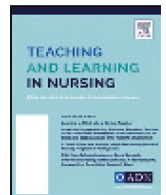




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Research

Effectiveness of EBPEPU (evidence-based practice educational program in undergraduate nursing education): a before-after study

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ABSTRACT

Background: The incorporation of EBP into practice remains a challenge of the nursing profession. Several studies highlighted the limited engagement of nursing students in utilizing evidence-based practice (EBP) and their difficulty in perceiving the relevance of scientific evidence in daily practice.

Aim: This study aimed to measure the acquisition of EBP skills among nursing students following the implementation of an innovative educational intervention that connected academic settings with training environments.

Methods: To assess the effectiveness of the educational intervention, a before-after study was carried out. The EBP Competency Questionnaire scale (EBP-COQ) was used to assess student's EBP competencies before and after the educational intervention, as well as at the end of their clinical training. A repeated-measures ANOVA was performed to compare the three tests' averages.

Results: After the educational intervention and upon completion of clinical training, students reported significant improvements in the subscales of competence, knowledge, and in the overall score.

Conclusion: Our results underline the importance of implementing teaching strategies to support students in acquiring EBP competences and empower them in decision-making.

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Background

Developing evidence-based practice (EBP) skills is crucial for nurses to safely and effectively take care for patients in all healthcare settings. The Institute of Medicine (IOM) in its report "Health Professions Education: A Bridge to Quality" (*Health Professions Education, 2003*) recognized EBP as one of the five essential competencies that healthcare professionals should possess and continually uphold throughout their professional career. Evidence-based nursing (EBN) was defined as a deliberate process where nurses integrate scientific research with their clinical expertise (*Vana et al., 2022*). When nurses strategize the nursing interventions, acquiring evidence is considered the foundation for making clinical decisions (*Wakibi et al., 2021*).

Recent findings indicate that registered nurses continue to face challenges in effectively integrating EBP into their daily practice

(*Maquibar et al., 2022*). To tackle these issues and provide a significant impetus to EBP, Universities, as the institutions responsible for training new nurses, can play a pivotal role. To ensure the acquisition of knowledge, skills, and attitudes connected with EBP diverse strategies and methods (i.e., gamification, peer teaching, and problem-based learning) were developed in academic settings to enhance nursing students' proficiency in effectively applying current best evidence to practice (*Hornthvedt et al., 2018; Rojjanasrirat & Rice, 2017; Sbaifi et al., 2018*). However, significant between-country differences have been noted in EBP skills among nursing students (*Labrague et al., 2019*). The observed differences may potentially be linked to factors such as the individual country's nursing educational system, the level of integration of EBP in nursing programs, the teaching strategies developed by nursing schools in EBP education, the duration of clinical training, and possibly the characteristics of the healthcare system of the single country. Moreover, several studies highlighted the limited engagement of nursing students in utilizing EBP and their difficulty in perceiving the relevance of scientific evidence in nursing practice (*Marcomini et al., 2022*). These issues are attributed to insufficient knowledge and skills, negative attitudes

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towards EBP, and inadequate support in clinical settings. Furthermore, limited literature has been found regarding educational interventions aimed at facilitating the acquisition of EBP skills in clinical learning environments (Marcomini et al., 2021). However, in order to enhance the skills necessary for applying the best available scientific evidence into practice, it is crucial to establish a strong integration between academic institutions and clinical environments (Bressan et al., 2016).

Therefore, this study aimed to measure the acquisition of EBP competencies among nursing students following the implementation of an innovative educational intervention that connected academic settings with clinical environments: the EBPEPU (Evidence-Based Practice Educational Program in Undergraduate nursing education).

Methods

Study design

A before–after study was conducted at the University of Brescia.

Participants and setting

EBPEPU was presented to a group of 44 third-year baccalaureate nursing students. Before and after the educational intervention in classroom, all the students returned the completed questionnaire. At the conclusion of the clinical internship, the completed questionnaires numbered 38. The research was approved by the Institutional Review Board of the University of Brescia. The students took part voluntarily in the pilot study and provided written informed consent of their participation.

The educational intervention

The COVID-19 pandemic forced universities to supplement in-person courses with distance learning activities (Kozlowski-Gibson, 2018). Thus, in 2020, an online educational intervention was designed to allow students to recognize, measure, and manage nursing-sensitive outcomes (NSO) through the use of scientific evidence. The term "nursing-sensitive outcome" was first introduced by Maas et al. (1996) and has since been widely agreed to cover any change in a patient's status, behaviour, or perceptions associated with a nursing intervention. NSOs are relevant outcomes of nursing care, for which there is empirical evidence of efficacy that demonstrates the correlation between nursing care and patient outcomes. NSOs are categorized into various domains, including pressure injuries, failure to respond, mortality, accidental falls, care-related infections, restraint use, self-care, nursing satisfaction, errors in drug administration, communication and perceived quality (Doran, 2011).

EBPEPU was structured based on Kolb's theoretical framework (2000) and it was carried out over 15 hours. To design the educational activity, a team consisting of experts in methodology and content convened in a consensus meeting. The team comprised four members including an associate professor, two PhD students in nursing science, and a clinical nurse.

The educational intervention aimed to help students achieve the following objectives: (a) gain familiarity with the characteristics of a scientific paper, (b) formulate a clinical question, (c) conduct searches in major electronic databases, (d) understand the concept of NSO, and (e) identify evidence-based strategies to achieve NSOs.

Through an online learning platform, educators refreshed student knowledge about how to use scientific databases (i.e., strategies for constructing research questions and a search query, and methods of consulting scientific databases). Then, students were asked to create assessment tools for monitoring NSOs and document nursing interventions taken by clinical nurses during three periods of training (a

total of 650 hours of clinical internship). The internship guides were informed of the contents and objectives of the study through an hour-long online meeting.

Students were divided into six groups, each consisting of seven participants. Each group had to monitor the NSOs and the interventions taken by clinical nurses through the implemented tools using an Excel spreadsheet. Specifically, the students had to report in the spreadsheet the following aspects: (a) whether nursing interventions necessary to avoid a complication or an adverse outcome had been put in practice by nurses, (b) the prevalence of any occurrence of a complication and/or adverse outcome related to nursing care during the monitoring period, and (c) any practices not evidence-based observed. Data collection was carried out by students only to avoid influencing the results. Students were then asked to synthesize the results with frequencies and percentages. Each student could monitor up to a maximum of two outcomes in each period of training.

In the end, students were engaged in a guided reflection on the activity. One of the author (RP) guided the critical reflection in classroom. Students were asked to explain in plenary the results of the monitoring. Particular emphasis was given to nursing activities observed that deviated from best practice and the prevalence of complications and/or adverse outcomes. Nurse educator then led the student to reflect through stimulus-based questions on how clinical practice could be improved.

Data collection

The socio-demographic characteristics of the sample (i.e., gender and age) were collected. Students' EBP competencies were measured before (T0) and after (T1) the educational intervention, as well as at the end of their clinical training (T2). The EBP Competency Questionnaire (EBP-COQ; Finotto & Garofalo, 2020) was used for that purpose. The scale measured students' perceptions of their evidence-based competencies across three subscales: competence, knowledge, and attitude. The EBP-COQ was composed by 25 items with response options on a five-point Likert scale. Higher scores represent higher levels of EBP competencies.

Three open-ended questions were also administered at the end of the educational activity to collect students' feedback about EBPEPU and assess their satisfaction. The questions presented to the students were as follows: (a) Are you satisfied with the educational intervention? (b) Was the educational intervention helpful in acquiring EBP competencies?, and (c) What suggestions do you have to improve the educational intervention?

Data were collected anonymously through the online platform Moodle.

Statistical analysis

Central tendency and dispersion measurements were used to describe the sociodemographic characteristics of the sample. The Kolmogorov–Smirnov and Shapiro–Wilk tests, as well as graphical evaluation, were used to assess normality. A repeated-measures ANOVA was performed to compare the three tests' averages. A database was constructed in Microsoft Excel and statistical analyses were conducted using IBM SPSS V.26.0. The statistical significance level used was 5%. The qualitative data were analysed and interpreted using a content analysis approach (Kerr et al., 2010). A four-step process was followed. First, students answers were read several times to acquire a sense of the whole. Second, codes were generated by reading the texts word by word. Third, codes were grouped into subcategories based on their similarities and differences. Fourth, the subcategories were organized into main categories based on their commonality.

Results

The students had an average age of 24.24 ± 2.3 . The majority of the students were female (96%). Tables 1 summarize the average scores obtained by the sample for each EBP-COQ item and subscale.

The lowest average scores were observed at all three time points in the knowledge subscale. Conversely, the highest average scores were observed in the attitudes subscale. After the educational intervention in classroom (T1), students reported an increase in competence ($F_{(1,43)} = 25.369$, $p < 0.001$), knowledge ($F_{(1,43)} = 27.095$, $p < 0.001$), and in the overall score ($F_{(1,43)} = 28.886$, $p < 0.001$). The attitudes subscale did not reveal a significant increase ($F_{(1,43)} = 3.834$, $p = 0.057$). After clinical data gathering periods students reported improved attitudes ($F_{(1,37)} = 9.407$, $p < 0.001$), competence ($F_{(1,37)} = 15.070$, $p < 0.001$), knowledge ($F_{(1,37)} = 16.127$, $p < 0.001$), and overall score ($F_{(1,37)} = 13.250$, $p < 0.001$).

The students stated that they were satisfied with the activity because it allowed them to strengthen skills concerning EBP competence. However, they gave suggestions to improve the educational intervention. Table 2 synthesises the main themes and sub-themes of nursing students' experiences with the educational activity.

Discussion

Our study has shown that the involvement of third-year nursing students in EBPEPU led to a notable enhancement in their overall proficiency in EBP, their positive outlook towards EBP, and their grasp of EBP-related knowledge and skills. Qualitative data revealed that the educational activity was generally well-received by the students, who were largely satisfied by it. However, the sample identified room for improvement linked to online teaching, which did not always allow for direct interaction with nurse educator and between course mates. Students also reported that the activity warranted more teaching hours.

Guided reflection supported the students to identify gaps in real-world clinical practice and find possible solutions.

The present body of literature on EBP educational interventions designed for nursing students exhibits diversity in terms of time frame, educational strategies, and whether they employ a single approach or a combination of approaches (Horntvedt et al., 2018; Patelarou et al., 2020).

According to Llasus et al. (2014) the translation of EBP contents from education to clinical practice is a challenge; the enhancement of EBP attitudes occurred when there is an efficient integration between theory and clinical practice. The mere provision of knowledge through classroom instruction is insufficient in adequately equipping nursing students to effectively apply evidence within clinical environments (Chang & Crowe, 2011). Knowledge, skills, and attitudes were significantly improved when EBP was contextualized within the clinical environment, leading to encouraging learning outcomes (Horntvedt et al., 2018; Rojjanasrirat & Rice, 2017; Sbaffi et al., 2018). However, previous findings highlighted that in clinical learning environments students are not able to observe the application of EBP skills; clinical nurses may encounter difficulties in accessing biomedical databases during work shifts due to the limited availability of time, lack of technological resources or insufficient competence (Palese et al., 2019). Thus, further efforts should be made to implement educational strategies combining theory and practice to increase EBP skills and attitudes especially in contexts characterized by limited availability of economic resources.

Our findings support the need to continue evaluating EBP competencies, to make students able to shape their decisions based on the best evidence available. The study may provide support to nurse educators in creating opportunities for acquiring EBP competencies within university programs. Future studies are necessary to test the teaching strategy in diverse contexts and enable cross-national investigations. It would be highly desirable to conduct studies to understand which characteristics

Table 1
Mean scores of EBP-COQ items and subscales

	T0 (n = 44)		T1 (n = 44)		T2 (n = 38)	
	M	SD	M	SD	M	SD
Attitudes						
The EBP helps with making decisions in clinical practice	4.52	0.59	4.45	0.70	4.42	0.79
I am confident that I will be able to critically evaluate the quality of a scientific article	2.95	0.99	3.50	0.63	3.53	0.86
The practice of EBP will help us have a better definition for the role of nurses	4.05	0.61	4.16	0.83	4.11	0.80
Nursing contracts should include time to read scientific papers and make a critical appraisal of them	3.93	0.82	4.18	0.84	4.03	0.97
Widespread EBP implementation will allow an increased nursing autonomy from other professions	4.25	0.72	4.27	0.69	4.21	0.87
When I work as a nurse, I am pleased if an EBP is in practice	4.09	0.83	4.32	0.74	4.16	0.97
The application of EBP improves patients' healthcare outcomes	4.30	0.63	4.55	0.55	4.39	0.79
In the future, I wish to contribute to applying the EBP	3.34	1.01	3.70	0.98	3.47	1.11
I do not like reading scientific articles	4.11	1.10	4.11	1.02	4.18	1.11
Patient care will undergo minor changes with the application of EBP	3.91	0.96	3.98	1.11	4.03	1.26
It pleases me that the EBP is only a theoretical movement that does not take place in practice	4.00	1.16	3.93	1.15	4.26	1.03
If I have the opportunity, I will undertake an EBP course	3.59	1.02	3.50	1.05	3.47	0.83
Mean score of Attitudes subscale	3.95	0.49	4.05	0.55	4.32	0.64
Knowledge						
I feel able to ask a clinical question to start searching for the best scientific evidence	3.14	0.82	2.41	0.82	2.42	0.76
I do not feel able to search for scientific evidence in the principal health sciences databases	2.75	1.01	3.64	0.84	3.66	1.05
I do not feel able to search for scientific information about a subject in the most important bibliographic indexes	2.73	0.85	3.73	0.87	3.71	1.04
I feel able to critically evaluate the quality of a scientific article	2.61	0.87	3.25	0.61	3.13	0.84
I do not feel able to analyze whether the obtained results of a scientific study are valid	2.89	0.78	3.20	0.90	3.53	1.11
Mean score of Knowledge subscale	2.85	0.46	3.28	0.35	3.31	0.49
Competence						
I know how to make clinical questions organized in the PICO format	3.50	0.82	3.84	0.78	3.74	1.00
I know the principal sources that offer the revised and catalogued information behind the evidence	3.25	0.81	3.82	0.79	3.74	0.79
I do not know the most important characteristics of the principal investigation designs	3.23	0.77	3.48	0.90	3.66	1.15
I know the different evidence levels of the designs of the investigation studies	3.00	0.81	3.80	0.70	3.53	0.83
I do not know the different recommendation grades regarding the adoption of a determined procedure or health intervention	3.09	0.80	3.50	1.05	3.55	1.20
I know the principal measures of association and potential impact that allow us to evaluate the magnitude of the analyzed effect in investigation studies	3.05	0.86	3.66	0.96	3.71	0.96
Mean score of Competence subscale	3.19	0.50	3.68	0.56	3.65	0.59

Table 2

Three overview over the main themes and sub-themes of nursing students' experiences with EBPEPU

Themes	Sub-themes
The educational intervention promoted EBP skills and knowledge	Discovering practical challenges Applying knowledge to the performance of activities Creating and using monitoring tools Positive change of attitude Applying quality improvement competencies
Room for improvement linked to the educational intervention	Few time dedicated to the educational activity Difficulty in interacting with the teacher during the online lesson

of clinical settings most significantly impact the acquisition of EBP competencies by nursing students.

The current investigation is subject to various limitations. Primarily, caution should be exercised in generalizing the results due to the small sample size. Additionally, the findings are indicative of the unique features of the nursing programs under consideration and may not accurately represent all nursing programs in Brescia.

Declaration of competing interest

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CRedit authorship contribution statement

Roberta Pandoni: Conceptualization, Methodology, Writing-Original draft preparation, Resources. Ilaria Marcomini: Conceptualization, Data curation, Writing-Original draft preparation, Visualization. Mattia Bozzetti: Conceptualization, Writing-Original draft preparation, Visualization, Investigation, Formal Analysis. Paolo Carlo Motta: WritingOriginal draft preparation, Supervision.

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