MINH
MALAHAYATI INTERNATIONAL JOURNAL OF NURSING AND HEALTH SCIENCE
ISSN 2620-9152 (Print)
ISSN 2621-4083 (Online)
DOI: 10.33024

Nomor: 79/E/KPT/2023

ARTICLE INFORMATION
Received: December, 15, 2023
Revised: January, 15, 2024
Available online: February, 19, 2024
at : http://ejurnalmalahayati.ac.id/index.php/nursing/index

Skill and performance to formulate evidence-based practice among nursing students: A qualitative study

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Abstract

Background: The PICO framework is frequently applied to formulate question for conducting literature searching in the evidence-based practices (EBPs) development. However, students experienced challenges in fitting the clinical questions into PICO's format. In Indonesia, the EBP was mostly taught conventionally through lectures and discussions. There was no specific evaluation for assessing the accuracy of the PICO formula. Previous studies indicated that incorporating visual art in learning effectively improves students' observation skills, self-confidence, communication skills, and promotes transformational learning.
Purpose: To describe the implementation of the PICO game and visual art as an EBP learning method and evaluate the accuracy of the PICO formula and the visual art created by nursing students, including their perspectives on the applied EBP learning method.
Method: This descriptive study was conducted at a secondary hospital in Sumedang District, West Java-Indonesia, in July 2023. Totally 53 nursing profession program (NPP) students of a University in Indonesia were voluntarily recruited as participants. They divided into 9 groups and received a description of how to play the PICO game and visual art for developing the PICO formula question. Each group required to develop PICO questions from the PICO trigger pictures and keywords on the PICO worksheets and to draw at least one visual art illustration from the developed PICO question. At the end of those sessions, they were also required to provide opinions on this EBP learning approach. The PICO question accuracy was assessed using the PICO formula observation sheet, while the visual art compatibility was measured using the visual art observation sheet. Quantitative data were analyzed descriptively and the students' perspectives on the EBP learning processes were analyzed by identifying the topic mostly described.
Results: There were 63 PICO formulas and 18 visual art illustrations. Most of the PICO formulas (93.7%) were identified as accurate. However, more than one-third (41.3%) of the PICO formula did not include the C (comparison) component. More than half of the developed visual art illustrations (61%) were inappropriately describing the developed PICO formula. Participants reported that using PICO Games and visual art was an interesting and fun approach that enhanced their comprehension of the PICO question formula, EBP, and improved their teamwork capacity.
Conclusion: The PICO game and visual art learning method facilitates high accuracy of the PICO question formula and is perceived as an effective and interesting EBP learning method. However, as the "C" (comparison) is the PICO component mostly found uncompleted, it is important to elaborate more on this issue in the EBP learning session. It is also important to extend the duration of the EBP learning method to facilitate students drawing the expected visual art appropriately. Further studies are needed to further confirm and follow up on the findings of this study.

Keywords: Game; Nursing Students; Performance; Skill.

DOI: https://doi.org/10.33024/minh.v6i8.13392

INTRODUCTION

Introducing procedures for preparing and utilizing evidence-based practice (EBP) is crucial during the learning period. A review reported that nursing students faced barriers in EBP due to negative attitudes toward it and a lack of knowledge and skills related to it (Fiset, Graham, & Davies, 2017). It was found that although nursing students and educators believe in EBP, the level of implementation is still low. They also perceive EBP as a difficult and time-consuming activity (Cardoso, Rodrigues, Pereira, Parola, Coelho, Ferraz, Cardoso, Ramis, & Apóstolo, 2021).

One framework that EBP practitioners often use is a mnemonic of population, intervention, comparison, and outcome (PICO), which helps in forming questions and facilitating literature searches. A researcher can evaluate the breadth and depth of their research question by utilizing the four PICO components, which will serve as the basis for developing the research question (Kazi, Chowdhury, Chowdhury, & Turin, 2021). However, it does not guarantee that all questions generated using this framework are appropriate (Nishikawa-Pacher, 2022). PICO questions do not always correspond to the project or change initiative that was planned at the beginning (Ford & Melnyk, 2019). This is because a well-written PICO question will direct the researcher to best practices for answering the question. A study found that students taking evidence-based practice courses generally had difficulty fitting clinical questions into PICO's structured format (Schiavenato & Chu, 2021).

One of the goals of nursing graduates is to integrate evidence-based practice (EBP) into the provision of nursing care to improve service quality. Nursing practitioners believe that adopting EBP is necessary to provide the highest quality of care and more cost-effective treatment methods (Schmidt, 2021). Currently, the EBP teaching method involves a formative evaluation after learning and preparing EBP reports at several PPN stages. However, there is no measurable evaluation using specific instruments or criteria to assess the accuracy of the PICO formula in the EBP title. This formula serves as the basis for searching literature related to the phenomenon that will be discussed.

Various studies support integrating the arts with academic curricula. The use of visual art in various types of learning involves developing a sense of self-confidence and promoting excellence, which encourages individuals to participate (Salayo, Lainez, Dolendo, Agonoy, Bargo, Yumang, Dizon, Chua, & Salayo, 2021). Studies show that combining visual arts with learning in the health sector can improve students' observation skills, enhance communication, foster new ways of thinking, increase self-awareness, integrate thoughts and feelings, cultivate empathy, raise cultural awareness, and promote transformational learning (Klugman, Peel, & Beckmann-Mendez, 2011; Rieger, Chernomas, McMillan, Morin, & Demczuk, 2016). Therefore, visual art has the potential to be an effective learning method.

In the Faculty of Nursing Universitas Padjadjaran, the EBP was taught through lecture and discussion both during academic and student in clinical practice settings. During NPP, the EBP learning was set as one of the competencies and evaluated through EBP reports and presentations. There was no specific evaluation in terms of the accuracy PICO question formula used for literature searching and its fitness with the EBP title. This study aimed to describe the implementation of the PICO Game and visual art as an EBP learning method and identify the accuracy of the PICO formula and visual art created by students, including their perspectives on the applied EBP learning method.

RESEARCH METHOD

This descriptive study was conducted at a secondary Hospital in Sumedang District, West Java-Indonesia, the setting where the student of Universitas Padjadjaran conducts the clinical practices. Totally 53 students were approached, provided research information, and students who provided verbal or written consent to participate were voluntarily recruited as participants. They were divided into 9 groups (6-7 students/group) and each group received two PICO game sets consisting of a set of PICO trigger images, PICO keywords, a PICO worksheet, clips, markers, and a set of papers and colouring pencils. The 3rd author explained the rules of the PICO game; each group selected trigger images, arranged them on a worksheet following the PICO component, and developed an EBP title formula based on the PICO arranged. Participants in each

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group were allowed to ask the research team (1st and 2nd authors who acted as facilitators for clues from the selected PICO trigger images. Participants then select the keywords set to create a PICO question formula following the previously arranged images. Then they filled as many of the PICO columns on the PICO worksheet with the appropriate keywords. Hence, the participants formulate the potential themes of literature searching for EBP. Participants select at least one of those PICO formulas that they considered the most interesting and draw it on paper using colouring pencils. After completing those activities, the researcher asked each group representative to provide their responses, comments, impressions, evaluations, and suggestions on the PICO Game and visual art activities. All of these activities were carried out for approximately 25 minutes.

Data in this study were collected using three instruments, namely a demographic data questionnaire, PICO formula observation sheet, visual art observation sheet, and one open question "What is your opinion on this EBP learning method?". All instruments were developed by the 1st author based on the related literatures. The second and third authors were assigned as the validator experts for the developed instruments, including during the item development, wording, or determining the number of items. The PICO observation sheet consists of 5 items (P- population, I-intervention, C-comparison, O-outcomes, and PICO formula) with two options; 0 (blank/filled but inaccurate) and 1 (filled and accurate). EBP title formula is considered accurate if the formula consists of the combination of accurate PIO components with or without the C component Along with a visual art observation sheet containing 5 items (with two options 0 (blank/drawn but inaccurate) and 1 (drawn and accurate). The 5th item used to assess whether or not the drawn picture is accurately represents the created EBP title formula. The picture is considered as accurate if the drawn picture minimum accurately illustrates PIO components. The participants' opinions on the PICO game and visual art activities were audio recorded and transcribed verbatim.

Data collection procedures were conducted after the hospital's permission and ethical approval from the Research Ethics Commission of Padjadjaran University, Bandung, No. 985/UN6.KEP/EC/2023 were obtained.

The collected data was then descriptively analyzed. The frequency distribution and percentage were used to describe participants' gender, learning styles, accuracy of the PICO formula and visual art. The data related to participants' perspectives were analyzed by the 1st author through some steps; transcribing the audio-recorded participant's statements, reading repeatedly, and identifying the common stated topics. The topics with similar themes will be grouped according to the relevant data. The identified topics were discussed and concluded together with the second and third authors as the validators.

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RESEARCH RESULTS

Table 1. Characteristic of Participants (N=53)

Variables	Results
Age (Mean±SD) (Range) (Years)	(23.15±0.95) (22-26)
Gender (n/%)	
Female	48/90.57
Male	5/9.43
Undergraduate's GPA (n/%)	
Very Satisfactory	43/81.13
With Compliments	10/18.87
Learning Styles (n/%)	
Visual	4/7.54
Visual & Auditory	29/54.72
Visual & Kinesthetics	16/30.20
Auditory & Kinesthetics	4/7.54

Table 1 shows that the majority of the participants were 23 years old and female (90.57%). Additionally, nearly all participants (had a very satisfactory graduation rating with a GPA ranging from (2.76 to 3.50) (81.13%). Additionally, more than half of the participants (54.72%) had a combination of visual and auditory learning styles.

Accuracy of PICO's Component and EBP title Formula

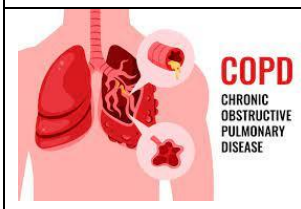
Trigger Image	P	I	C	O	Title Formulation	Visualization of one of The Predetermined Titles
	COPD	Prone Position	High Fowler	Respiratory Parameters	Comparison of prone and high Fowler positions on respiratory parameters and self-efficacy in patients with COPD	
			Position	Self-efficacy Related COPD		

Figure 1. PICO component and EBP title formula from Group Seven.

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Table 2. Frequency and Percentage of the Accuracy of PICO Component and EBP Title Formula (N=63)

PICO Component & PICO Formula	Results	
	Filled accurately (n/%)	Not filled/Inaccurate (n/%)
P - Population	62/98.4	1/1.6
I - Intervention	60/95.2	3/4.8
C - Comparison	37/58.7	26/41.3
O - Outcome	63/100	0/0
EBP Title Formula	59/93.7	4/6.3

Table 2 describes that component O (100%) and component P (98.4%) had the highest filled and accuracy percentages, while component C was found to be the one with the lowest filled percentage (58.7%). The developed EBP title is the majority most accurate (93.7%).

Visual Art Accuracy in Illustrating the EBP Tittle Formula

Table 3. Frequency and Percentage of Visual Art Compatibility toward the PICO Formula (N=18)

PICO Component	Results	
	Accurate (n/%)	Inaccurate (n/%)
P - Population	15/83.3	3/16.7
I - Intervention	14/77.8	4/22.2
C - Comparison	8/44.4	10/55.6
O - Outcome	11/61.1	7/38.9
EBP Title Illustrated in the Visual Art	8/44.4	10/55.6

Table 3 shows that most of the drawn pictures are compatibly illustrates P (83%) and I (78%) components. At the same time, most component that was not illustrated in the drawn pictures was component C (55.6%). Among all of the drawn pictures, only 8 (44.4%) drawn pictures accurately illustrate the EBP title formula.

Figure 2. EBP title illustrated in the visual art from Group Two

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Nursing Students' Perspectives on PICO Games and Visual Art

Theme 1: Interesting, Unique, and Fun

The research results showed that the majority of participants felt happy when doing PICO Game activities. Participants stated that this method was interesting, unique, and creative. Below are a few statements provided by the participants:

"…PICO Game is interesting and wrapped in a creative concept." (Q1)

"We found that preparing PICO can be fun and includes a unique breakthrough to become an approach in preparing PICO for EBP later." (Q3)

"The activities are very interesting and also useful." (Q4)

"From attractive packaging, we learn to be able to remember..." (Q6)

"...one of the methods for compiling a PICO is more fun than using the method that we previously knew or got in lectures, just making it based on writing." (Q7)

"The PICO game is very exciting and wrapped in a unique concept." (Q8)

"The activity is very interesting and makes it easier..." (Q9)

Theme 2: Understanding and Insights about PICO and EBP

According to the interviews, the majority of participants indicated that the PICO Game might enhance their comprehension of EBP. Aside from that, several participants claimed that this sort of activity would allow them to enlarge their minds while discovering new knowledge. Participants' statements include the following:

"PICO Game can help understand the concept of EBP and PICO in the future." (Q1)

"...many interventions and outcomes from patients provide new insights for us so that we learn new things about each problem that can be done on patients." (Q6)

Participants reported that playing the game increased their interest in finding articles based on the PICO formula, which had been introduced during gameplay. Here are some statements from participants:

"...trying to find articles from the PICO results that have been obtained." (Q4)

"The thing that needs to be explored further in this program is related to the limitations that can be used as EBP." (Q5)

Theme 3: Improving Teamwork

Playing games in teams or groups can increase cooperation. Participants' statements include the following:

"Understanding the importance of teamwork as a means of sharing insight when working together." (Q2)

"Then the work between group members also makes us more enthusiastic about participating in this activity." (Q4)

Theme 4: Words that are Difficult to Understand

According to the findings of the study, the majority of participants had difficulty understanding the words that were offered. A participant also suggested paying closer attention to the terms used in the game. Participants stated the following statements:

"There were several interventions or words that were still difficult to understand or unfamiliar so that at first our group was confused..." (Q8)

"In the PICO Game itself there are several words that are quite confusing to put into PICO." (Q1)

"…hard to find the words to create the title EBP." (Q2)

Theme 5: Difficulty Determining Comparison Components

A number of participants expressed difficulties in determining appropriate comparison components during the gameplay. It is plausible that these difficulties arose from a lack of clarity in understanding the available terminology or challenges in integrating the terms into the PICO formula. Below are a few statements provided by the participants:

"There are a few obstacles because there is still confusion in determining the comparison part by the clues given..." (Q4)

"...limited knowledge of what is done in this activity and there are several interventions that are not very familiar so that sometimes it is difficult to find a balanced comparison with the interventions that will be carried out." (Q7)

"Difficulty in making appropriate comparisons." (Q9)

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Theme 6: More Time is Required

As per the feedback received from the participants, it has been observed that the PICO Game activities were accomplished within a short duration of time. It has been further revealed that owing to the time constraints, the participants were unable to complete the worksheet. Consequently, this led to a decrease in their enjoyment level while playing the game.

"But the time was limited which meant we could not able to fully enjoy the game." (Q3)

"...adjust to the clue given, especially in a short time." (Q4)

"...still adjusting to the conditions or because this is the first time formulating PICO based on a method like that so it takes longer." (Q7)

"The time provided to complete the PICO game is too short." (Q9)

DISCUSSION

This research aims to identify the accuracy of the PICO formula in the EBP title and visual art created by students as well as the perspective of students regarding the PICO Game and visual art. According to the findings of this study, the majority of PICO formulas formulated by participants satisfied each PICO component and fell into the right formula category. This might be because students learned about EBP and research procedures throughout their undergraduate studies. However, some students have trouble figuring out all PICO criteria, particularly factor C (Comparison).

The existence of component C has the potential to compare an intervention with an alternative standard (control), placebo (no intervention), or a model approach (Eldawlatly, Alshehri, Alqahtani, Ahmad, Al-Dammas, & Marzouk, 2018). Component C is an optional component because there may not be any other alternative for comparison. A study found that out of 59 clinical question formulas, only 3 of them included the comparison component. Based on participants' statements, they left component C blank because they were unsure how to make a suitable comparison (Huang, Lin, & Demner-Fushman, 2006). Another thing that might support this situation is that participants find it difficult to understand words that are medical terminology to improve this, one approach is to learn relevant terminologies and frameworks that can assist in formulating clinical questions (Speckman & Friedly, 2019).

The study revealed that the majority of the visual art mentioned by participants fell into the incorrect visual art category. Because of the limited time available in the game, participants can only complete one to two components to be illustrated. Currently, we are unable to determine the precise length of time that is needed to complete the drawing process. However, one study gave students 20 minutes to draw about nursing (Özkan, Kurt, & Bayram, 2022). Another study did not determine the time needed for students to draw about how they see themselves in nursing (Prosen, 2022). Furthermore, participants believed that the drawing techniques used in the design of PICO formulas were extremely beneficial for individuals with a visual learning style. Our findings are consistent with a study that found that visual arts instruction can improve health students' visual observation abilities (Klugman et al., 2011). Another study also discovered the same outcomes, finding that combining the arts with nursing education engaged students in developing new ways of thinking, facilitated transformational learning, and enhanced observation abilities (Rieger et al., 2016). Visual art encourages individuals to use their imagination to visualize ideas, ultimately increasing their confidence to experiment with new concepts (Barnes, 2015).

Most students stated that this game was a fun, unique, and interesting learning method to improve understanding and skills in formulating research questions or EBP titles in PICO format. This will help them find the best ideas or evidence to apply in EBP. These results are in line with research which found that most students believed that games were an interesting and fun method for building and strengthening skills for forming research questions in a searchable format (Milner & Cosme, 2017). The high level of student involvement in game-based EBP learning was illustrated by responses that state that they feel happy and challenged, resulting in a desire to continue learning (Davidson & Candy, 2016). A study found that implementing competitive learning techniques can enhance students' academic performance and elevate their engagement in the learning process (Corell, Regueras, Verdú, Verdú, & de Castro, 2018). This research shows that the pleasant feelings that arise during the learning process will trigger individuals to enjoy the process and get motivation to learn and improve their abilities.

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According to recent research, using games as a learning tool can promote teamwork among students. This finding is consistent with a study that found that undergraduate nursing students who participated in game-based teaching sessions were highly engaged, motivated, and experienced improved teamwork and relationships (Tavares, 2022). Another study also found that group play can effectively facilitate problem-solving through help-seeking among students, allowing them to collect insights from one another, thus expanding their knowledge base (Topçu, 2023). Encouraging teamwork allows every team member to showcase their knowledge and receive support from the group (Roman, Rodriguez-Arrastia, Molina-Torres, Márquez-Hernández, Gutiérrez-Puertas & Ropero-Padilla, 2019).

STRENGTH & LIMITATIONS

While this study found to be the first study that implemented PICO game and visual art as EBP learning method in Indonesian context, some limitations namely self-developed instruments, single setting, and non-experimental designs must be acknowledged.

CONCLUSION

The PICO game and visual art learning method facilitates high accuracy of the PICO question formula and is perceived as the effective, fun, and interesting EBP learning method. However, the fact that the C component was found to be the least completed component and a lot of the drawn pictures found incompatibly illustrate the PICO formula, the use of the PICO game and visual art as EBP learning needs some improvement to elaborate those issues. We also found that most of the participants reported that the duration was considered too short to finish the given task. Thus, a further stronger experimental study is highly required to clarify the effectiveness of this learning method.

ACKNOWLEDGEMENT

We are grateful to AIPNI for providing a research grant under the AINEC Research Award 2023 program so that we could conduct this research.

CONFLICT OF INTEREST

The authors of this article respectfully declare that there are no conflicts of interest about the research, authorship, and/or publication.

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