

The Effectiveness of Evidence Based Practice Education in Nursing Students Based on Rogers's Diffusion of Innovation Model

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Abstract: It is crucial to employ approaches that bring evidence-based practice (EBP) into clinical setting but nursing instructors have many challenges to find the effective teaching approach to it. Present study investigated the effectiveness of EBP education in nursing students based on Rogers's Diffusion of Innovation Model. A quasi-experimental design was used to evaluate nursing students' knowledge, attitude and adoption of EBP in order to know effectiveness of teaching strategy. The target population was all nursing students at the faculty of nursing and midwifery who are studying at the community health nursing (n=80). They are assigned randomly to experimental group (n=40) and control group (n=40). The experimental group underwent EBP education based on Rogers's Model where as control group received traditional approach. Both groups were compared before and after intervention. Data were gathered by surveys, which included demographic questionnaire and knowledge, attitude and adoption of EBP. The results showed that there was a significant difference in the mean scores of knowledge, attitude and adoption of EBP between the experimental and control groups ($P<0.05$) after intervention. A statistically significant association was found between knowledge, attitude and adoption of EBP with age, GPA and familiar with EBP ($P<0.05$). EBP Education based on teaching strategy of Rogers's model lead to improved knowledge, attitude and adoption of EBP. All the necessary steps for better adoption are included in this educational approach which can be used to teach any new subject like EBP.

Key words: Evidence based practice • Education • Nursing students • Rogers's Diffusion of Innovation

INTRODUCTION

Evidence based practice (EBP) is the careful, explicit and judicious use of current best evidence in making decisions about the care of the individual patient [1]. The paradigm of EBP was formed in the past two decades and expanded in response to the needs of the society and patients for professional encounter [2]. Nowadays, experts believe that EBP enhances the patient's outcomes, lowers health costs and decreases errors in addition to offering a stable approach to provide quality care at reasonable costs [3-6]. Moreover, EBP is essential for

solving clinical problems and remaining up-to-date. It is accepted as an appropriate approach for health care provision [1,7-9].

Therefore, it is important for health care professions as nurses, because they are the vital members and probably leaders of the health care teams, to be able to use evidence in executing interventions to provide patients with quality and optimal health care [1-10].

However, many nurses are unable to determine, interpret and apply the best evidence in their practice [10-12]. Therefore, there has been a lot of emphasis on teaching EBP skills in the nursing curricula [7-13], because

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using the best scientific EBP is the bridge for existing gap between research and practice [6-14]. In other words, nursing faculties need to integrate concepts of EBP into their curricula to prepare graduates to practice evidence-based patient care [15-17]. Moreover, they should make life-long commitment to critically analyze nursing practice considering scientific advances [4].

Nevertheless, nursing instructors have many challenges when it comes to finding the most effective teaching approach to prepare nurses for EBP [12-18]. Creative approaches are currently being used to help students obtain required EBP skills [6]. Although available literature in the field of nursing education have discussed different approaches, many of them remain academic exercises and fail to make necessary changes in real practice of the nurses. Therefore, it is crucial to employ approaches that bring education into the clinical setting and result in changes in the nursing practice [4]. Since Rogers's diffusion of innovation (DOI) model includes all the necessary steps to accept an event [19], this model was chosen as the theoretical framework of current research.

Different approaches have been used to teach EBP including workshop [20-23], seminar, journal club [24-26], computer based educational modules [27], distant learning, DVD, didactic classroom teaching [28], role modeling [29], etc. So, requiring the students to find articles pertinent to the clinical or seminar topic, critique the article and determine its usefulness in answering a clinical question has been recommended by many [30-32].

In a systematic review performed by Coomarasamy and Khan (2004)[33], it was concluded that most teaching approaches for EBP changed knowledge while attitude and behavior remained unchanged.

Teaching of evidence based should be moved from classrooms to clinical practice to achieve improvement in substantial outcomes. Therefore, In the current research, EBP was considered as an innovation and was taught using the DOI model. DOI model includes innovation-decision process (teaching strategy) which has five steps. These steps consist of knowledge, persuasion, decision, implementation and confirmation. In the beginning, the individual acquires the necessary knowledge about an innovation and forms an opinion in this regard. This stage is influenced by relative advantage, observability, complexity, trialability and compatibility of the innovation (characteristics of the innovation). After that, the individual decides to adopt or reject the innovation. The individual then implements the innovation upon adoption and searches for further information about its advantages

or disadvantages. Since EBP is a new approach in the Iranian nursing education system, the researchers decided to evaluate knowledge, attitude and adoption of the undergraduate nursing students to determine the effectiveness of teaching EBP based on the Rogers's diffusion of innovation model, because knowledge understanding, attitude and adoption can influence the development of an appropriate approach to teach EBP in nursing faculties.

MATERIALS AND METHODS

Design: This quasi-experimental study was performed on two groups of experimental and control to determine and compare the level of knowledge, attitude and adoption of EBP before and after the educational intervention. The target population was all nursing students at the faculty of nursing and midwifery who are studying at the community health nursing. In the experimental group, participants received EBP education based on the teaching approach of DOI model while the controls received routine education. Knowledge, attitude and adoption of EBP were compared between the two groups before and after the intervention.

Data Collection: Data was collected with self-report questionnaires which were completed before and after the intervention by both groups.

Ethical Considerations: The present study was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences and necessary authorizations were obtained for the intervention. Participants were informed of necessary information regarding the objective of the study and were requested to sign informed consent forms prior to participation. The participants were also assured of anonymity and confidentiality of the data. It was also reminded to the participants that they could withdraw from the study at any time. In the end, the results of the study were revealed in favour of the beneficiary.

Sampling: All nursing students ($n = 80$) were in the final semester of their degree program and studying the course of community health nursing were chosen and assigned randomly to experimental ($n=40$) and control ($n=40$) groups.

Interventions: Intervention in the present study was EBP education based on the Rogers's diffusion of innovation model which was carried out in the experimental group.

The experimentals were assigned randomly into 5 groups of 8 individuals and the intervention started in small groups according to the stages of the model:

- Knowledge acquisition: in this stage, the emphasis is on acquiring knowledge or skills for more effective adoption of EBP. Rogers (2003)[19], believes that in this stage, the individual is not aware of the problem and is not willing to learn or act in the future. Before education, the curriculum of EBP was provided and approved by experts in the field of EBP. The number of sessions and hours were determined with respect to the needs and free hours of subjects. According to the designed curriculum, 10 educational sessions were considered and in each session, PowerPoint presentation, question and answer (Q and A) and discussion were used to convey educational material.
- Persuasion: Rogers (2003)[19], believes that in this stage, the individual is aware of the problem and thinks about ways to overcome it seriously but still has no commitment to perform it. In this stage, the researcher tried to enhance the students' attitude. For this reason, the students were asked to observe the existing problems in the health centers critically and think about the possible ways of adjusting the problems with EBP. They were also requested to discuss and evaluate the existing needs with an evidence based approach. To discuss new knowledge with others and to form a positive image in relation to EBP were the objectives of this stage and knowledge and innovation-based behaviors were encouraged. In this stage, group discussions were used to address the perceived characteristics of the innovation. Then, in a group discussion session with staff of the center, health priorities were determined and clinical questions were designed. Health priorities in the centers were as follows and evidence-based clinical questions were designed accordingly:
 - Evidence based prevention of gestational hypertension
 - The importance of breast feeding
 - Evidence based management of diabetes and effective recommendations
 - Evidence based prevention of intra uterine growth retardation
 - The importance of vaccination

Each group designed its own clinical questions based on health priorities and finalized them with the help of the

researcher. Connection and contact between group members outside educational hours plays an important role in the success of the educational strategy based on the model and the students were persuaded to be in touch with researchers when educational hours were finished. Then, more sessions were held with group members to enhance their skills in knowledge, attitude and adoption of EBP and provide them with opportunities to use best available evidence.

Decision to Adopt or Reject: Rogers (2003)[19], believes that in the third stage-which is the decision-making stage-the individual develops a tendency to perform the innovation in the near future but still does not do it. The individual tends to search for more information regarding the innovation and test it. In this stage, the students were free to choose to continue for participating in the research or withdraw from the study. In other words, they were free to adopt or reject the innovation.

Implementation: In this stage, the researcher and the students visited the IT center of the faculty and practically searched for evidence for the clinical questions. They first became familiar with credible websites in which evidence can be searched, like Cochrane, Pubmed, Ovid, Ebsco, Up to date,... and then searched for evidence related to their clinical questions. Then, the articles were criticized, available evidence was categorized and the levels of evidence were determined. During this process, if the students had any questions, the researcher answered the questions and was in contact with the group members via email. Therefore, in this stage, the clinical questions were answered based on best current evidence.

Confirmation: In the next stage based on the model, diffusion and confirmation are very important. Verbal and written communication skills are vital to disseminate information. The students presented their activities through poster presentation in the health centers, gave information about their EBP orally and sought confirmation from other groups (students), instructors and health center staffs.

After the intervention, the two groups of experimental and control were evaluated in knowledge, attitude and adoption of EBP before and after the intervention with the aim of determining the effectiveness of the intervention. The control group received routine education and the researcher performed no intervention.

Instruments: Data collection tool was a 2-part questionnaire; a questionnaire on demographic characteristics and an EBP questionnaire (Rubin and Parrish, 2010)[34] to evaluate the level of knowledge, attitude and adoption of EBP. Demographic information included age, gender, GPA (University Grade-Point Average), familiarity with EBP and DOI model, participation in the classes of “research methods”.

The EBP questionnaire developed by Rubin and Parrish (2010)[34] was used in current study. It has 5 subscales that were used 3 parts from it. (Knowledge, attitude and adoption) with 34 items (knowledge= 10 items, attitude= 14 items and adoption=10 items). Responses were in the 6-point Likert’s scale (from “I completely disagree”(1)..... to “I completely agree”(6)) and Cronbach’s alpha was reported to be more than 80%. After obtaining authorization from Prof. Robin, the process of translation and determining its validity and reliability were performed. Face and content validity of the tool was evaluated by 14 nursing faculty members and experts in the field of EBP and S-CVI (Scale-Content Validity Index) was determined 0.98. To determine the reliability of the questionnaire, Interclass Correlation Coefficient (ICC) and Cronbach’s alpha were used to evaluate the stability and internal consistency of the tool respectively which showed favorable results.

(Knowledge: $\alpha=0.82$ and ICC=0.94, attitude: $\alpha=0.80$ and ICC=0.94 and adoption: $\alpha=0.75$ and ICC=0.74).

Data Analysis: Data was analyzed with SPSS version 19. Descriptive statistics were used for frequency, mean, SDs and Pearson’s correlation coefficients. Paired T-test and independent T-test were employed to compare of knowledge, attitude and adoption of EBP in two groups.

RESULTS

Findings showed that the mean of age in students was 22.8 years and the majority of the students were female (74%); mean of students’ GPA was 16, most of them had passed statistics and research methods courses (71.2%) but were not familiar with the DOI model (98.8%) and EBP (73.8%) (Table 1).

According to findings, paired T-test showed a significant difference in the means of knowledge (29.2±7.09, 45.2±3.89), attitude (45.17±9.65, 61.27±7.22) and adoption (35.95±5, 45.67±4.42) before and after EBP education based on the DOI model in the experimental group (P<0/0001) but no difference was noted before and after the intervention in the control group (P>0/05), which had received traditional education. Independent t-test showed a significant difference in the means of knowledge, attitude and adoption between two groups after intervention (P<0/0001). The detail results are presented in Table 2.

Pearson correlation test and Independent t-test were used to examine the association between study variables.

Table 1: Demographic characteristics of nursing students (n=80)

	Variable	N	%
Gender	female	60	74.0
	male	20	26.0
Familiar with research methods	yes	57	71.2
	no	23	28.8
Familiar with EBP	yes	21	26.2
	no	59	73.8
Familiar with DOI model	yes	1	1.2
	no	79	98.8
Age(years) GPA	Mean±SD= 22.8±1.04		
	Mean±SD=16±1.05		

Table 2: Knowledge, attitude and adoption means in nursing students.

Means	Knowledge			Attitude			Adoption		
	experimental	Control	Independent T-test	experimental	Control	Independent T-test	experimental	Control	Independent T-test
Before	29.2±7.09	30.3±5.26	P=0.43	45.17±9.65	48.15±7.26	P=0.124	35.95±5	35.9±4.96	P=0.964
After	45.2±3.89	31±7.05	P<0.0001	61.27±7.22	48.77±7.67	P<0.0001	45.67±4.42	36.65±4.93	P<0.0001
Paired T-test	P<0.0001	P=0.053		P<0.0001	P=0.136		P<0.0001	P=0.51	

Table 3: Correlations between variables

Variable	Knowledge	Attitude	Adoption
Age	-0.247(*)	0.082	-0.091
GPA	0.437(**)	0.432(**)	0.304(*)

*Correlation in significant at the 0.05 level (2-tailed).

**Correlation in significant at the 0.001 level (2-tailed).

Table 4: Association between variables (Independent t-test) (n=80)

Variable		knowledge	attitude	adoption
Gender	female	29.20±6.1	47.71±8.3	35.52±5.03
	male	31.28±6.4	43.71±8.9	37.04±4.6
P Value		P=0.20	P=0.082	P=0.21
Familiar with research methods	yes	30.21±6.2	47.49±8.7	35.94±5.4
	no	28.60±6.05	44.60±8.07	35.86±3.5
P Value		P=0.3	P=0.17	P=0.95
Familiar with EBP	yes	29.23±7.4	50.19±9.9*	36.28±6.2
	no	29.93±5.8	45.40±7.7*	35.79±4.4
P Value		P=0.66	P<0.02	P=0.70

The results showed that students' age ($r=-0.247$, $P<0.02$) and students' GPA ($r= 0.437$, $P<0.001$) was correlated with knowledge of EBP, also students' GPA was correlated with attitude toward ($r= 0.432$, $P<0.001$) and adoption of EBP ($r=0.304$, $P< 0.006$) Table 3. Also, familiar with EBP ($P<0.02$) was significantly associated with attitude towards EBP (Table 4).

DISCUSSION

The results of this study showed that the knowledge, attitude and adoption of EBP increased significantly after education based on the Rogers's diffusion of innovation model. Moreover, the scores of knowledge, attitude and adoption of EBP had a significant difference between the two groups after the intervention, indicating the effectiveness of the educational approach in increasing the knowledge, attitude and adoption of EBP. In addition, there was relationship between independent variables (age, GPA, familiar with EBP) and dependent variables (knowledge, attitude toward and adoption of EBP).

Studies performed by Ross (2003)[23]; Brown, Kim, Stichler and Fields (2010)[35], Zhang, Zeng, Chen and Li (2012)[36] and others also showed increased knowledge after education. However, it should be mentioned that the knowledge acquired through the Rogers's model could transform knowledge into practice and lead to increased practical knowledge which is not limited to academic environments and knowledge acquisition is not stopped in this stage. So, Brown, Kim, Stichler and Fields (2010)[35], demonstrated that EBP knowledge, attitude toward EBP and future use of EBP statistically significant

increase in mean scores with advancing academic levels, these results consist with current study.

The current results showed that attitude toward EBP increased after education based on DOI model. A study conducted by Palmar(2010)[37] showed that the attitude toward EBP predicted EBP and therefore, the DOI model can be used for changing ideas and having more success. The findings of research of McCleary and Brown (2003)[38] indicated that education about research might be one way to overcome negative attitudes toward research as a barrier to research utilization. These results consist with current study.

The results of studies by Granoff (2002)[39], Scott, Plotnikof, Karunamuni, Bize and Rodgers (2008)[40], Anderson and Comrie (2009)[41] regarding the DOI model to adopt an innovation showed that the process of adopting an innovation is a social factor and understanding the advantages of innovation, compatibility and observability can be the determinants of adopting the innovation, which should receive attention in the process of adoption. In the present study, attention was paid to the perceived characteristics of the innovation by nursing students in persuasion stage.

Johnson *et al.*, (2010)[42] believes that learning with doing, like persuading the participants in a research, can be very effective. The results of a study performed by Carlson (2006)[43] indicated adoption of EBP and showed that nurses were aware of EBP but did not implement it. Majid *et al.*, (2011)[44] reported that although nurses had a positive attitude towards EBP, certain barriers hindered its adoption. Schmidt and Brown (2007)[4] believed that the Rogers's model effectively helped the students to be

better prepared for delivering optimal care, as professional caregivers and assisted them to overcome the barriers hindering optimal practice. Because educational system needs to be open to new approaches that will best help the faculty [45]. The limitation of study was coordination to education of EBP with instructors and students, because educational classes were outside of curriculum. Present study was conducted at Tehran University of Medical Sciences; researchers have suggested that a similar study be conducted at other universities with large sample size.

CONCLUSION

The results of the current research showed that an education strategy based on the Rogers's diffusion of innovation model could enhance knowledge, attitude and adoption of EBP in nursing students, since operationalizing EBP requires positive attitude, knowledge and skills associated with understanding and applying research in clinical practice. The model emphasizes the necessary steps to teaching an innovation and factors determining its adoption and could be used to bring EBP from classrooms to clinical settings. Therefore, clinical and nursing instructors, policy-makers of nursing education, caregivers, nurses, students and other professions can use it.

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