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Promoting Critical Care Nurses' Information Literacy Through an Evidence-Based Practice Workshop: A Quasi-Experimental Study

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Abstract

Background: Advanced nursing practice necessitates using research findings and evidence as well as effective clinical decision making. The use of evidence in nursing practice is not only a duty, but also a professional responsibility and practice.
Objectives: The current study aimed at assessing the effects of an evidence-based practice training workshop on the information literacy of critical care nurses.
Methods: The current 2-group, pretest-posttest, quasi-experimental study was conducted in 2016. A convenient sample of 90 critical care nurses was selected. Nurses were non-randomly allocated to a control and an experimental group 45 subject each group. An 8-hour evidence-based practice training workshop was held in 2 consecutive days for nurses in the experimental group, while nurses in the control group received no evidence-based practice training. A researcher-made valid and reliable questionnaire was used to measure the information literacy in nurses. The collected data were analyzed using the SPSS software version 19, and via running the Fisher exact, the paired- and independent-sample t tests.
Results: At baseline, the mean score of information literacy in the control group did not differ significantly from that of the experimental group (9.668 ± 5.11 vs. 8.84 ± 4.37; P value = 0.40). After the study, these values increased to 10.51 ± 5.03 and 23.75 ± 3.07, respectively. Intergroup differences regarding the posttest information literacy score was statistically significant (P value < 0.001).
Conclusions: The evidence-based practice training significantly promotes the information literacy in critical care nurses and paves the way for the use of evidence in their clinical practice.

Keywords: Nurses, Care, Evidence-Based Practice, Information Literacy

1. Background

Intensive care unit (ICU) is the heart and a main component of a clinical care setting. Due to the urgent conditions of patients who are hospitalized in ICUs, critical care nurses need to have great professional knowledge and experience, great clinical competence, and great abilities in working with the sophisticated equipment. In critical care units, high-quality critical care, high-tech equipment, competent critical care staff, and effective group decision making facilitate critically-ill patients' recovery (1). Studies showed that high-quality critical care can reduce mortality rate in ICUs by 28% to 30% (2).

Knowledgeable and skillful critical care staff is a key component to high-quality critical care delivery. Critical care staff, particularly nurses, need to manage unpredictable critical situations and thus, they need to have adequate professional knowledge and skills (3). To keep themselves up-to-date and develop their profession, nurses need to read the latest research findings. Consequently, considerable attention is paid to the evidence-based practice (EBP); ie, the use of most appropriate scientific evidence, clinical expertise, and patients' preferences (4). The use of evidence in nursing practice is not only a duty, but also a professional responsibility and practice (5). EBP helps nurses have the best clinical practice and thereby, improves the quality and effectiveness of nursing care services (6).

Evidence-based nursing is defined as the systematic process of decision making about patient care through the existing evidence that includes the assessment and appraisal of the quality and practicality of research findings, patients' preferences, and healthcare professionals' clinical expertise (7).

Nurses who base their practice on the scientific evidence and documents, make wiser decisions, provide care services with higher quality, shorten patients' hospital stay, lower their healthcare costs, and improve care and organizational effectiveness. Moreover, they have greater professional accountability, greater self-confidence, and

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firmer professional identity. Consequently, healthcare authorities and policy-makers recently pay special attention to EBP as a mean of promoting care standards and improving care quality (8, 9).

Studies showed that nurses have difficulties in following the EBP. For instance, Thiel and Ghosh found that although nurses had positive attitudes toward EBP, 72.5% of them obtained their necessary information from their peers and colleagues and just 24% referred to the cumulative index to nursing and allied health literature to find answers to their questions (10). A group of Australian occupational therapists also found that 96% of nurses based their clinical decisions on their own clinical experiences rather than research findings. They also reported that more experienced nurses less frequently used the theoretical academic knowledge. In other words, the use of theoretical knowledge was negatively correlated with the work experience (11). Ruth et al., also studied 663 neonatal care nurses and found that only 53% of them had access to the Cochrane library, out of which only 38% used the library and 81% to 88% were interested in attending EBP courses (12).

Studies revealed that the main barrier to nurses in using scientific evidence was their unfamiliarity with search strategies, scientific databases, and critical appraisal of published documents (8, 9). Consequently, most previous studies pointed to nurses' need to obtain information on searching scientific databases as well as the necessity to use recent research findings to improve patients' outcomes. These studies also highlighted that careful planning was needed to improve the information literacy in nurses and turn them into the active users of evidence (4-9).

Previously, literacy referred to reading, writing, and calculating the abilities. However, in the present era, the meaning of literacy has changed due to the information technology advancements, generation and distribution of a wide variety of data, development of numerous databases and networks, and humans' greater need for information (13).

2. Objectives

The importance of using the latest research findings in clinical nursing practice, the information literacy of nurses, and particularly critical care nurses is a serious issue in the nursing profession. The critical care nurses' need for information literacy and EPB-related information is much more than those of other groups of nurses, due to the greater sensitivity of working in ICUs and the urgent conditions of critically-ill patients. The current study aimed at assessing the effects of an EBP training workshop on the information literacy of critical care nurses.

3. Methods

The current 2-group, pretest-posttest, quasi-experimental study was conducted in 2016. Study population comprised all the critical care nurses who worked in 2 military hospitals in Tehran, Iran. One of the hospitals had the equipment and facilities needed to implement the study intervention including an adequate number of personal computers as well as internet access. Thus, the critical care nurses in this hospital were purposively allocated to the experimental group, while the critical care nurses of the second hospital were allocated to the control group. Sampling was also done conveniently. Sample size was calculated using the mean scores of information literacy reported by Esfandiary-Moghadam and Kashi-Najafali (14) with a type I error of 0.01 and a power of 95%. Consequently, the sample size formula (Equation 1) indicated that 25.76 nurses were needed for either of the study groups. In order to compensate nurses' probable withdrawal from the study, it was planned to recruit 29 nurses in each group. However, as the baseline mean score of information literacy in the experimental group was significantly lower than that of the control group, sampling was continued until recruiting 45 nurses in each group. There was no significant difference between the 2 groups regarding the mean score of information literacy. Sample size calculation formula (Equation 1).

$$\begin{aligned} n &= \frac{\left(S_1^2+S_2^2\right)^2\left(Z_{1-\frac{\alpha}{2}}+Z_{1-\beta}\right)^2}{\left(\overline{x}_1-\overline{x}_2\right)^2} \\ &= \frac{\left(56.71^2+52.38^2\right)\left(17.84\right)^2}{\left(226.05-161.81\right)^2} \\ &= 25.76 \end{aligned} \tag{1}$$

Eligibility criteria included holding bachelor's or higher degrees in nursing, having an ICU work experience of 5 years or more, securing no double-employment in both the experimental and control hospitals, and acquiring an information literacy score of less than 24.5. Nurses were excluded if they changed their working ward or voluntarily withdrew from the study.

Data collection tool consisted of 2 questionnaires namely a demographic and an information literacy questionnaire. The first consisted of items such as age, gender, educational and marital status, ICU work experience, and the history of attending any EBP course. The second contained items on nurses' information literacy. The literature review revealed that at the time of the study, there was no valid and reliable questionnaire to measure the information literacy of nurses; consequently, an information literacy questionnaire was initially developed based

on the Siamak and Davarpanah information literacy questionnaire (15). They developed a 55-item questionnaire to measure the information literacy of library and scientific information in students. However, as the present study dealt with the information literacy of nurses, the questionnaire was not appropriate for the purpose of the current study. Consequently, their questionnaire was used to develop a nurse-oriented information literacy questionnaire. The designed questionnaire consisted of 26 four-option multiple-choice questions, out of which, 20 questions had just 1 correct answer, 3 questions had 2 correct answers, and 3 questions had 3 correct answers. Correct and incorrect answers were scored 1 and 0, respectively. Therefore, the total score of the questionnaire ranged from 0 to 35. To assess the qualitative face validity of the questionnaire, authors personally interviewed 10 critical care nurses about the difficulty, appropriateness, and clarity of the questions. Questions that they considered as difficult or unclear were reworded or amended according to their comments. Besides, the content validity of the questionnaire was assessed through asking 12 nursing and instrument development experts to comment on its content, wording, word choice, item placement, and scoring. Their comments were used to amend the questionnaire. On the other hand, the reliability of the questionnaire was evaluated using the test-retest method. Accordingly, 15 nurses who were independent from the study participants were asked to complete the questionnaire twice. There was a strong correlation between the test and the retest scores ($r = 0.97$; P value < 0.001). Internal consistency assessment also revealed that the Cronbach's alpha of the questionnaire was 0.86.

4. Intervention

Nurses in the experimental group received EBP training through a 2-day workshop. In order to develop the content of the workshop, authors reviewed EBP and evidence search textbooks and documents, attended several EBP workshops and congresses, and consulted several EBP experts. The developed content was frequently reviewed and revised. Finally, a course design was developed for the 2-day workshop. Then, PowerPoint presentations and educational pamphlets were provided to present theoretical training materials to the participants. After that, necessary permissions were obtained from Baqiyatallah and AJA Universities of Medical Sciences, Tehran, Iran.

In the study setting, an opening session was initially held for the nurses of each hospital to inform them about the aims of the study and also ask them to complete the demographic questionnaire and sign the informed consent. One week before holding the workshop for the nurses in the experimental group, nurses in both groups were invited to complete the information literacy questionnaire. Then, the 2-day workshop was held for nurses in the experimental group.

The 2-day EBP training workshop was almost the same as the workshop that Taheri et al. held for 24 nursing students (16). The workshop in each day included two 2-hour theoretical and practical training sessions. The first session of the first day was related to EBP, designing a clinical question or problem, searching relevant resources, and critically appraising the retrieved documents. Training was provided both verbally and through several pamphlets. In the second 2-hour session of the first day, participants were divided into 9 small groups each of 5 persons and were provided with a scenario about "pressure ulcer prevention in ICU". Then, they were asked to exercise the training provided in the first session through group discussion and team work. Accordingly, they initially held a group discussion to identify the main problem and develop the main question. Then, they determined several search keywords and started searching online databases. Nurses in each group printed the results of their online searches and provided the printed documents. Finally, the groups critically appraised the retrieved documents. On the second day, the contents of the first day workshop were reviewed and nurses were provided with a new scenario about "the newest treatments for pressure ulcer in ICU". They were asked to work on the scenario in the same way as they did on the first day. Finally, participants' questions were answered and they were invited to recomplete the information literacy questionnaire. Nurses in the control group received no EBP training. They completed the study questionnaire in the same manner as the nurses in the experimental group did.

The collected data were analyzed using the SPSS software version 19. Initially, the Kolmogorov-Smirnov test was run to compare the distributions of the study variables with the normal distribution. The results of the test showed no significant different between the variable distribution of the study and the normal distribution. Accordingly, parametric statistical tests such as Chi-square, the paired- and independent-samples t, and the Fisher exact tests were employed for the intra- and intergroup comparisons. Data description was also done using the measures of descriptive statistics such as mean, standard deviation (SD), as well as raw and relative frequencies.

The current study was approved by the ethics committee of AJA University of Medical Sciences (code: A.J.9175.37). As the authors were affiliated to AJA University of Medical Sciences and the experimental hospital was affiliated to Baqiyatallah University of Medical Sciences, an agreement was signed between the universities to conduct the study.

Moreover, necessary permissions were obtained from the authorities of both universities. It was tried to adhere to the contents of the "declaration of Helsinki: ethical principles for medical research". For this purpose, the aim of the study was explained to the participants, and their written informed consent was obtained; the subjects were free to voluntarily participate in or withdraw from the study, and they were assured about their access to the study findings.

5. Results

Most nurses in the control and the experimental groups were female (51.1% and 57.7%, respectively), married (53.3% and 57.7%, respectively), and held bachelor's degree in nursing (93% and 95%, respectively). The means age of the participants in the experimental and control groups were 33.95 ± 5.7 and 34.2 ± 5.6 years, while the means of their ICU work experience were 10.2 ± 4.6 and 4.9 ± 3.6 years, respectively. None of the subjects had already participated in EBP training courses. The results of the Fisher exact and the independent-samples t tests indicated no significant difference between the groups regarding nurses' gender, marital and educational status, age, and work experience (P value > 0.05; Table 1).

Table 1. Demographic Characteristics of the Study Participants

Variables	Groups		The Fisher Exact Test Results
	Experimental N (%)	Control N (%)	
Gender			
Female	26 (57.7)	23 (51.1)	P value = 0.672
Male	19 (42.2)	22 (48.8)	
Marital status			
Single	19 (42.2)	21 (46.6)	P value = 0.832
Married	26 (57.7)	24 (53.3)	
Educational degree			
Bachelor's	43 (95.5)	42 (93.3)	P value = 1
Master's	2 (4.4)	3 (6.6)	
	Mean (SD)	**Mean (SD)**	**The results of the independent-samples t test**
Age (year)	34.2 (5.6)	33.97 (5.7)	T = 204.0, P-value=839.0
Work experience (year)	4.9 (3.6)	10.2 (4.6)	T = 920.0, P-value = 360.0

At baseline, there was no significant differences regarding the mean score of information literacy between the study groups (P value = 0.40). However, after implementing the study intervention, the difference between the study groups was statistically significant (P value < 0.001). Moreover, in the control group, the posttest value of information literacy did not differ from the pretest value (P value = 0.82), while in the experimental group, the posttest value of information literacy was significantly higher than that of the pretest value (P value < 0.001).

6. Discussion

The current study aimed at assessing the effects of an EBP training workshop on the information literacy of critical care nurses. Baseline mean scores of information literacy in the control and experimental groups were respectively 9.68 ± 5.11 and 8.84 ± 4.37, indicating the limited information literacy of nurses at baseline. These findings highlighted the necessity of EBP training to promote information literacy in the critical care nurses. Similarly, Dehghani et al., reported that although the participating nurses adopted positive attitudes towards EBP, most of them had poor knowledge and practice in the area of EBP (17). Shahidifar also found that the participating nurses had limited knowledge about EBP for the ventilator-associated pneumonia prevention (18).

The results of the present study showed the significant increase in the mean score of information literacy in the experimental group after holding the 2-day EBP training workshop. However, the mean score of information literacy in the control group did not change significantly. These findings denoted that the 2-day EBP training workshop significantly promoted the information literacy in the critical care nurses. In line with the current study findings, Kessenich et al., also found that incorporating EBP training into the nursing research course significantly improved their perceptions regarding research papers (19). Wyned also developed and offered a 16-week evidence-based critical care course for junior and senior nurses and found that it effectively broadened and stabilized their knowledge on critical care nursing (20). Similarly, Nelson et al., reported the effectiveness of their evidence-based curriculum module to enhance nursing students' and instructors' knowledge on the safe patient handling and movement (21). Besides, Nohee et al., found that EBP training improved nurses' decision-making ability (22).

6.1. Conclusion

The current study findings showed that EBP training significantly promoted the information literacy of critical

Table 2. Intra and Intergroup Comparisons Regarding the Information Literacy in the Study Subjects

Group	Time				The Results of the Paired-Samples t T
	Before		After		
	Mean	SD	Mean	SD	
Control	9.68	5.11	10.5	5.03	T = 2.68, P = 0.82 df = 44
Experimental	8.84	4.37	23.7	3.07	T = 17.6, P < 0.001, EF = 3.93, df = 44
The results of the independent-samples t test	T = 0.842, df = 88, P value = 0.402		T = 15.05, df = 88, P value < 0.001, EF = 3.2		

care nurses and facilitated their use of evidence in their clinical practice. Discussing and working on clinical cases in EBP training workshops paved the way to improve information literacy and professional knowledge in nurses. Thus, holding such workshops is suggested to promote information literacy and improve care quality in the critical care nurses, and enhance patients' and nurses' satisfaction. A prerequisite to promote nurses' EBP and information literacy is the availability of adequate facilities and infrastructures. Therefore, healthcare authorities are recommended to equip hospitals with an adequate number of personal computers and broad-band internet. Additionally, incorporating EBP training courses into nursing curricula and in-service training programs can help to promote information literacy in nursing students and nurses and facilitate their use of evidence in their daily clinical practice.

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Footnotes

Authors' Contribution: Kobra Esfandani: searching, data collection, and writing the manuscript; Amir Hossein Pishgooei: data analysis; Shahla Aliyari and Abbas Ebadi: study design, data collection, and writing the manuscript.

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References

1. Tofigee S, Naseree H, Meskarpoor M. Justice in Distribution critical care beds in Iran fromLorenzcurve (in Persian). *Iran J Quarterly Med scientific university Lorestan.* 2011;**12**(75):56–62.
2. Zali A. The secend International Congress critical care. national library Tehran (in Persian). *Erna Tehran news.* 2015.
3. Noroozi A, Moshri E. The relationship between physical and human resources in the intensive care units and patients mortality rate in hospitals of markazi province's. *Arak Med Univ J.* 2007;**12**(2):9–29.
4. Ghanbari A, Rahmatpour P, Salehzade AH, Pasban M. Nurses' perceptions about facilitators and barriers of implementation of evidence-based practice Chehrzad MM1 (in Persian). *Social Determinants of Health Research Center, Guilan University of Medical Sciences, Rasht, Iran.* 2015;**2**(17):50–65.
5. Susan J, Wells Lani M, Merritt Harold E, Wells Lani M. Bias racism and evidence based practice:thecase formore focused development of the child welfare evidence base. *Children YouthServReview.* 2009;**31**(11):7–16.
6. Mosavi A. Fundamental and principles of management in nursing. 2nd ed. Tehran: Teimorzadeh; 2005.
7. Sackett D, Straus S, Richardson W, Rosenberg W, Haynes R. Evidence-basedmedicine.how to prac tice and teach EBM. 2nd ed. Edinburgh: Churchill Livingston; 2000.
8. Adib-Hajbaghery M. Factors facilitating and inhibiting evidence-based nursing in Iran. *J Adv Nurs.* 2007;**58**(6):566–75. doi: 10.1111/j.1365-2648.2007.04253.x. [PubMed: 17442028].
9. Sharif Moghadam H, Salami M, Narimani MR, Razmkhah M. The rate of information literacy of faculty members and phd students of faculty of nursing and midwifery based on successful evidence healthcare (in Persian). *JNE.* 2016;**4**:60–6.
10. Thiel L, Ghosh Y. Determining registered nurses' readiness for evidence-based practice. *Worldviews Evid Based Nurs.* 2008;**5**(4):182–92. doi: 10.1111/j.1741-6787.2008.00137.x. [PubMed: 19076919].
11. Rostas A. Barriers to using research evidence in nursing practice. *JAdv Nurs.* 2000;**31**.
12. Martis R, Jacqueline H, Caroline A. Survey of knowledge and perception on the access to evidence base practice and clinical practice change among maternal and infant health practitioners in South. *BMC Pregnancy Childbirth East Asia.* 2008;**5**(8):31–42.
13. Habibi S, Rezaei Hachesoo P, Tabag R. Enhancing information literacy as a base of developing evidence-based nursing (in Persian). *Health Inform Manage.* 2010;**7**(3):50–62.
14. Esfandiary Mogadam A KNV. A effect information technology on the information literacy studying at Hamedan. *Discipline info service.* 2011;**1**(1):25–38.
15. Siamak M, Alipour Nodoushan K, Khalighi N. Measurement of the Information Literacy Level in the Students of Qom University of Medical Sciences during 2010-2011. *Qom Univ Med Sci J.* 2013;**7**(1):23–30.
16. Taheri H, Mirmohammad Sadeghi M, Adibi L, Ashourioun V, Sadeghizadeh A. Theeffect of anevidence based medicine workshop on undergraduate medical students' skills inapplyingEBMIranian. *J Med Educ.* 2006;**6**(2):70–81.

17. Dehghani H, Heidari F, Karimian Kakolaki Z, Salimi T. Critical Care Nurses' knowledge, attitude and practice in Yazd University of Medical Sciences' Teaching Hospitals on Evidence-Based Nursing (in Persian). *Community Health J.* 2014;**8**(2):30–7.
18. Shahidi Far S. Evaluation of critical care nurses' knowledge of evidence-based guidelines for prevention of ventilator-associated pneumonia (in Persian). *J.A.N.F.* 2015;**2**(1):29–36.
19. Kessenich C, Guyat G, Diceno A. Teaching nursing student evidence based nursing. *Nurse Educator.* 1997;**22**(6):40–52.
20. Wyned C. Evidence based education and the evaluation of a critical care course. *J ContiniunigEduc Nurs.* 2007;**2**(5):33–9.
21. Nelson AL, Waters TR, Menzel NN, Hughes N, Hagan PC, Powell-Cope G, et al. Effectiveness of an evidence-based curriculum module in nursing schools targeting safe patient handling and movement. *Int J Nurs Educ Scholarsh.* 2007;**4**:Article26. doi: 10.2202/1548-923X.1486. [PubMed: 18171323].
22. Nohee E, Abdolahyar A, Fasehi Harandi T. Evaluation determine staff nursing afterevidence base nuresing education kerman Hospital univercity (in Persian). *Archive of SID2 nd ed Edinburgh.* 2014;**11**:35–41.