

Education and implementing evidence-based nursing practice for diabetic patients

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ABSTRACT

Background: Foot ulceration is one of the most common complications associated with diabetes that needs to be managed. In Iran, prevalence of diabetes foot ulcer is 3%. According to studies, evidence-based nursing (EBN) is an effective alternative to facilitate clinical decision making in patient care and may lead to quality improvement in nursing practice. The aims of this study are to assess the effects of EBN education on the knowledge, attitude, and practice of nurses who take care of patient with diabetes foot ulcer.

Materials and Methods: A quasi-experimental study (based on IOWA model as a framework to improve nursing practice) was conducted using a before-and-after design. All of nurses (consisted of 19 baccalaureate nurses) who are working in an endocrinology ward were chosen and taught using EBN approach through different workshops. Before and after educational intervention, the data about nurses' knowledge, attitude, and practice were gathered by questionnaire and then compared. The nurses' performance in patient care was evaluated in 3 months by one checklist. The data were analyzed using descriptive and inferential statistics.

Results: There were statistically significant differences in knowledge, attitude, and practice of nurses before and after intervention ($P=0.001$). The nurses' performance in caring for patient with diabetes foot ulcer, based on clinical guideline, showed the improvement in clinical practice.

Conclusion: Education of EBN can improve the nurse's knowledge and attitude to EBN, and be used as a basis on which to influence the professional practice of nursing.

Key words: Clinical nursing, diabetes foot ulcer, evidence-based nursing practice, IOWA model of evidence based practice, Iran

INTRODUCTION

The rapid rise in the prevalence of diabetes is alarming to healthcare professionals because of the serious complications of the disease, which often result in the amputation of lower extremities.^[1,2] One of the most important complications of diabetes mellitus is diabetes

foot ulcer.^[3] Foot ulceration and amputation contribute significantly to the high rates of morbidity and mortality affecting individuals with diabetes.^[4,5] It is reported that prevalence of diabetes mellitus in Iran is 5-8%^[6] with an annual increase of 5,000 patients,^[7] and the prevalence of diabetes foot ulcer is 3%,^[8] and the rate of lower limb amputation is to be 30%.^[3] Rolfe *et al.*^[9] (2003), in their study about the management of chronic leg ulcers by nurses, elucidated that the recurrence risk of leg ulceration needs accurate diagnosis and assessment of individual patients, and affected persons should be cared based on evidence-based recommendations contained in adopted guidelines or protocols that they provide evidence-based recommendations based on current best evidence.

Evidence-based nursing (EBN) is based on the integration of the best research evidence with clinical expertise and patient values to facilitate clinical decision making,^[10] and it may become a vital part of quality improvement in nursing practice.^[11] Nurses have a key role in facilitating and using evidence into practice, in order to become accountable for outcome-oriented patient care through the use of evidence-based practice (EBP).^[12] It expect that trained nurses with EBN could have access to these skills. Because implementing such skills in nursing practice imperative since

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many organizations seek nurses who are able to analyze existing practices, discriminate between alternative and conflicting information, and use EBN to improve patient outcomes.^[11]

Regarding the increasing importance of EBN for the nursing profession, recent data suggest that the US nurses are not well prepared,^[13] and some nurses are unable to use scientific evidence in their clinical practice to support their critical thinking and nursing skills.^[14] The lack of skills and the inaccessibility of research findings reduce readiness for research utilization,^[15] and this requires an organizational environment that values the importance of EBN and its potential impact on patient care.^[16] The development of a learning culture in nurses' workplaces would facilitate improvement of their skills.^[17] Results of a qualitative study in Iran showed that workplace conditions are not prepared in order to implement EBP.^[18] The transition to EBN is a process of cultural change^[19] and one way to bring about its implementation in clinical practice is through education.^[20] Consequently, educational and clinical strategies for EBP in nursing could prepare nurses to interpret and integrate evidence into clinical care.^[21]

A qualitative study indicated that although nursing education had been transferred to universities in Iran, public and health administrators still criticized Iranian nurses for poor-quality patient care. It seems that nurses are unable to transfer their theoretical knowledge acquired in an academic setting into the clinical area. In other word, routine – based paradigm is the dominant picture of Iranian nursing in practice and education at the baccalaureate level.^[22]

Context has often been cited as a significant factor in shaping research utilization behaviors.^[23] Several studies have evaluated whether EBN training courses can improve skills, but there are still few studies of whether teaching EBN skills and providing evidence-based resources result in changes in nurses' behaviors or clinical outcomes.^[24] It seems trained nurses based on EBN, could prevent amputations and other adverse outcomes in people with diabetes foot ulcer by early recognition and management of foot complications.^[25]

MATERIAL AND METHODS

Sample

All of nurses (consisted of 19 baccalaureate nurses) who worked in the endocrinology ward of an educational hospital in Tehran, Iran, were participated in this study based on IOWA model. This model developed as a framework to improve patient outcomes, enhance nursing practice, and monitor health care costs. Moreover it

facilitates the application of empirical evidence to clinical practice.^[26] Indeed, in this model, implementation started with a small group and then refined based on evaluation data, and the change will be implemented with additional populations for which it is appropriate.^[27] This study focused on data gathered from the nurses by self-reporting about EBN (the nurses were invited to fill in a questionnaire) and a checklist about clinical performance, which was filled in by a researcher.

(It should be noted that the endocrinology ward has 16 beds, patients with different endocrine problem were hospitalized which average one in five patients with diabetic foot were admitted).

Design and intervention

A quasi-experimental study, before and after intervention, was conducted. One endocrinology ward that covered with Tehran University of Medical Sciences, Iran Was selected. In order to find out their clinical answers and take part in the study the nurses were given access to a computer installation to internet.

The study procedure was as described below.

Pre-intervention period

The nurses' knowledge and attitude to EBN approach were evaluated by the use of two questionnaires. Nurses' practice was evaluated using two tools, which comprised a self-report questionnaire for the evaluation of EBN approach and a checklist for the evaluation of nurses' skills in the performance and assessment of people with diabetes foot ulcer by researcher, before and after intervention.

Study questionnaire

The questionnaire contained four sections and 66 questions, which had been formulated using relevant articles on the subject and developed by the researcher. The questionnaire consisted of the following four sections:

- Section I: Participants were asked to provide specific personal and professional data.
- Section II: Questions about nurses' knowledge with three possible answers. The range of scores was classified as weak (score: <31), good (score: 31-41), and excellent (score: >41).
- Section III: Questions about nurses' attitudes using a Likert scale. The range of scores was classified as negative (score: <45), neutral (score: 45-72), and positive (score: >72).
- Section IV: Questions with three possible answers about nurses' practice. The range of scores was classified as undesirable (score: <19), nearly desirable (score: 19-27), and desirable (score: >27).

The National and Regional Clinical Guideline in Iran was used as a checklist to assess the nurses' clinical practice to people with diabetes foot ulcer.^[28] This assessment included taking the patients' general health, assessing foot neuropathy, vascular problems, infection, characteristics of ulcers, and patient educational needs. The range of scores was 0-35.

Average scores and standard deviations (SDs) were calculated for the scores of knowledge, attitude, and practice. Face validity as well as content validities using "content validity Index" (CVI) were established with considering 10 faculty members' comments (who had expert in EBN). They were asked to give their comments regarding the questionnaire items and content. Their comments led to modifications of the items, and all items were evaluated as valid (the mean score for CVI was 89.77). As an indication of the reliability of the questionnaire in actual use, the internal consistency value using Cronbach's alpha coefficient was 0.84.

Educational intervention period

Nurses were divided into three groups (all of nurses cannot simultaneously participate in the workshop, so each group contains 6-7 participants). Each group was taught an EBN approach in relation to diabetic foot ulcer, through three workshops, each lasting 4 days. Learning activities for each group included developing a clinical question using the PICO (problem, intervention, comparison, and outcome) format, searching for evidence, reading and critiquing nursing researches, discussing articles, synthesizing evidence, and developing a summary of findings. Each participant was then asked to develop a clinical question, search for an article containing high-level evidence, and critiquing it based on a Consolidated Standards of Reporting Trials scale as an assignment. (In order to achieve these capabilities, the researcher was present as a helper in the ward.)

Clinical practice evaluation period

The nurses' performance in clinical practice was investigated by used a checklist. Every trained nurse in the ward was expected to assess the patients and identify their problems. In the process of assessment, they were asked to find out which patients were more at risk, to identify the most serious ulcer, and the patients' educational needs. The results of their assessment were monitored and documented in the nurses' notes and scored by the main researcher. As well, it is worth mentioning that performance assessment after intervention was conducted more than once for each nurse within a period of 3 months. This period lasted for 3 months.

Post-intervention evaluation period

The knowledge, attitude, and practice of the nurses about

EBN were evaluated by means of the questionnaires mentioned above. The data (before and after intervention) were analyzed using descriptive and inferential statistics.

Data collection and analysis

Statistical analysis was carried out using the SPSS program version 11.5 (SPSS, Chicago, IL, USA). Descriptive statistics (frequencies and percentages) and inferential statistics (paired *t*-test, repeated measures, and Kolmogorov-Smirnov test for acceptance of normal distribution) were used. Statistical significance was accepted at $P < 0.05$.

ETHICAL CONSIDERATIONS

The ethics committee of the Endocrinology and Metabolism Research Centre (EMRC), Tehran, Iran, in accordance with Declaration of Helsinki and the guidelines of the Iranian Ministry of Health and Medical Education (code number: E-00127), approved the study. The committee ensured that the ethical requirements were adhered to the study. In addition, permission for the researchers to enter the research environments was obtained. The information sheet provided a detailed explanation of the purpose of study. All participants were guaranteed strict confidentially, and they had been aware that they have right to withdraw without giving a reason. Written consent was gained from all participants.

RESULTS

The findings showed that most of the nurses participating in the study were female (89.5%). For most of them (52.6%), the duration of their career was less than 5 years. The age of 73.7% of the nurses was 20-29 years and many of them (68.4%) worked in a rotational shift. None of the nurses had participated in any EBN workshop, many of them (63.2%) had not participated in any class related to diabetic foot care, and 52.6%, 89.5%, and 94.7% had not passed any course on computers, searching for articles using internet databases, and research methodology, respectively.

Results of knowledge, attitude, and practice of nurses about EBN

Nurses were interested in using EBP, and the response rate was 100%. Results from the questionnaire on knowledge about EBN showed that, before intervention, most of the nurses (78.9%) had a good knowledge level and 15.8% had an excellent knowledge level. After the intervention, all nurses (100%) had an excellent knowledge level. The mean scores for nurses' knowledge about EBN before and after the intervention were 36.31 (SD = 5.16) and 48.10 (SD = 1.76), respectively. The mean differences in nurses' knowledge score were statistically significant ($M = 11.78$, $SD = 5.03$, $P < 0.001$).

Findings from the questionnaire about attitude to EBN showed that most nurses (73.7%) had neutral attitude and 21.1% had a positive attitude before the intervention. After the intervention, 47.4% had a neutral attitude and 52.6% had a positive attitude. The mean EBN attitude scores before and after the intervention were 63.47 (SD = 9.89) and 73.89 (SD = 8.11), respectively. The mean difference in attitude score (before and after the intervention) was statistically significant (M = 10.42, SD = 11.65, $P < 0.001$).

The findings from questionnaire about EBN practice showed 36.8% of the nurses had an undesirable practice and 63.2% had a nearly desirable practice before the intervention. After the intervention, 57.9% of the nurses had a nearly desirable practice and 42.1% had a desirable practice. The mean EBN practice scores before and after the intervention were 19.10 (SD = 2.94) and 26.05 (SD = 2.48), respectively. The mean difference in practice score (before and after the intervention) was statistically significant (M = 6.94, SD = 3.30, $P < 0.001$) [Table 1].

The results from the nurses' assignment (EBP approach) showed that 78.9% nurses could search for articles independently but 73.7% could critique articles only dependently [Table 2].

The nurses' mean performance score for the assessment

Table 1: The comparison between mean differences of knowledge, attitude, and practice of nurses about evidence-based nursing practice before and after intervention

Variable	Mean difference before	Mean difference after	
Knowledge	36.31 (5.16)	48.10 (1.76)	(paired t-test)
Attitude	63.47 (9.89)	73.89 (8.11)	$P < 0.001$
Practice	19.10 (2.94)	26.05 (2.48)	

Table 2: Distribution of nurses' practice about evidence-based practice process

Evidence-based practice	How to do	
	Dependent N (%)	Independent N (%)
Writing a clinical question	10 (52.6)	9 (47.4)
Searching an article	4 (21.1)	15 (78.9)
Critiquing an article	14 (73.7)	5 (26.3)

Table 3: Comparison of mean differences in practice of nurses about assessment of diabetic foot ulcer patient based on Evidence - based practice

Before intervention	Mean (SD) of Practice			Mean differences of practice			
	After intervention (M*)			Before and after intervention mean (SD)			
	First	Second	Third	Before and 1 st	1 st and 2 nd	2 nd and 3 rd	Before and 3 rd
6.05 (2.68)	9.69 (7.48)	8.17 (6.59)	18.46 (3.67)	1.78 (6.49)	1.52 (7.30)	10.29 (7.16)	11.29 (3.91)

M*, Month*: Statistical meaningful

of people with diabetes foot was 6.05 (SD = 2.68) before the intervention. At the first, second and third months after intervention, mean scores were 9.69 (SD = 7.48), 8.17 (SD = 6.59), and 18.46 (SD = 3.67), respectively. Repeated measurements of empirical evidence and comparisons of the nurses' performance in analyzing and investigating diabetes foot ulcers revealed a difference in mean values between months 2 and 3 after intervention and between the time points before and 3 months after the intervention period ($P < 0.001$) [Table 3].

DISCUSSION

This study was the first that had been conducted in clinical practice setting, in Iran. Results of this study showed that there was an improvement in the nurses' knowledge, attitude, and practice about EBN after the intervention compared with before the intervention. In a similar study, Kim *et al.* (2009) showed that, when they used an EBP in experimental group the mean differences in knowledge and practice of participants in this group were statistically significantly higher before teaching strategy than in the control group. Our study is compatible with these results.^[29]

The effects of integrating EBP into a clinical practice by means of educational strategies on the efficacy of EBP among Korean nursing students were examined by Oh *et al.* (2010). EBP efficacy scores increased significantly after the use of educational strategies for evidence-based clinical practice. This shows that, with effective educational strategies, it is possible to develop and integrate EBP concepts into a clinical practice.^[30] Education was found to be an important factor in EBP, and EBP has emerged as a marker of healthcare quality.^[31]

Results of this study indicated that the nurses' attitudes became increasingly positive about EBP after intervention. Some studies in the Iranian context showed that Iranian nurses have a positive attitude to the use of scientific evidence in guiding practice, but this evidence has little application in their current nursing practice.^[32,33] In addition, results of the Dugdall and Watson's study (2009) indicated that nurses who had attained higher level academic education also demonstrated higher knowledge and a

better attitude toward EBP. Such findings mean that factors such as individual characteristics of the nurse providing the care, education, and training of nurses could influence the implementation of EBP and lead to better care.^[34] Concurrently, results of some studies showed that nurses with positive attitudes are more likely to utilize research and incorporate it into practice than nurses whose attitudes toward EBP are negative. Consequently, the data revealed that limited access to research and lack of research to the field of nursing are all factors that could influence nurses' attitudes about implementation of EBP.^[35]

Results of this study showed that the nurses who participated in this study were able to search for articles independently, but they could write a clinical question and critique an article only dependently. EBP is one way in which research can influence professional practice. Practitioners need to be able to evaluate evidence from research and assess research quality in order to use research evidence as a basis for practice.^[36] Critical appraisal of quantitative research is a skill that is necessary for adequate EBP.^[37] Brancato^[38] (2006) reported that learning EBP skills and knowledge increased nurses' confidence in defining research questions, their efficacy in searching for evidence, and their ability to integrate research into practice.

Results of this study after intervention indicated that nurses' performance in the assessment of people with diabetes foot ulcer based on the evidence-based approach better than before the intervention. EBP is now recognized as the framework for implementing clinical decision making and delivering high-quality care. It has become a fundamental belief that all nurses, regardless of educational preparation, should engage in EBP in the clinical setting.^[39] Implementing of EBP strategy can improve the knowledge of access to and implementation of EBP among clinical nurses.^[40] The results reported by Oh *et al.*^[30] (2010) after two sessions of clinical practice incorporating EBP in 6 days indicated an improvement of clinical practice in nursing students. Results of another study showed that after a 15-week clinical practice education with an emphasis on EBP, the application of EBP to actual clinical problems has improved the nursing students' practice.^[38] Our study is compatible with this result.

New information from research needs to be incorporated into nursing practice. Healthcare organizations can facilitate the translation of evidence into practice.^[41] Nurses have the opportunity to improve the quality of life of their clients by teaching them evidence-based self-care and interdisciplinary intervention.^[42] It is important that an evidence-based approach to nursing care be incorporated into clinical practice settings in order to improve patient outcomes.^[43] In an appropriate framework, support in terms of clinical structure and organization, as well as the promotion of

EBP, can be beneficial for patients. The implementation of a realistic research framework in clinical nursing practice has the potential to influence nursing research culture, and to promote evidence-based care within the workplace.^[44] through learning activities nurse educators could facilitate EBN. However, based on data, some issues such as time factors, access to information and resources, nurses' research knowledge, skills, and learning opportunities inhibit the implementation of EBN in practice area.^[43]

Evidently, there is an immediate need to have strategies for change and improve research training in teaching hospitals to facilitate the development of the local literature, both in terms of research utilization and production.^[15] Healthcare organizations need to consider multiple strategies to facilitate and promote EBP. Managerial support, facilitation, and a culture that is receptive to change^[45] are essential.

CONCLUSIONS

The findings of this study show that the EBN intervention, including the teaching of EBN skills can change clinical practice. These results provide important visibility into the matter of nurses' needs regarding the implementation of research results in practice, as well as the promotion of positive attitudes toward research and its utilization in practice.

This multifaceted intervention can promote significantly improved patterns of EBP in an educational hospital. Ideally, the teaching of EBP should be incorporated into the clinical setting. Collaboration between the academic and healthcare sectors is needed in order to provide a united voice to advance the nursing profession. The use of research evidence can be used as a basis on which to influence the professional practice of nursing. To ensure that EBP is implemented in clinical nursing care, a realistic and practical structure must be applied. Nursing leaders have a basic role in the education and direction of their workforce to enable them to understand EBP and implement it in the clinical setting.

LIMITATIONS OF THE STUDY

The results of this study may be specific, although the limited sample size may limit the generalizability of the present findings. However, this study provides information that may be useful in directing future nursing education in order to enhance nurses' knowledge, attitudes, and practice regarding EBP and be applicable to similar nurses in other countries.

ACKNOWLEDGMENT

The authors wish to thank all the participants in this study for their time, School of Nursing and Midwifery, and Tehran University

of Medical Sciences for its financial support regarding to PhD dissertation.

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How to cite: Varaei S, Salsali M, Cheraghi MA, Tehrani MRM, Heshmat R. Education and implementing evidence-based nursing practice for diabetic patients. *Iranian J Nursing Midwifery Res* 2013;18:251-7.

Source of Support: None, **Conflict of Interest:** Nil.