p < 0.05$). There is an influence of Paul's model of critical thinking training and modules on knowledge and skills ($p < 0.05$). Paul's model of critical thinking training can increase nurses' knowledge and skills in implementing nursing care.

Keywords: Nursing Care, Critical Thinking, Paul Model

1. INTRODUCTION

Nurses are an important element in a hospital because they have the longest contact with patients compared to other professions, especially patients in the treatment room. The main role of nurses includes providing nursing care starting from assessment, diagnosis, planning, implementation, and evaluation (Potter et al. 2010). In carrying out nursing care, it is necessary to apply critical thinking to ensure that every decision and action taken is in accordance with the needs and conditions of the patient. Critical thinking is one of the six nursing clinical competencies, namely communication, clinical knowledge, critical thinking, responsive leadership, professionalism, and technical ability (Berman, Snyder, and Frandsen 2020).

Critical thinking refers to the skills needed to quickly analyze clinical situations and make informed decisions (Lee and Oh 2020). In addition, critical thinking (CT) is a self-regulating and purposeful evaluation process that leads to problem solving and correct decision making (Nguyen 2021). In nursing, critical thinking is a cognitive process that presents the ability to apply arguments to reduce errors in decision-making (Alfaro-LeFevre 2019). Nurses use critical thinking every day to assess, plan and provide patient care (Bambini et al. 2009). By strengthening critical thinking skills, nurses are expected to become critical thinkers in their actions (Kashaninia et al. 2016).

A professional nurse is considered a critical thinker when they are able to develop skills to

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interpret and analyze problems and situations, evaluate and draw conclusions, predict outcomes and implement effective actions (Kashaninia et al. 2016). The problems that arise are not just simple problems but various complex and unusual problems (Ali-Abadi, Babamohamadi, and Nobahar 2020). Critical thinkers can also resolve conflicts and identify patient needs and choose the best care interventions (Kashaninia et al. 2016). Therefore, critical thinking is considered an important skill for nurses as it helps them make decisions and solve nursing problems effectively (Nguyen and Liu 2021).

There are several theories and models that discuss critical thinking including Paul's model. Paul's model focuses on three aspects of thinking, namely; elements of reasoning, intellectual standards, and intellectual properties. Paul's model is one of the most widely used models in training and teaching programs (Babullah and Nugraha 2023). The advantage of Elder and Paul's critical thinking theory over other critical thinking theories is that it adds an assessment of the breadth of meaning and depth of critical thinking (Pamungkas et al. 2023).

Paul & Elder (2020) elaborate that the critical thinking process involves eight main components, which include: goals that form the basis of thinking, questions that drive the search for answers, assumptions that underlie thinking, viewpoints that influence interpretation, information used as evidence, concepts that shape understanding, inferences that are conclusions drawn, and implications and consequences of conclusions. Each of these elements is interrelated and contributes to a logical thinking process.

Good critical thinking requires mastery of intellectual standards including nine main elements, (Paul and Elder 2020) namely: clarity the ability to convey ideas clearly and easily understood, accuracy presents information or data accurately without errors, thoroughness gives detailed attention to important aspects of a topic, relevance relates information or arguments to the topic or situation being discussed, depth dives into the complexity of an issue with deep thinking, breadth has a broad perspective and considers various points of view, logic uses coherent reasoning and reasoning to form conclusions, meaning and fairness. Intellectual traits consist of 7 components, namely: humility, courage, empathy, integrity, perseverance, conviction, and fairness.

Rationale is a process of thinking to gain knowledge (Liyanto, Disman, and Dahlan 2021). Intellectual standards serve as a guide or basis in thinking logically, which nurses apply these standards when carrying out the nursing process (Potter et al. 2017). At the critical thinking level, intellectual standards and elements of reasoning can be used to measure a person's level of critical thinking ability (Pamungkas et al. 2023.

At each stage of the nursing process, nurses apply critical thinking and analytical skills to evaluate the importance, significance, and relationship between patient data. This is done so that they can select and determine the most appropriate nursing care (Christensen and Kenney 2009).

Research conducted by Deniati et al. (2018) confirmed that there was a significant impact of critical thinking training on improving the ability of executive nurses to provide nursing care. The results of a study conducted by Kamil et al. (2021) showed that the critical thinking ability of nurses related to the implementation of nursing documentation at the Aceh Government Hospital, generally reached a good level with a percentage of 72,0%.

Based on preliminary studies conducted at RUD Prof. DR. MA. Hanafiah SM Batusangkar and RSUD Sijunjung, the quantity and quality of nursing care was found to be below the standard <85% (MOH 2005).

The study aims to identify the impact of Paul model critical thinking training on the level of knowledge and skills in the implementation of nursing care at Prof. DR. MA. Hanafiah SM Batusangkar and Sijunjung Hospital.

2. RESEARCH METHOD

This study used quasi experiment method

with pre test and post test nonequivalent control group design. The intervention group was given Paul's critical thinking training model, while the control group was given Paul's critical thinking module in the implementation of nursing care consisting of understanding, objectives, elements of Paul's critical thinking model, application of Paul's critical thinking model in the nursing process.

The population was 98 nurses in the inpatient room of RSUD. Prof. Hanafiah SM Batusangkar and 95 nurses at Sijunjung Hospital. The sample size in this study was determined based on estimates (estimates) to test the hypothesis of a difference in 2 means in different groups (Dharma 2015) which amounted to 66 nurses divided into 33 people in the intervention group and 33 people in the control group.

Inclusion criteria include nurses willing to be respondents, PPJA, and executive nurses. The independent variables included Paul's critical thinking training model, while the dependent variables were nurses' knowledge and skills measured using a questionnaire.

The intervention used in this study was to provide training on Paul's critical thinking model in the implementation of nursing care in the intervention group This training was conducted in april 2024. Before the training, a pretest was conducted consisting of a socio-demographic questionnaire, a questionnaire measuring cognitive abilities and Paul model critical thinking skills. Paul's critical thinking training was conducted for three days with a total time of 720 minutes or 12 hours. On the third day at the end of the training, a post-test was conducted. While the control group before being given the Paul model critical thinking module was also carried out a pre-test and after 3 days a post-test was carried out. This training was assisted by enumerators.

The first instrument was used to collect demographic characteristics consisting of gender, age, education, and tenure. Furthermore, the researcher used the Paul model critical thinking knowledge questionnaire consisting of 25 questions using a Guttman scale, where answering correctly scores 1 and if wrong scores 0. The range of questionnaire scores is 0 to 25. While the skills questionnaire consists of 25 questions using a Likert scale with a score of 1–4, the range of questionnaire scores is 25–100.

In this study, the validity test was carried out at Sawahlunto Hospital on april 03, 2024 on the knowledge instrument, and competence with 30 respondents. The results of the validity test using the corrected - item total correlation on 25 knowledge questionnaire statements showed that all statement item values were above the r table value (0, 361), while the 28 skill questionnaire statements had 3 (three) invalid statements, namely statement no. P2, P12, and P15 less than r table 0,361 then the 3 statements were removed so that the question items for skills became 25 statements. The results of the reliability test on the knowledge questionnaire obtained the result of Cronbach's alpha 0,894, the skills questionnaire obtained the result of Cronbach's alpha 0,896. This shows that all instruments are declared reliable with a very good level of reliability (> 0.7) (Wahidiyat et al. 2021). This shows that the questionnaire has good consistency to measure knowledge and skills.

The technique of data collection was carried out after obtaining ethical approval from Andalas University. Researchers selected study participants based on certain criteria, then to ensure their willingness, the benefits and objectives of the study were explained. Individuals who agreed to participate then signed an informed consent form, which served as an agreement document. The researcher administered a questionnaire to collect information on participants' knowledge and critical thinking skills of Paul's model before the intervention (pre-test intervention). Next, the researcher conducted the Paul model critical thinking training for 3 (three) days and conducted mentoring for 2 (two) weeks after which a post test was conducted with a knowledge and skills questionnaire. Finally, the collected data were processed and analyzed.

Univariate analysis was conducted to determine the distribution of the characteristics of the study variables frequency of gender, age, education, and tenure. Bivariate analysis was conducted to assess the impact of Paul's critical

thinking training model on nurses' knowledge and skills.

This study obtained ethical permission from the Ethics Committee of FKEP Andalas University with No. 0270.layaketik/KEPKFKEP UNAND.

3. RESULT AND DISCUSSION

Result

Univariate Analysis

Univariate analysis was based on gender, age, education, and tenure (Table 1)

Table 1. Respondent Characteristics

Socio-Demographics Nurses	Category	Intervention (n= 33)		Control (n= 33)		Total (n=66)	
		f	%	f	%	f	%
Gender	Male	0	0,0	2	6,1	2	3,0
	Female	33	100	31	93,9	64	97,0
Age	18 - 25	1	3,0	3	9,1	4	6,1
	26 - 35	16	48,5	18	54,5	34	51,5
	36 – 45	11	33,3	12	36,4	23	34,8
	46 - 55	5	15,2	0	0	5	7,6
Education Level	Vocational	20	60,6	19	57,6	39	59,1
	Ners	13	39,4	14	42,4	27	40,9
Working Period	< 6 Years	4	12,1	7	21,2	11	16,7
	6 – 10 Years	17	51,5	17	51,5	34	51,5
	> 10 Years	12	36,4	9	27,3	21	31,8

The distribution of respondents showed that almost all nurses were female, namely 98 respondents (97,0%), most of them were 26-35 years old as many as 34 respondents (51,5%), most of the nurses' education was vocational as many as 39 respondents (59,1%), and most of the length of service was 6 - 10 years as many as 34 respondents (51,5%).

In the intervention group, all respondents were female as many as 33 people (100%), most of them were 26-35 years old as many as 16 people (48,5%) most of the nurses' education was vocational as many as 20 respondents (60.6%), and most of the length of service was 6 - 10 years as many as 17 respondents (51.5%).

In the control group, almost all respondents were female as many as 31 people (97%), most were aged 26-35 years as many as 18 people (54,5%) most of the nurses' education was vocational as many as 19 respondents (57,6%), and most of the length of service was 6 - 10 years as many as 17 respondents (51,5%).

Bivariate Analysis

Bivariate analysis of nurses' knowledge and skills before and after Paul's critical thinking training intervention in the intervention group and module provision in the control group (Table 2).

Table 2. Bivariate test of the effect of Paul model critical thinking training on nurses' knowledge and skills.

Variabel	Group	*Pre - Test*		*Post - Test*		*p value*
		Median	Min-Max	Median	Min-Max	
Knowledge	Intervention	14,00	8 - 21	22,00	19 - 25	0,000
	Control	14,00	7 - 20	20,00	18 - 24	0,000
Skills	Intervention	74,00	69 - 100	86,00	86 - 100	0,000
	Control	74,00	69 – 82	82,00	80 - 100	0,000

Based on the table above, there is an effect of nurse knowledge (p value 0,000) with a pre-intervention median value of 14 increasing to 22 in the treatment group. The median value also showed an increase in the control group, where the median value before intervention was 14 to 20 post intervention.

Based on these findings, it is concluded that the (Ho) is rejected, there is an effect of Paul's critical thinking training model on nurses' knowledge at Prof. DR. MA Hospital. Hanafiah SM Batusangkar and Sijunjung Hospital.

Table 2 shows the results of the effect of nurse skills (p value 0,000) with a pre-intervention median value of 74 increasing to 86 in the treatment group. The median value also showed an increase in the control group, where the median value before intervention was 74 to 82 post intervention.

Based on these findings, it is concluded that the (Ho) is rejected, there is an effect of Paul's critical thinking training model on nurses' skills at Prof. DR. MA Hospital. Hanafiah SM Batusangkar and Sijunjung Hospital.

Difference Test

The difference in scores before and after the intervention and control groups are presented in Table.

Table 3 Difference Test

Variable	Measurement	Group	Median (Min-Max)	Mean Rank	*P value*
Knowledge	Post Test	Intervention (n=33)	22,00 (19-25)	40,70	0,002
		Control (n=33)	20,00 (18-24)	26,30	
Skills	Post Test	Intervention (n=33)	86,00 (86-100)	48,12	0,000
		Control (n=33)	82,00 (80-100)	18,88	

Based on the table above, there is a significant difference in knowledge scores after treatment in the intervention group, namely the median value of 22,00 with a mean rank of 40,70 and the control group median value of 20,00 with a mean rank of 26,30 (p value = 0,002). The table above shows that there is a significant difference in skill scores after treatment in the intervention group, namely the median value of 86,00 with a mean rank of 48,12 and the control group median value of 82,00 with a mean rank of 18,88 (p value = 0,000), so that from the information above it can be further analyzed that knowledge, and skills with Paul's critical thinking training model show a meaningful / significant difference, this is evidenced by the p value (<0,05).

Thus it is concluded that the (Ho) is rejected, meaning that there is a difference in knowledge and skills scores before and after between the intervention and control groups at Prof. DR. MA. Hanafiah SM Batusangkar and Sijunjung Hospital.

DISCUSSION

Univariate Analysis

The results showed that almost all nurses were female, namely 98 respondents (97%). The intervention group was entirely dominated by women as many as 33 (100%), while the control group was almost entirely dominated by women as many as 31 (97%). Opinions regarding gender theory put forward by Ilyas (2016), which states that gender will provide different encouragement, psychological theory expressed by Robbins & Judges 2008 in (Sarlia, Sumarni, and Rimba Putri 2021) which explains that women are more obedient to authority than men. It is concluded that women have better knowledge than men.

The results showed that most of them were 26-35 years old as many as 34 respondents (51,5%), the intervention group was 18 people (54,5%), while the control group was 16 people (48,5%). The results of this study are the same as Zainaro & Novita's research (2019) which revealed that most nurses aged 26-35 years (56%) were in the early adulthood age range. Age 20-40 years is the stage of early adulthood which is the peak of the development of physical conditions in the application of knowledge and skills that have been obtained (Awliyawati 2015).

The results showed that most nurses' education was vocational as many as 39 respondents (59,1%). The intervention group was 20 respondents (60,6%), while the control group was 19 respondents (57,6%). This is the same as the research of Furroidah et al. (2023) in IRNA 1 dr. Saiful Anwar Malang Hospital revealed most of the vocational education level (69,35%). The results of this study differ from research conducted by Sarastya et al, (2018) which showed that most nurses have a Ners education level (56,2%).

Education affects knowledge because it is a process of changing attitudes and behavior through teaching and training that produces knowledge (Notoadmojo, 2014). Nurses with different levels of education have differences in the quality of nursing care documentation due to cognitive and skill improvements (Panggabean 2020). The results of the research and the theory above show that the higher the nurse's education, the better the nurse's application of critical thinking, it is hoped that nurses can increase their education level.

The results showed that most of the length of service of the intervention and control groups were 6–10 years as many as 34 respondents (51,5%). The intervention group was 17 people (51,5%) and the control group was 17 people

(51,5%). In contrast to research by Furroidah et al. (2023) where the results were that almost half of the nurses had 6–10 years of work experience (40,32%). The working period of a nurse is related to the nurse's ability to implement nursing care. Nurses who have a lot of experience are considered more mature in facing challenges so that they affect the perception of inner confidence (Nurjaman, Mulyani, and Yufi Aliyupiudin 2020). The longer a person's tenure, the more he will understand the environmental conditions and have better critical thinking skills.

Bivariate Analysis

The results of the Wilcoxon test bivariate analysis showed the effect of Paul model critical thinking training on nurses' knowledge (p value <0,05). The median value showed an increase where the pre-intervention median value of 14 increased to 22 in the treatment group. The median value also showed an increase in the control group, where the median value before intervention was 14 to 20 post intervention.

The results of this study are in accordance with the research of Kartikasari et al. (2020) showed that the average score of nurses' knowledge after being given training increased the knowledge score, namely 22,30, an increase of 6,75. In line with the results of research by Miko & Arrisa (2023) there was an increase in the average knowledge after training by ± 10,8 and namely 48,56%. Sitio et al. (2022) said critical thinking stimulates the development of one's knowledge.

Knowledge in nurses in this study has a high value in the knowledge aspect of intellectual standards. Sutriyanti et al. (2019) also emphasized that intellectual standards are a very influential element in shaping a nurse's critical thinking skills.

According to the Kamus Besar Bahasa Indonesia (KBBI), knowledge can be interpreted as all that is understood, expertise, and all that is learned about a particular subject. Notoatmodjo (2014) says knowledge is the dominant factor in achieving a certain level of skill. Good knowledge will make it easier for individuals to develop skills with exercises, so that nurses' knowledge can increase due to the information provided during training.

The critical thinking model can improve knowledge because it emphasizes critical analysis, which helps nurses to distinguish between facts and opinions, and evaluate the credibility of information sources, which is important in making appropriate clinical decisions (Alfaro-LeFevre 2019). Paul's model through the introduction and justification of conclusions, as well as the creation of valid inferences, nurses are trained to make meaningful judgments about the information they receive, which is essential in nursing care (Sullivan 2012).

As for skills, the results of the Wilcoxon test bivariate analysis showed the effect of Paul model critical thinking training on nurse skills (p value 0.000). The median value showed an increase where the pre-intervention median value of 74 increased to 86 in the treatment group. The median value also showed an increase in the control group, where the median value before intervention was 74 to 82 post intervention.

The results of this study are in line with research conducted by Ardian et al. (2019) showed a significant increase in nurses' ability to think critically after training. Research by Retno Winarti et al. (2018) which showed an increase in skills after being given training. In line with research conducted by Kartikasari et al. (2020) showed that there was an effect of training on nurses' skills. Meanwhile, training conducted by Miko & Arrisa (2023) also said training can improve skills.

The research findings provide strong support for the implementation of nursing theory developed by Patricia Banner in daily nursing practice with the view that nurses who have good skills if they focus on practical knowledge used to guide innovation and thus create career development progress. Patricia Benner's nursing theory philosophy is oriented towards nurse competency standards. The increasing competence of nurses will continue to develop in accordance with the career path of nurses ranging from novicea to expert (Sitio et al., 2022).

Paul's model identifies key critical thinking skills that nurses should develop, such as concept clarification and condition identification, which enhance their ability to provide quality nursing care.

According to Dessler (2015) suggests that, "Training means giving new or existing employees the skills they need to do their jobs. Training is very important, if even high potential employees don't know what to do and how to do it, they will improvise or not do something at all".

Nurses' knowledge and skills improved after the critical thinking training because the training provided direct interaction/two-way interaction between trainers and participants, which could improve understanding and retention of the material, during the training sessions, participants could directly ask questions and get solutions to the problems they faced, the training included exercises/stimulations that helped participants apply theory to real situations. While modules can be a good learning resource and offer flexibility, there is no interaction between researchers and participants, lack of motivation for participants to read the modules.

Paul's critical thinking model assists nurses in developing their ability to think systematically and analytically, which in turn improves their knowledge and skills in providing effective and quality care (Sullivan 2012).

The implications of Paul's critical thinking model in the nursing context can improve the quality of nursing care, nurses can identify patients' health needs more accurately and make the right decisions in the implementation and documentation of nursing care, critical thinking helps nurses recognize changes in patient status, encourage innovation and continuous learning which is important for nurses' professional growth and improvement of nursing practice. Therefore, it is hoped that the hospital will conduct a training program on Paul's model of critical thinking towards the implementation of sustainable nursing care.

Difference Test

Based on the results of the study, there was a significant difference in knowledge scores after treatment in the intervention group, namely the median value of 22,00 with a mean rank of 40,70 and the control group median value of 20,00 with a mean rank of 26,30 (p value = 0,002). While the skills of nurses showed that there was a significant difference in skill scores after treatment in the intervention group, namely the median value of 86,00 with a mean rank of 48,12 and the control group median value of 82,00 with a mean rank of 18,88 (p value = 0,000).

The results of this study are in accordance with the research of Sabzevari et al. (2018) in Iran showed a significant difference in knowledge on the average quality of nursing care in the intervention group, namely with an average value (39,99 ± 3,35) and the control group (24,19 ± 2,3). These findings indicate that critical thinking is able to improve the quality of nursing services, there is a change in the use of critical thinking towards the nursing process, allowing nurses to provide better quality nursing services.

The results of this study are in line with research conducted by Sitio et al. (2022) which shows that nurses who have good knowledge and skills will think critically effectively to provide higher quality nursing care because they are able to solve clinical problems better, which will provide benefits for patients, nurses and hospital institutions.

Doengoes (2000) says the consequences of unqualified documentation can cause the continuity of nursing care to be interrupted and improve the quality of nursing services to be hampered (Erna & Dewi, 2020). For this reason, it is very necessary for nurses to have the ability to think critically, logically and analytically using the steps of the nursing process as a scientific framework so that they are able to solve and overcome any problems that arise in patients.

CONCLUSION

There was an effect of Paul model critical thinking training on nurses' knowledge (p <0,5) in the intervention group, with the median pre-

score increasing from 14 to 22 post intervention and in the control group with the median pre-score increasing from 14 to 20 post intervention. There is a difference between the post-score between the intervention and control groups with a p value of 0,002.

There was an effect of Paul model critical thinking training on nurses' skills (p 0,000) in the intervention group, with the median pre-score increasing from 74 to 86 post intervention and in the control group with the median pre-score increasing from 74 to 84 post intervention. There is a difference between the after scores between the intervention and control groups with a p value <0,05.

Paul model critical thinking in the context of nursing can improve the quality of nursing care, Paul model critical thinking, especially the elements of reasoning and intellectual standards, plays an important role in analyzing clinical data, evaluating the effectiveness of care, and managing risk and patient safety. Paul's critical thinking training not only improves nurses' individual abilities but also brings positive changes in the overall quality of nursing care. It creates a work environment that is more dynamic, innovative, and responsive to patient needs and today's health challenges. Therefore, it is highly recommended to integrate this training in staff development programs in hospitals.

Nurses who take part in critical thinking training have a better ability to provide nursing care. They are 2,403 times more likely to be able to provide good nursing care compared to nurses who lack critical thinking (Deniati, Anugrahwati, Suminarti, et al. 2018). There is a significant relationship between nurses' critical thinking and the quality of nursing care. Nurses who think critically have a 6 times greater chance of showing good quality nursing care (Aprisunadi 2011).

ADVICE

In this study, it is expected that nurses can attend critical thinking training regularly to update knowledge and skills, use active learning methods such as group discussions, case studies, and clinical simulations to hone critical thinking skills. The hospital should develop a structured and sustainable critical thinking training program for all nurses, conduct periodic evaluations (supervision) of training effectiveness and provide constructive feedback to nurses for continuous improvement. So, it is expected that the ability of nurses can increase and will affect the quality of good nursing care.

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