






The Relationship between Information Literacy Skills and Evidence-based Medicine Competencies in Clinical Residents

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Abstract

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Introduction: The emergence of new information and communication technologies has emphasized the importance of obtaining reliable and up-to-date information. There is a need to encourage clinical residents to use up-to-date medical evidence in clinical decision-making, which could empower their information literacy skills. This study aimed to investigate the relationship between possessing information literacy skills and competencies of evidence-based medicine by clinical residents at Kerman University of Medical Sciences (KUMS), Iran.

Methods: The present study was survey-based. The study population consisted of all clinical residents at KUMS. One hundred fifty participants were selected at random to participate in completing the questionnaire. The data were presented using descriptive statistics (mean; SD) and analyzed using statistical tests: Pearson correlation coefficient; linear regression; independent t-test.

Results: Pearson Correlation Coefficient between information literacy and evidence-based medicine was obtained 0.529 (p-value=0.001). Also, there was a significant relationship between information literacy skills and evidence-based medicine competencies by the clinical residency. With a mean score equal to 3.22, the clinical residency's ability as to the components "information need" and "information organization" was more than that with other information literacy skills. The clinical residents' ability to use pieces of evidence (3.09) in the evidence-based approach was also higher than that of other components in this approach.

Conclusion: Improving clinical residents' ability to apply information literacy skills to gain medical evidence improves their clinical decision-making performance and may lead to the improvement of health in society.

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Introduction

A physician requires reliable evidence on various illnesses to treat patients; however, has limited time to access the information. Traditional resources, such as books, journals, and encyclopaedias, are often inefficient to meet this need, and therefore modern information technology has become an easy way to access many databases where experts' scientific needs are met. In recent years, empowering physicians to use information and communication technology (ICT) skills to access scientific evidence has

been considered a solution to these issues (1).

By providing an infrastructure for ICT, information professionals try to expand the exchange of information among people in the community. Information influences our decisions on a variety of issues, especially our health. Currently, a myriad of health information is available to individuals in electronic and web-based formats. However, finding the correct information can be tricky and requires acquiring information literacy skills, such as identifying,



accessing, and evaluating information. Similarly, evidence-based medicine included utilization information from reliable scientific papers (2,3). Evidence-based medicine components include Formulation question, Evidence-finding, Critical appraisal, Application of evidence, and Evaluation of results (4).

Due to the great volume of medical information, increasing medical resource growth, and physicians' heavy workload, it is necessary for physicians to learn to deliver successful evidence-based medicine, requiring them to access correct information quickly (5). Studies in medicine and nursing show that practitioners encounter various issues in finding evidence, such as non-recognition of the right resources, using optimal search methods, and critically evaluating evidence (6). Competence is needed to have good evidence-based skills in the e-environment (7). One skill that can help deliver successful evidence-based medicine is, having good information literacy skills. Information literacy is the ability to understand the need for information, locate resources, and apply information during work (8). Components of information literacy include understanding the information requirements, finding information, evaluating information, organizing information, and disseminating information (4). However, the studies on information literacy in medical students have shown that their mean scores in general information literacy standards are significantly lower than the ideal level. This requires training of information literacy skills for students (9).

In Iran, clinical residents are the first level of contact with patients. It means that they play a critical role in delivering evidence-based medicine in daily activities and clinical decisions. For clinical residents to excel in their specialty areas, they must have the capabilities required to identify and use the correct medical evidence, which may be done through good information literacy skills. Therefore, there is an evident relation between information literacy and evidence-based medicine that the present study investigated the relationship between having information literacy skills and competencies of evidence-based medicine by clinical residents at KUMS. There were two questions in this research:

- Q1: What is the level of information literacy and evidence-based medicine skills in clinical residents of the KUMS?
- Q2: Is there a significant relationship between information literacy skills and competencies of evidence-based medicine?

Methods

The study is a survey research with a descriptive-analytical approach. It was conducted in hospitals affiliated with KUMS, Iran. The study population was 369 clinical residency at hospitals affiliated with KUMS in Sep-Feb 2017. The sample size for this study was calculated 150. According to the pilot study, the sample size was calculated based on the correlation value between the evidence-based performance and information literacy skill ($r=0.266$).

Participants were randomly selected, and 150 questionnaires were distributed among clinical residents by researchers. Moreover, the online questionnaire link was sent via email and telegram groups to hospital residents affiliated with KUMS.

The tool used to collect data is a three-part questionnaire. The first part was demographic information; the second part

was related to information literacy skills (based on information from Ghasemi et al. (10)); the third part includes evidence-based medicine competencies based on a literature review, according to five steps based on evidence. Three librarianship professors and two medical faculty members stated their opinions about the questionnaire to measure reliability. The questionnaire was first provided to ten participants in the study population to determine validity, and Cronbach's alpha was calculated as 0.94. The reliability was estimated to be 0.93 for the total population ($n=369$). The questions were based on a 5-point Likert scale. (1= very rare and 5= very high).

The questionnaires were distributed in person by the researcher. Moreover, the online questionnaire link was sent via email and telegram groups to residents.

Data analyses were done in version 22 Software SPSS, a software package used for interactive or batched, statistical analysis. Descriptive statistics used, including frequency, mean and standard deviation, Kolmogorov-Smirnov test, and Pearson correlation test.

Results

In total, 62 men (41.3%) and 88 women (58.7%) participated in the study. In terms of work experience, 36 (24%) had no work experience, 90 (60%) had one to five years, and 24 (14%) had five to ten years. On average, participants with five and less than five years of work experience had more information literacy skills (3.26) than those with more than five years of work experience (2.80). In terms of specialty, 145 participants (96.7%) were a specialty and five, subspecialty (3.3%). The ability of the specialty clinical residency in information literacy and evidence-based medicine skills were 3.18 and 2.78

Residents of the radiology department ranked highest in terms of information literacy skills among participants (3.67), while residents of the paediatrics department were higher in terms of evidence-based skills than other participants (3.50).

The majority of participants were in their first year of work ($n=52$; 34.7%), while the minority were participants in their fourth year ($n=15$; 10%). Those in their first year of work had higher information literacy skills and evidence-based medicine competencies (3.33 and 2.92, respectively). Both information literacy skills and competencies of evidence-based medicine scores were higher in people who have been trained before (2.36 and 2.83, respectively) (table 1).

The highest score of the residents' information literacy scores was related to the "Understanding the need for information" and "Organization of information" (3.22). Their ability in the "Application of evidence" component (3.09) in the evidence-based approach was higher than the other components in this approach. The mean scores of information literacy skills and competencies of evidence-based medicine were 3.18 and 2.78, respectively.

The distribution of the data was examined using the Kolmogorov-Smirnov (KS) test. Accordingly, the results supported the normal distribution of all variables' data ($P < 0.05$). For this reason, the Pearson correlation coefficient was used to evaluate the correlation between information literacy and evidence-based medicine.

Pearson correlation coefficient indicates a direct and significant relation between evidence-based medicine and all information literacy skills (table 2).



Table 1. Information literacy & evidence-based medicine in clinical residents at KUMS, Iran.

	Variable	Mean	Standard deviation
Information literacy	Understanding the need for information	3.22	0.67
	Finding information	3.17	0.58
	Information evaluation	3.17	0.65
	Organization of information	3.22	0.62
	Exchange and dissemination of information	3.10	0.69
	Total	3.18	0.51
Evidence - based medicine	Formulation the question	2.51	0.72
	Finding evidence	3.01	0.57
	Critical appraisal	2.61	0.69
	Application of evidence	3.09	0.68
	Evaluation of results	2.70	0.73
	Total	2.78	0.49

Table 2. Relationship between information literacy and evidence-based medicine in the clinical residents at KUMS

Information literacy	Evidence-based medicine	
	Coefficient of correlation	P-value
Understanding the need for information	0.35	0.05
Finding information	0.33	0.05
Information evaluation	0.43	0.05
Organization of information	0.47	0.05
Exchange and dissemination of information	0.51	0.05
Information literacy	0.529	0.001

Discussion

This study examined the relationship between information literacy and evidence-based medicine in clinical residency who worked at hospitals affiliated with KUMS. The results showed that information literacy (each of the five components) and evidence-based medicine had a direct, positive, and significant relationship with each other.

Delfan, in his review, highlighted the need for continuous training in the field for general practitioners (11). In another study by Mary Anne Friesian, she introduced training, education, and research as a way to empower the physicians (12). On the other hand, in this study, most participants stated that they did not receive training. There was a significant relationship between training and literacy amount. Since information literacy affects evidence-based medicine competencies, the need for more training in information literacy is undeniable. However, Dragon Iliac et al. concluded that participation in training workshops did not cause a significant difference in medical information

search skills and evidence-based competencies for medical students. They considered training more effective as a part of the curriculum during the preclinical and clinical years (13). In this regard, Andrea P Frazier highlighted the necessity of the inclusion of health literacy courses in the students' curriculum during the first and fourth years to inform students about the importance of health literacy development in teaching medical colleges (14).

The study of Sadeghi et al. (2010) showed that the residents at KUMS had little insight into evidence-based medicine, and only 20% of them were aware of evidence-based medicine, which is in line with our results that showed mean and standard deviation of the use of evidence-based medicine was equal to 2.78 ± 0.49 and residents have moderate evidence-based competencies (15). On the other hand, Zarea reported that the mean score of using evidence-based medicine in clinical decision-making by medical residents was 43.3 % (3), which can be explained by an evidence-based medicine center



at Tabriz University of Medical Sciences. Sadeghi et al. highlighted the necessity of coherent planning on education in evidence-based-medicine and practical application (15).

Hashemian et al. reported that the information literacy of Isfahan University students was somewhere between moderate and ideal levels, and it was essential to strengthen the skill of information literacy in students (9). Kamali Pour et al. examined the information literacy of paramedical, nursing, and midwifery students at Bandar Abbas University. They also estimated that information literacy in the students was at a moderate level, and strengthening the students' information literacy skills was essential (16). In the current study, the level of ability clinical residency in information literacy components equal to 3.18 out of 5 (more than average).

Ghahremanfard et al. reported using evidence-based skills as poor; still, the community they studied had a positive view of evidence-based medical programs (17), which is inconsistent with the present study results. However, Sahebzamani et al. reported that awareness of evidence-based medicine in the assistants was at a medium level (5).

All the mentioned studies highlighted the necessity of evidence-based medical education. Moreover, in the competencies of evidence-based medicine by clinical residents, the lowest score was obtained for the component "question formulation," and the highest score was obtained for the component "application of evidence." Sharif Moghadam reported that the highest mean score of evidence-based competencies component was for question formulation skills and the lowest mean score was for evaluating skills results (4). In this regard, Ebrahimi et al. studied medical students at Shiraz Medical Sciences University regarding the evidence-based processes and reported that the highest score was obtained for "Application of evidence" equal to 3.37 (18), which is consistent with the present study

There was a significant relationship between the skills of information literacy and evidence-based medicine ($r=0.592$, $P \leq 0.001$), which is consistent with the study of Ansari and et al. which indicated the promotion of information literacy improves evidence-based performance and increases the clinical performance of nurses and leads to higher community

health in the future (19). Moreover, Mahmoudi et al. showed that information literacy predicted about 40% of health literacy changes (20). Mullen Bach et al. emphasized the necessity of integrating information literacy and evidence-based medicine as a school curriculum (21).

Conclusion

Because of the relationship between information literacy and evidence-based medicine, enhancing information literacy skills could increase the evidence-based medicine competencies in residents. Accordingly, clinical residency can increase the level of evidence-based medicine competencies by learning information literacy skills and improving their clinical decision-making performance, and may lead to the improvement of health in society.

Declarations

Acknowledgement

Researchers express their gratitude to all clinical residents who participated in the study.

Conflicts of Interests

None declared.

Ethical statement

By considering the ethics of research, the required permissions were obtained first from the hospitals' managers. Furthermore, the participants were informed about the study's objectives and the confidentiality of the collected data and participants voluntarily completed the survey.

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Authors' contributions

Mohammad Azami and Moazame Soltaninejad designed and directed the project; Akbar Mehralizadeh analysed the data; Moazame Soltaninejad wrote the article.

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