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Information seeking and retrieval skills of nurses: Nurses readiness for evidence based practice in hospitals of a medical university in Iran

Jamileh Farokhzadian[a], *Reza Khajouei*[b,d,*], *Leila Ahmadian*[c,d]

[a] *Department of Community Health Nursing, School of Nursing and Midwifery, Kerman University of Medical Sciences, Kerman, Iran*
[b] *Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran*
[c] *Research Center for Health Services Management, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran*
[d] *Department of Health Information Management and Technology, Faculty of Management and Medical Information Sciences, Kerman University of Medical Sciences, Kerman, Iran*

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ABSTRACT

Background: With the explosion of medical information, and emergence of evidence-based practice (EBP) in healthcare system, searching, retrieving and selecting information for clinical decision-making are becoming required skills for nurses.
Aims: The aims of this study were to examine the use of different medical information resources by nurses and their information searching and retrieving skills in the context of EBP.
Method: A descriptive, cross-sectional study was conducted in four teaching hospitals in Iran. Data were collected from 182 nurses using a questionnaire in 2014.
Results: The nurses indicated that they use more human and printed resources than electronic resources to seek information (mean = 2.83, SD = 1.5; mean = 2.77, SD = 1.07; and mean = 2.13, SD = 0.88, respectively). To search online resources, the nurses use quick/basic search features more frequently (mean = 2.45, SD = 1.15) than other search features such as advanced search, index browsing and MeSH term searching. ($1.74 \leq \text{mean} \leq 2.30$, SD = 1.01). At least 80% of the nurses were not aware of the purpose or function of search operators such as Boolean and proximity operators. In response to the question measuring skills of the nurses in developing an effective search statement by using Boolean operators, only 20% of them selected the more appropriate statement, using some synonyms of the concepts in a given subject.
Conclusion: The study showed that the information seeking and retrieval skills of the nurses were poor and there were clear deficits in the use of updated information resources. To compensate their EBP incompetency, nurses may resort to human resources. In order to use the

* *Corresponding author at*: Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Haft-bagh Highway, PO Box 7616911320, Kerman, Iran. Tel.: +98 34 31325406; fax: +98 34 31325406.
E-mail addresses: farokhzadian2010@yahoo.com (J. Farokhzadian), r.khajouei@yahoo.com, r.khajouei@kmu.ac.ir (R. Khajouei), ahmadianle@yahoo.com (L. Ahmadian).

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latest up to date evidence independently, nurses need to improve their information literacy. To reach this goal, clinical librarians, health information specialists, nursing faculties, and clinical nurse educators and mentors can play key roles by providing educational programs. Providing access to online resources in clinical wards can also encourage nurses to learn and use these resources.

1. Introduction

Worldwide evidence-based practice (EBP) has emerged as an important initiative in healthcare system [1]. EBP highlights a shift among healthcare professionals from a traditional practice to the best research-based practice [2]. EBP in nursing is the procedure of clinical decision-making by nurses using the best research evidence, clinical expertise and patient values [3].

EBP has been recognized as the gold standard for delivery of compassionate and safe care as well as promoting excellence in nursing care [2]. It has also been suggested as an essential skill for nurses in the 21st century [4]. Nurses spend considerable time and efforts providing healthcare and have a central role for determining and implementing acceptable standards of clinical nursing practice [5]. With the high amount of healthcare information produced every day, finding, retrieving and using existing evidence is a major concern for nurses. They are under pressure by professional expectations and policy makers to use information and scientific evidence to support their clinical judgment and decision-making [6] as well to provide accurate information to patients and their families [2].

Despite the exploding availability of healthcare information and the ongoing pressure by authorities, application of research-based evidence in nursing practice is limited [5,7,8]. A number of barriers to nurses' use of research evidence in practice have been identified by studies addressing nurses' EBP [9–11]. The most important barriers include information overload; lack of knowledge, skill or experience with the resources or respective technology; complexity of electronic information resources, and organizational procedures and policies; lack of value for research in practice; and difficulty in accessing or understanding research materials. Studies addressing EBP showed that healthcare providers do not use electronic resources such as online databases very often, even though access to electronic resources has been increased. They tend to seek professional information from human resources such as colleagues, doctors, superiors and other healthcare providers [1–3,9,12–19].

In order to implement EBP effectively, information literacy would be a pre-requisite. Hence, nurses need to develop their information seeking and retrieval skills to be able to attain relevant and accurate information required in their practice [10,12,20]

Majority of the studies addressing nurses' EBP mainly focused on nurses' use of information resources and barriers of information seeking, while only a few have adequately investigated their information searching skills, such as use of various search features, and formulation of correct search strategies. In Iran, traditional practice of nursing and the theory-practice gap are major challenges in healthcare system [21]. In addition, there are also limited studies on nursing information seeking and retrieval skills, and the appropriate strategies for implementing EBP in nursing practice. For EBP to become widespread in reality and research results to be implemented and adapted in daily practice, the first necessary step would be a comprehensive assessment of the current situation. The results can help to highlight potential drawbacks on both personal and organizational levels and to encourage required initiatives to promote EBP.

The aims of this study were to examine (1) the extent to which nurses use different medical information resources, (2) their information searching and retrieval skills and (3) their awareness and skills to use different search operators, in the context of EBP.

2. Methods

2.1. Study design and setting

This descriptive cross-sectional study was conducted at four referral teaching hospitals affiliated with Kerman University of Medical Sciences in Kerman, the largest city in Southeast Iran, from January to April 2014. The implementation of healthcare policies is centralized in Iran [22] and the ministry of health governs all hospitals. Therefore, the distribution of healthcare providers is similar in all hospitals around the country.

All four hospitals in this study have medical libraries available to all employees and provide access to printed indices and electronic databases, such as MEDLINE and CINAHL. Moreover, all employees can access online resources in hospitals' computer sites. One hospital also provides access to the recent printed nursing journals. There is no online access to resources in clinical wards.

The target population was all nurses employed at the time of data collection ($n = 730$). The sample size ($n = 195$) was determined based on the Cochran formula ($d = 0.06$, $\alpha = 0.05$). Nurses were eligible for the study if they had an academic degree of nursing and worked more than 1 year as a nurse. We used proportionate simple random sampling (based on the proportion of eligible nurses in each hospital and clinical ward) to recruit participants. Therefore, from the populations of 242, 238, 140 and 110 nurses in four hospitals, 64, 63, 39, and 29 nurses were enrolled respectively.

Table 1 – Demographic information of participants ($n = 182$).

		N	%
Sex	Female	158	87
	Male	24	13
Age group	<25	38	21
	25–35	84	46
	36–45	49	27
	>45	11	6
Nursing experience	<5	42	23
	5–10	71	39
	>10	69	37
Educational degree	Bachelor	177	97
	Masters	5	3
Position	Nurse	159	87
	Supervisors	7	4
	Head nurse	16	9
Working shift	Rotation	164	90
	Fixed	18	10
Attending training on EBP	Yes	23	13
	No	159	87
Familiar with EBP	Yes	69	38
	No	113	62

2.2. *Instrument and data collection*

In this study, data were collected using a questionnaire. This questionnaire was based on a valid and reliable questionnaire developed by a "team comprising faculty members from Nanyang Technological University, and nursing representatives from Alexandra Hospital and National University Singapore" [12]. It was used with permission. First, the researchers translated the original questionnaire accurately into Persian. Then, for cross-cultural comparison of translation, a person proficient in English language translated it back into English and its agreement with the original text was confirmed. Face validity of the questionnaire and nurses' understanding of the questions were also checked. A group of experts, comprising eight faculty members of Nursing and three Medical Informatics specialists reviewed the draft for content validity. The resultant version of the questionnaire was pilot-tested on 30 nurses in the study hospitals and these nurses were excluded from the study. Cronbach's alpha coefficient was used to assess reliability ($\alpha = 0.87$).

The questionnaire was composed of two sections. The first section was used to collect demographic information of participants such as their sex, age, educational degree, work position, duration of nursing experience, and participation in professional training and familiarity with EBP. The second section questioned participants concerning the use of different information resources for patient care and clinical decision-making (19 questions). These questions could be answered on a 5-point Likert scale ranging from "never" to "always". This section also collected information about features used by the nurses for literature searching (10 questions) as well as their knowledge of Boolean and proximity operators (1 question). In order to assess the database searching skills of the nurses, a supposed subject was given to them with five possible search statements. They were asked to select the most appropriate search statement for the given subject.

2.3. *Ethical considerations*

The questionnaires were distributed by one of the researchers. The nurses were informed about the purpose of the study prior to completing the questionnaire. They were explained the voluntary nature of the participation and were assured about anonymity and confidentiality of the responses. Informed consent was implied from returning the completed questionnaires.

2.4. *Statistical analysis*

SPSS software version 20 was used to analyze the data. We used descriptive statistics including frequency, percentage, mean, and standard deviation (SD). Moreover, analytical statistics including independent samples *t*-test and analysis of variance (ANOVA) were performed. As this was an initial exploratory study, the significance level of 0.05 was being used for each comparison.

3. Results

3.1. *Demographic information*

In this study we obtained a 93% response rate (182 out of the 195 nurses completed the survey). The majority were female (87%), aged between 25 and 35 years (46%), had between 5 and 10 years of nursing experience (39%) and had a bachelor degree (97%). Most of the respondents were in position of a regular nurse (87%), had shift rotation (90%), had not attended

Table 2 – Use of different human information resources.

Human information resources	Mean score[a]	SD
Ward colleagues	3.47	1.04
Physicians	2.98	1.07
Nursing supervisor	2.59	0.95
Professional friends working in other hospital and clinics	2.53	1.16
Nursing management staff	2.51	1.09
Nursing research committee/EBP Group	2.45	1.13
Total	2.83	1.5

[a] Mean scores are calculated out of five.

Table 3 – Use of printed information resources.

Printed Information Resources	Mean score[a]	SD
Pamphlets/handouts (produced by healthcare companies, hospitals)	3.12	1.06
Reference books (e.g. medical dictionaries, encyclopedias)	2.96	1.06
Textbooks	2.71	1.10
Newspapers	2.37	1.06
Journal articles	2.30	1.02
Total	2.77	1.07

[a] Mean scores are calculated out of five.

any specific training on the implementation of EBP in patient care (87%) and were not familiar with the term evidence-based practice (60%) (Table 1).

3.2. *Use of information resources*

The total mean scores of different information resources used by participants are presented in Tables 2–4. The findings showed that human resources (mean = 2.83) were the most used resources by nurses followed by printed information resources (mean = 2.77) and electronic resources (mean = 2.13) respectively.

Table 4 – Use of electronic information resources.

Electronic information resources	Mean score[a]	SD
Google (websites providing information about a specific medicine, treatment or symptom)	2.57	1.19
Hospital resources: electronic standard operating procedure (SOP) (i.e. work instructions, support documents)	2.45	1.13
Nursing e-books	2.11	1.05
Digital medical and nursing libraries	2.08	1.09
Up to date; MD consult	2.13	0.88
Online tutorials provided by professional associations, medical libraries, and overseas hospitals	1.98	1.14
Medical databases (e.g. CINAHL)	1.94	1.05
Blogs on EBP	1.93	1.05
Total	2.13	0.88

[a] Mean scores are calculated out of five.

Concerning the use of different human information resources (Table 2), the nurses consulted their ward colleagues the most frequently (mean = 3.47) and the hospitals' nursing research committee/EBP Group the least frequently (mean = 2.45).

Among the printed information resources, pamphlets/handouts (mean = 3.12) were the most frequently and journal articles (mean = 2.30) the least frequently used items (Table 3).

Concerning the electronic information resources (Table 4), general Internet websites (mean = 2.57) were the most and medical databases and blogs concerning EBP the least frequently used resources (mean = 1.94 and 1.93, respectively).

Compared to the nurses who had not attended EBP training, nurses who had attended EBP training used more printed ($t = 3.03$, $p < 0.001$) and electronic resources ($t = 3.55$, $p < 0.001$). No statistical significant differences were found in the use of information resources by nurses based on their other demographic variables ($p > 0.05$).

3.3. *Information searching skills*

Table 5 shows the total mean score of using different search features of online databases and web search engines. Nurses used the "quick/basic" search option (mean = 2.45) more and "Proximity operators" less frequently (mean = 1.59) than the other search features.

Among Boolean operators, "AND" was the most (mean = 1.88) and "NOT" the least frequently (mean = 1.77) used operator. However, the mean scores for the use of all Boolean operators were quite low. Nurses who had attended EBP training ($t = 4.16$, $p < 0.001$), had 5–10 years experience ($F = 3.84$, $p < 0.01$), aged 25–35 years ($F = 5.57$, $p < 0.001$), and had managerial position ($F = 3.097$, $p < 0.05$) tended to use different search features more frequently. Nurses' sex ($t = 0.175$, $p > 0.05$), educational degree ($t = 1.43$, $p > 0.05$), and working shifts ($t = 1.43$, $p > 0.05$) had no significant effect on the use of different search features.

3.4. *Using search strategy and operators*

The majority of the nurses (84%) were not familiar with how to use different proximity operators. The percentage of the nurses not familiar with Boolean operators "AND", "OR", and "NOT" was 79%, 83%, and 84%, respectively. Totally, at least 80% of the nurses were not aware of the function of search operators and about how the use of Boolean and proximity operators would change their search results.

To assess their skills in developing an effective search statement by using Boolean operators, the nurses were given a supposed subject, "Effect of cigarettes on lung cancer". For simplicity the use of certain search features, such as truncations, proximity operators and extensive synonyms were avoided. The nurses were asked to choose the most appropriate statement from a list of five possible search statements. Table 6 shows that only 20% of the nurses selected the most appropriate statement, using some synonyms of the concepts 'cigarette' and 'lung cancer' and putting them in parentheses (option 4 in Table 6).

Table 5 – Use of different search features.

	Search features	Mean score	SD
	Quick/basic search	2.45	1.15
	Advanced search	2.30	1.08
	Index browsing (e.g. author, title, resource)	2.16	1.06
	Truncations/wildcards (e.g. '*', '?')	1.82	0.98
	Medical Subject Headings (MeSH)	1.75	1.00
	Search limits (e.g. publication date)	1.74	1.00
	Proximity operators (e.g. W/nn)	1.59	0.87
Boolean operators	'AND' operator	1.88	1.03
	'OR' operator	1.84	1.01
	'NOT' or 'AND NOT' operators	1.77	0.96
Total		1.93	1.01

Results showed a significant statistical difference in selecting different search statements based on the familiarity with Boolean operators, so that the nurses with better understanding of "AND" or "OR" operators selected the correct option 4 ($t = 3.52$, $p < 0.05$). The nurses who participated in EBP training courses selected more option 4 than those who had not attended any such training ($t = 4.12$, $p < 0.05$).

4. Discussion

4.1. *Principal findings*

The aims of this study were to examine the use of different medical information resources by nurses and their information searching and retrieving skills in the context of EBP. The results showed that the nurses sought information more from human and printed resources than from electronic resources. Their skills to retrieve and search evidence are not adequate. Specifically nurses' skills to use different search features and operators and to develop a search strategy are poor. The findings concerning the use of information resources demonstrated a similar response pattern with the previous studies conducted in Canada [16], USA [1,9,17], UK [15], Finland [1], Mongolia [23], and Iran [14]. Approximately 60% of the nurses were not familiar with the term EBP, which was consistent with the previous study in USA [9]. Our study showed that the participating nurses preferred to use more traditional resources namely human and printed resources. Hence, they rely more on getting information from colleagues, physicians or other medical professionals. This could be explained by the nature of nursing work and clinical practice particularly at the point of care which often requires frequent communication [17]. In addition, this could be due to the higher and convenient accessibility to these resources [13,24]. Among printed resources, journals were rated at the bottom of all printed resources which was consistent with some previous studies [2,9,13,16]. This was probably due to a multitude of factors such as lack of time, lack of knowledge to understand and interpret research findings, unfamiliarity with English language, difficult accessibility to journals and other organizational barriers.

In this study, the nurses used electronic information resources rarely. Currently, considerable amount of the latest research and new evidence is merely available in electronic format (e.g. in electronic journals and books). The low use of these resources can be related to clinicians conditions (disagreement regarding the importance of EBP in nursing practice [15] poor literature searching skills, lack of knowledge about the existence of such resources [19,25] [26], cultural resistance to change [27], negative attitudes toward EBP [3], lack of time and language barriers [26]); organization conditions (limited accessibility to these resources [15]); and information conditions (inherited difficulty of information seeking using electronic databases and the complexity of retrieved literature [19,25], information overload, information quality concerns[26] and mistrust in available information [28]). The results of this study showed that most nurses were not adept at advanced searching techniques. These techniques could save time to search the Internet and improve search results by limiting results to the required field(s). The majority of the nurses did not know how the use of Boolean and proximity operators could alter their search outcomes. A small percentage of the nurses chose an appropriate search option for a supposed subject. This was predictable from nurses' restricted familiarity with Boolean operators. The utilization of different search features such as truncations and wildcards, MeSH terms, search limits, and proximity operators was low. This indicates that poor knowledge had resulted in the low use of various search functions. These findings are similar to the previous research that showed very low use of Clinical Queries or MeSH browsers and other advanced functions [18,19]. In two other studies [9,17], respondents considered their confidence and ability to search databases, such as CINAHL and

Table 6 – Selection of the search statements ($n = 182$).

	N	(%)
1. Effect of cigarettes on lung cancer	54	30
2. Effect AND cigarettes AND lung cancer	14	7
3. Cigarettes AND lung cancer	26	14
4. (Cigarettes OR smoking OR tobacco) AND ("Lung Cancer" OR "Lung Tumor" OR "Lung Neoplasm").	36	20
5. Cigarettes AND smoking AND tobacco AND "Lung Cancer" AND "Lung Tumor" AND "Lung Neoplasm"	52	29

Medline very low. The nurses' skills to find and use research reports are important and should be taken into account when assessing readiness for EBP. According to Luker [29], ability to provide high-quality care to a great extent is dependent on the availability of a well-educated and clinically competent nursing workforce which be able to access and utilize up-to date knowledge.

It was additionally found that young nurses with 5–10 years working experience were more inclined to use a variety of search features as compared to their senior colleagues. This could be because younger individuals are more accustomed to use computer and Internet. Similarly, it was found that participation in professional training programs increased the use of various search features. Consistent with the previous studies, this finding suggests that the nurses in studied hospitals require EBP training [30,31].

EBP training can improve the nurses' knowledge and skills of search operators and MeSH terms to search electronic information effectively. These competencies promote the nurses' confidence in using up-to-date and relevant research, in addition they increase sharing of information with colleagues or other more experienced healthcare professionals [12].

Without the support of organizations and administrators, which supply and encourage nurses to access current best evidence, it will take a concerted effort to use evidence-based nursing within clinical practice settings. EBP approach will become a reality only if nurses have access to libraries close to clinical settings, recent research journals and resources, and the Internet for using in clinical practice [27].

4.2. *Limitations*

This study had two limitations. First, the use of questionnaire to assess literature searching skills and use of information resources may have resulted in exaggerated scores, and could be subject to personal bias. Future studies can use a competency test to help determine the actual skills. To increase the reliability of findings, a triangulation in data collection such as interviews and observation can be helpful too.

Second, this study was limited to nurses in four teaching hospitals affiliated with a medical university in Iran. This may question the generalizability of the results. However, as we pointed out in the methods section, because of the centralized healthcare policy making system in Iran the distribution of healthcare providers and the organization of healthcare institutions are similar in the whole country. For example as a drawback to EBP, all hospitals in Iran lack higher educated nurses who are actively involved in the healthcare delivery and practice [32] and the majority of nurses are bachelors.

4.3. *Implications for practice, education, and research*

The existing issues within clinical nursing environments have made this difficult to integrate EBP fully into practice. Before implementing EBP, a baseline assessment should be conducted to determine readiness for EBP including information needs, and nurses' knowledge and skills to find, assess and use different levels of evidence. Clinical librarians and informatics specialists can play key roles in providing constant training with multiple methods for nurses to enhance their information literacy for applying EBP. Consequently, the paradigm must be changed by integrating topics like information literacy and EBP into educational programs. It is essential to integrate routine measurement of nurses' information literacy into the curricula so that the programs can be refined as needed to ensure training of information competent graduates. All these preparations would be fruitful if accessibility to evidence is provided beforehand, especially at the point of care. In addition, we suggest further qualitative and quantitative studies to evaluate the effect of different approaches to enhance the EBP competencies of healthcare providers.

Summary points

What was already known on the topic:

- EBP has been recognized as the gold standard for delivery of compassionate and safe care as well as promoting excellence in nursing care.
- Despite the exploding availability of healthcare information and the ongoing pressure by authorities, application of research-based evidence in nursing practice is limited.
- There are few studies about nursing information literacy, and the appropriate strategies for implementing EBP in nursing practice.

What this study added to our knowledge:

- Nurses do not have sufficient skills to search best evidence and to use the Internet and online databases for information seeking and retrieval.
- Nurses have a tendency to use more traditional resources such as colleagues and other medical professionals than up-to-date resources such as electronic resources and journals to make clinical decisions.
- Nurses should attempt to improve their information literacy competencies for developing EBP.

5. Conclusions

The findings of this study indicate that nurses are not ready for EBP. Generally, their information literacy skills to search best evidence from different databases and the Internet are not sufficient. These basic skills are prerequisites for information retrieval, which is necessary for EBP in nursing. The nurses often do not search appropriate information resources. They have a tendency to resort to traditional resources such as colleagues and other medical professionals, which might not possess up-to-date information, to make sound clinical decisions. Up-to-date resources such as electronic resources and journals are used infrequently. The findings suggest nurses should be provided with the latest evidences. This can be accomplished by introducing decision support functionalities in nursing information systems. Otherwise, nurses need to learn using necessary resources to embrace new and innovative techniques for providing effective and quality care and

to improve the clinical outcomes for their patients. Providing access to online resources in clinical wards can also encourage nurses to learn and use these resources.

Author contributions

Jamileh Farokhzadian, Reza Khajouei and Leila Ahmadian contributed to conceiving and designing the research. The data was collected, analyzed and interpreted by Jamileh Farokhzadian. All authors contributed equally in writing the manuscript. All authors reviewed and approved the final manuscript.

Conflict of interest

The authors report no conflicts of interest in this work.

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