



Medical Information Sources Used by Specialists and Residents in Mashhad, Iran

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Abstract

Background: Physicians continually need to update their knowledge to ensure appropriate decision making about patient care.

Objectives: We aimed to identify and compare information sources used by specialists and residents, their reasons for choosing these sources, and the level of their confidence in these sources.

Materials and Methods: We conducted a cross-sectional study among specialists and residents using a validated questionnaire in the five academic hospitals affiliated with Mashhad University of Medical Sciences (in northeast Iran). We compared the specialists with residents in term of gender, age, years since graduation, use of information sources, confidence in use of information sources, and reasons for selecting the information sources. Within each group, we also investigated the effect of work experience and gender on frequently used information sources and users' confidence in them.

Results: The questionnaire was sent to 315 physicians, including 155 specialists and 160 residents. One hundred twenty-six specialists (response rate: 81%) and 126 residents (response rate: 79%) completed it. The most frequently mentioned sources by all specialists included "English textbooks" (84.9%), "web/internet" (74.6%), "English medical journals" (62.3%), and "discussions with colleagues" (57%). Among residents, "web/internet" (65.9%), "discussion with colleagues" (61.3%), and "Persian textbooks" (50.4%) were the most frequently used sources of information. In both groups, high confidence was demonstrated in "English textbooks," "English medical journals," and "international instructions/guidelines." Both groups counted reliability, easy accessibility, and being up to date as their primary reasons for the selection of their information sources. There was also a significantly negative correlation between using the internet as an information source and age in specialists (Spearman's rho=-0.238, p=0.01), but not in residents.

Conclusions: Reliability, easy accessibility, and being up to date should be considered in establishing information sources for physicians.

Keywords: Information Sources, Physicians, Information Seeking Behavior

1. Background

Evidence refers to the best current information gathered through clinical care investigations (1). Physicians should be able to systematically seek, analyze, and organize information from a variety of information sources in a timely manner, so that they can make informed decisions about their patients. They will not be able to offer qualified care to their patients unless they update their clinical knowledge (2-5). It is necessary for physicians to apply existing, updated evidence to their practice, so that they can make sure that they have chosen the best and most cost-effective treatments for their patients (6-8).

The results of many studies show that determining

proper information sources in order to make informed decisions in health care has become a difficult task. Information source selection depends on success in accessing the favored information in the fastest and most appropriate way (9). The availability of valid information can be considered a cost-effective strategy for the constant improvement of health care services (10).

Different studies have shown that health care staff use electronic sources such as online databases and hand-held devices, medical books, consultation with colleagues, reference books, and scientific journals as information sources (11, 12). A study comparing the information-seeking behaviors of family physicians and specialists showed that

family physicians were more likely to search for information related to a specific patient's problem, while other specialists were more likely to search for the latest research on a specific topic (9). Although there are different studies in the field of physicians' information-seeking behaviors, there are only few studies on these actions in developing countries (13).

Studies conducted in Iran revealed that the most frequently used information sources for nurses were colleagues (14), whereas general practitioners and faculty members used more books as their information sources (15, 16). Another study compared the use of information sources among specialists, residents, and interns and revealed that specialists use journals, but assistants and interns consider books/reference books when consulting information sources (17).

2. Objectives

This study aims to identify and compare the information sources used by specialists and residents, their reasons for choosing these sources, and the level of their confidence in these sources.

3. Materials and Methods

3.1. Research Setting

A cross-sectional, questionnaire-based study was conducted between August and October 2013 in the five academic hospitals affiliated with Mashhad University of Medical Sciences (in northeast Iran).

Mashhad University of Medical Sciences is one of the biggest universities in Iran, with 7000 students in different fields of medicine and several academic hospitals. It is responsible for the health care of 5,994,402 inhabitants.

The investigators visited all clinical departments and personally handed a letter of introduction and questionnaire to each physician. The letter explained the study. The physicians' participation was voluntary and uncompensated. Agreeing to participate in the study by responding to the questionnaire implied consent.

3.2. Sample

The target population consisted of physicians working in the five academic hospitals affiliated with Mashhad University of Medical Sciences. The criteria for selecting physicians were their willingness to participate and their availability. The questionnaire was offered to 315 physicians, including 155 specialists and 160 residents. A total of 252 physicians completed the questionnaire. We included only specialists (university faculty members), regardless of their grade, specialty, age, or gender, and residents regardless of their age or gender. Based on the sample size calculation formula for a survey, and with a confidence level of

95% and population of 750 persons, we needed a sample size of about 254 subjects.

3.3. Questionnaire Design

We designed our questionnaire based on previous studies and the published literature (9-11, 18, 19). The questionnaire included four parts: (1) the participant's demographic characteristics (gender, age, occupation, years since graduation); (2) sources of medical information used in clinical practice ("English textbooks," "Persian textbooks," "seminar/congress," "weekly conferences," "continuing medical education (CME) attended courses," "CME virtual courses," "educational classes," "discussion with colleagues," "internal instructions/guidelines," "international instructions/guidelines," "drug company information," "media (TV and radio)," "professional newsletters," "web/internet," "electronic documents (offline)," "personal notes," and others); (3) reasons for using information sources; (4) confidence in using information sources.

Two medical informatics specialists and three physicians were asked to provide feedback on the format, clarity, and meaning of questions and response options. Their suggestions were all incorporated in the questionnaire, and minor modifications were made to the questions. Furthermore, a pilot study was conducted to test the questionnaire prior to the main study. To this end, ten physicians working in different units of the hospital were included in the pilot study. The test-retest reliability of the instrument was conducted within two weeks. The participants were also invited to comment on the clarity and comprehensibility of the questionnaire. The threshold for acceptable of test-retest reliability is .75. In this study, the test-retest reliability was 85 percent, which was considered satisfactory or good.

3.4. Statistical Analysis

We used a non-parametric test (Mann-Whitney U) for ordinal data and chi-square for our categorical data to assess the differences between the two groups. We considered significance at the $P < 0.05$ level. The data were analyzed using the SPSS version 16.0.

3.5. Ethical Approval

The Research Committee of Mashhad University of Medical Sciences (No: 910514-24, approved date: 1.2.2013) approved this study; we also obtained authorization from the hospitals' managers and supervisors. An anonymous questionnaire was used. Participants' information confidentiality and privacy were maintained.

4. Results

4.1. Characteristics of the Study Population

In this study, 252 physicians (126 residents (response rate: 79%) and 126 specialists (response rate: 81%)) completed the questionnaire. Table 1 shows that most physicians (65.5% specialists vs 61% residents) were male. As predicted, specialists tended to be older than residents and to have more experience in medicine. The average age of specialists was 45 years (SD = 9.5), compared to 32 years for residents (SD = 5.3) ($P < 0.001$).

Table 1. Characteristics of Specialists (n = 126) and Residents (n = 126) and Statistical Significance of the Differences Between Them^a

Characteristics	Specialists	Residents	P-Values
Gender (N = 237)			0.470
Male	78 (65.5)	72 (61)	
Female	41 (34.5)	46 (39)	
Age in years (N = 228)			< 0.001
< 30	3 (2.6)	60 (53.1)	
30 - 39	24 (20.9)	44 (38.9)	
40 - 49	57 (49.6)	8 (7.1)	
50 - 59	19 (16.5)	1 (0.9)	
60 ≤	12 (10.4)	0	
Years since Graduation (N = 153)			< 0.001
1 - 5	34 (30.6)	27 (64.3)	
6 - 9	20 (18)	11 (26.2)	
10 - 12	14 (12.6)	3 (7.1)	
≥ 13	43 (38.7)	1 (2.4)	

^aData are presented as No. (%).

4.2. The Most Frequently Used Sources of Relevant Information

The most frequently mentioned sources by specialists were “English textbooks” (84.9%), “web/internet” (74.6%), “English medical journals” (62.3%) and “discussion with colleagues” (57%) (Table 2).

For the residents, “web/internet” (65.9%), “discussion with colleagues” (61.3%), and “Persian textbooks” (50.4%) were the most frequently used sources of information. Specialists indicated that continuous medical education (CME), virtual courses (44.2%), and professional newsletters (34.5%) were the least frequently used information sources. Also, residents reported that CME virtual courses (59.3%), CME attended courses (46.9%), and Persian medical journals (42.3%) were the least frequently used information sources.

Residents used “English textbooks,” “English medical journals,” “seminar/congress,” “CME (attended courses),” and “(inter)national instructions/guidelines” significantly less than the specialists did ($P < 0.001$).

4.3. Confidence in Information Sources

The sources that both specialists and residents felt high confidence in were “English textbooks,” “English medical journals,” and “international instructions/guidelines” (Table 3).

Physicians (both specialists and residents) had the least confidence in the media and professional newsletters. Notably, the specialists had more confidence in CME when compared to residents ($P < 0.05$). Both the residents and specialists reported that they had low confidence in “Persian medical journals,” and the specialists even had less confidence in “Persian textbooks.”

4.4. The Physicians’ Reasons for the Selection of an Information Source

When some physicians were asked to enumerate their reasons for the selection of information sources in order from “1, the most important,” to “7, the least important,” the specialists counted reliability, easy accessibility, and being up to date with mean scores of 2.9, 3.1, and 3.2 respectively. Residents considered reliability, being up to date, and easy accessibility with mean scores of 2.4, 2.5, and 2.6, sequentially, as their primary reasons for the selection of their information sources (Table 4).

4.5. Comparison of Using Information Sources in Relation to Gender, Work Experience, and Age

There was a significant difference between using some information sources, such as weekly seminars ($P = 0.019$), personal notes ($P < 0.001$), and gender, in the group of specialists. Men used more of these information sources than women. For residents, significant differences existed between only using Persian textbooks ($P = 0.040$), Persian medical journals ($P = 0.031$), and internal instructions ($P = 0.017$) in relation to gender. Women were more likely to use Persian textbooks and internal instructions, while men were more likely to use Persian medical journals.

No significant differences existed between using information sources and work experience in either group of physicians ($P > 0.05$).

There was a positive relationship between using some information sources and age among both specialists and residents (Table 5). Only a significant negative correlation existed between using the internet as an information source and age in specialists.

4.6. Comparison of confidence in Information Sources in Relation to Gender, Work Experience, and Age

There was a significant difference between confidence in some information sources, such as personal notes ($P < 0.001$) and discussions with colleagues ($P = 0.012$), in relation to gender in the group of specialists. Men had more confidence in these information sources.

Table 2. Frequency of Use of Information Sources^a

	Use of Information Sources				Use of Information Sources				P-Values
	Specialists (n = 126)				Residents (n = 126)				
	Always	Some	Never	Median (Q1,Q3)	Always	Some	Never	Median (Q1,Q3)	
English Textbook	107 (84.9)	19 (15.1)	0	3 (3,3)	55 (45.8)	62 (51.7)	3 (2.5)	2 (2, 3)	< 0.001
Persian Textbooks	10 (9.6)	67 (64.4)	27 (26)	2 (1,2)	61 (50.4)	53 (43.8)	7 (5.8)	3 (2, 3)	< 0.001
English Medical Journals	76 (62.3)	44 (36.1)	2 (1.6)	3 (2,3)	31 (27)	66 (57.4)	18 (15.7)	2 (2, 3)	< 0.001
Persian Medical Journals	7 (6.6)	76 (71.7)	23 (21.7)	2 (2,2)	16 (14.4)	48 (43.2)	47 (42.3)	2 (1, 2)	0.058
Seminar/Congress	33 (27.5)	84 (70)	3 (2.5)	2 (2,3)	12 (10.3)	64 (55.2)	40 (34.5)	2 (1, 2)	< 0.001
Weekly Conferences	30 (25.9)	75 (64.7)	11 (9.5)	2 (2,3)	26 (21.7)	79 (65.8)	15 (12.5)	2 (2, 2)	0.341
CME (Attended Courses)	24 (20.2)	84 (70.6)	11 (9.2)	2 (2,2)	15 (13.3)	45 (39.8)	53 (46.9)	2 (1, 2)	< 0.001
CME (Virtual Courses)	5 (4.8)	53 (51)	46 (44.2)	2 (1,2)	7 (6.2)	39 (34.5)	67 (59.3)	1 (1, 2)	0.051
Educational Classes	30 (26.8)	68 (60.7)	14 (12.5)	2 (2,3)	40 (34.2)	57 (48.7)	20 (17.1)	2 (2, 3)	0.650
Discussion with Colleagues	69 (57)	50 (41.3)	2 (1.7)	3 (2,3)	76 (61.3)	43 (34.7)	5 (4)	3 (2, 3)	0.617
Internal Instructions/guidelines	29 (25)	71 (61.2)	16 (13.8)	2 (2,2.75)	24 (20.3)	56 (47.5)	38 (32.2)	2 (1, 2)	0.009
International Instructions/guidelines	43 (35.5)	68 (56.2)	10 (8.3)	2 (2,3)	18 (15.9)	64 (56.6)	31 (27.4)	2 (1, 2)	< 0.001
Drug Company Information	10 (8.6)	75 (64.7)	31 (26.7)	2 (1,2)	9 (7.8)	68 (58.6)	39 (33.6)	2 (1, 2)	0.288
Media (TV and Radio)	2 (1.8)	41 (36)	71 (62.3)	1 (1,2)	13 (11.5)	53 (46.9)	47 (41.6)	2 (1, 2)	< 0.001
Professional Newsletters	5 (4.4)	69 (61.1)	39 (34.5)	2 (1,2)	16 (13.8)	56 (48.3)	44 (37.9)	2 (1, 2)	0.673
Web/Internet	91 (74.6)	27 (22.1)	4 (3.3)	3 (2,3)	81 (65.9)	41 (33.3)	1 (0.8)	3 (2, 3)	0.183
Electronic Documents (Offline)	33 (28.4)	76 (65.5)	7 (6)	2 (2,3)	37 (31.9)	67 (57.8)	12 (10.3)	2 (2, 3)	0.981
Personal Notes	44 (37.9)	64 (55.2)	8 (6.9)	2 (2,3)	41 (35.3)	66 (56.9)	9 (7.8)	2 (2, 3)	0.660

^aData are presented as No. (%).

Also, significant differences existed between confidence in some information sources, such as CME (attended courses) ($P = 0.029$) and CME (virtual courses) ($P = 0.013$) and work experience. These sources were used more often by specialists who had more work experience.

In the group of residents, women had more confidence in seminars / congresses ($P < 0.001$), CME (attended courses) ($P = 0.043$), internal instructions ($P < 0.001$), drug company information ($P = 0.043$), and the internet ($P = 0.027$) than men did. In this group, there was no significant difference between confidence in information sources and work experience ($P > 0.05$).

There is a positive relationship between confidence in some information sources and age in both groups of physicians (Table 5).

5. Discussion

The results obtained from the present study showed that the use of English textbooks, web/internet, and English medical journals are the most frequently chosen sources by specialists searching for medical infor-

mation, while, for residents, the most used sources are web/internet, discussions with colleagues, and Persian medical sources.

Previous studies have concluded that printed books and journals were the most trusted information sources, which is inconsistent with the findings of the present study (19, 20). Kapiriri and Bondy reported that physicians' statements and "discussions with colleagues" followed by textbooks, were the most frequently used sources of information for physicians who participated in their study (10). They showed that reliability is the most important reason for selecting an information source. Moreover, in accordance with our results, a review of confidence levels in different information sources showed that specialists and residents have the most confidence in English textbooks. Cullen's research showed that general practitioners mostly rely on medical journals and books, rather than other sources, especially the internet/web (21). However, our results showed that, among residents who are younger and belong more to the Internet Age than specialists, the internet was the first preferred information source. Our findings support previous research indicating

Table 3. Confidence in Use of Information Sources^a

Source of Information	Level of Confidence			Median (Q1, Q3)	Level of Confidence			Median (Q1, Q3)	P-Values
	Specialists (n = 126)				Residents (n = 126)				
	High	Some	None		High	Some	None		
English Textbooks	107 (88.4)	14 (11.6)	0	3 (3, 3)	107 (89.9)	12 (10.1)	0		0.712
Persian Textbooks	11 (10.1)	79 (72.5)	19 (17.4)	2 (2, 2)	40 (33.6)	74 (62.2)	5 (4.2)	3 (3, 3)	< 0.001
English Medical Journals	86 (72.9)	32 (27.1)	0	3 (2, 3)	73 (62.9)	39 (33.6)	4 (3.4)	2 (2, 3)	0.076
Persian Medical Journals	11 (10.3)	80 (74.8)	16 (15)	2 (2, 2)	24 (20.9)	64 (55.7)	27 (23.5)	3 (2, 3)	0.836
Seminar/Congress	28 (23.9)	82 (70.1)	7 (6)	2 (2, 2)	28 (25)	70 (62.5)	14 (12.5)	2 (2, 2)	0.534
Weekly Conferences	26 (22.4)	83 (71.6)	7 (6)	2 (2, 2)	27 (23.5)	80 (69.6)	8 (7)	2 (2, 2.75)	0.963
CME (Attended Courses)	29 (25.9)	77 (68.8)	6 (5.4)	2 (2, 3)	24 (21.6)	67 (60.4)	20 (18)	2 (2, 2)	0.041
CME (Virtual Courses)	18 (18.6)	67 (69.1)	12 (12.4)	2 (2, 2)	15 (13.8)	67 (61.5)	27 (24.8)	2 (1.5, 2)	0.036
Educational Classes	38 (34.9)	66 (60.6)	5 (4.6)	2 (2, 3)	44 (38.9)	61 (54)	8 (7.1)	2 (2, 3)	0.738
Discussion with Colleagues	36 (30.5)	76 (64.4)	6 (5.1)	2 (2, 3)	38 (32.2)	80 (67.8)	0	2 (2, 3)	0.408
Internal Instructions/guidelines	37 (33)	67 (59.8)	8 (7.1)	2 (2, 3)	42 (36.8)	54 (47.4)	18 (15.8)	2 (2, 3)	0.744
International instructions/guidelines	73 (64)	36 (31.6)	5 (4.4)	3 (2, 3)	60 (53.1)	50 (44.2)	3 (2.7)	2 (2, 3)	0.138
Drug Company Information	37 (33)	67 (59.8)	8 (7.1)	2 (1, 2)	42 (36.8)	54 (47.4)	18 (15.8)	3 (2, 3)	0.256
Media (TV and Radio)	2 (1.8)	52 (46.8)	57 (51.4)	1 (1, 2)	11 (9.8)	54 (48.2)	47 (42)	2 (2, 2)	0.057
Professional Newsletters	10 (9.1)	73 (66.4)	27 (24.5)	2 (1.75, 2)	14 (12.5)	70 (62.5)	28 (25)	2 (1, 2)	0.743
Web/Internet	40 (34.8)	70 (60.9)	5 (4.3)	2 (2, 3)	60 (52.6)	53 (46.5)	1 (0.9)	2 (1.25, 2)	0.004
Electronic Documents (Offline)	41 (36)	66 (57.9)	7 (6.1)	2 (2, 3)	43 (38.4)	64 (57.1)	5 (4.5)	3 (2, 3)	0.617
Personal Notes	31 (28.2)	70 (63.6)	9 (8.2)	2 (2, 3)	29 (26.1)	65 (58.6)	17 (15.3)	2 (2, 3)	0.299

^aData are presented as No. (%).**Table 4.** Reasons for Selecting the Information Sources and Physicians Preference on a Scale From 1 "the Most Preferred" to 7 "the Least Preferred"

Reasons for Selecting	Specialists ^a	Preference ^b	Residents ^a	Preference ^b
Reliability	105 (83.3)	2.9 (2.5)	105 (83.3)	2.4 (2.1)
Accessibility	107 (84.9)	3.1 (2.2)	108 (85.7)	2.6 (2.3)
Being up to date	107 (84.9)	3.2 (2.5)	106 (84.1)	2.5 (2.2)
Ease of use	95 (75.4)	3.7 (1.9)	103 (81.7)	3 (2.1)
Being concentrated on one source	100 (79.3)	3.8 (2.2)	98 (77.8)	3.5 (2.1)
Reduced costs	102 (80.9)	4.2 (1.9)	106 (84.1)	3.3 (2.1)
Being in Persian language	91 (72.2)	4.7 (2.4)	100 (79.3)	3.8 (2.2)

^aData are presented as No. (%).^bData are presented as Mean (SD).

that residents use internet as the most important information source (22). The physicians' unfamiliarity with online instruments and the great deal of information demanding "information literacy" for access were mentioned as the reasons of the low usage and confidence to online sources (9). In this respect, also the findings about information sources' use in relation to specialists' ages showed that there is a significant relationship between using the web/

internet as an information source and age.

Among existing textbooks, the findings showed that texts in the Persian language were used less by physicians (specialists and residents) than texts in English. However, the specialists had less confidence in Persian textbooks compared to the residents. These texts are usually translated from the English language. One reason for this lack of confidence could be related to translation problems, such

Table 5. Spearman Correlations Between Using Some Information Sources, or Confidence in Some Information Sources, and Age in Specialists and Residents²

Information Sources	Using Information Sources				Confidence in Information Sources			
	Specialists		Residents		Specialists		Residents	
	Spearman's rho	P-Values	Spearman's rho	P-Values	Spearman's rho	P-Values	Spearman's rho	P-Values
English Textbooks	-	-	0.273	< 0.001	NA	NA	NA	NA
English Medical Journals	NA	NA	0.352	< 0.001	NA	NA	NA	NA
Persian Medical Journals	NA	NA	0.216	0.032	NA	NA	NA	NA
Seminar / Congress	0.300	0.001	0.351	< 0.001	NA	NA	NA	NA
Weekly Conferences	0.265	< 0.001	0.329	< 0.001	NA	NA	0.234	0.017
CME (Attended Courses)	0.240	0.012	0.225	0.023	NA	NA	0.241	0.015
CME (Virtual Courses)	NA	NA	0.248	0.012	NA	NA	NA	NA
Educational Classes	0.239	0.015	NA	NA	NA	NA	NA	NA
Drug Company Information	NA	NA	0.254	< 0.001	NA	NA	0.261	< 0.001
Media (TV and Radio)	NA	NA	0.242	0.014	NA	NA	0.231	0.020
Professional Newsletters	NA	NA	0.239	0.014	NA	NA	0.280	< 0.001
Web/Internet	0.238	0.012	NA	NA	NA	NA	NA	NA
Electronic Documents (Offline)	NA	NA	0.355	< 0.001	NA	NA	NA	NA
Discussion with Colleagues	NA	NA	NA	NA	0.228	0.017	0.388	< 0.001
International instructions/ guidelines	NA	NA	NA	NA	0.191	0.051	NA	NA
Personal notes	NA	NA	NA	NA	NA	NA	0.311	< 0.001

² Abbreviation: NA, No statistically significant correlation available.

as an incomplete understanding of the original content and intent of the original authors. Therefore, physicians prefer to refer to the original texts. In addition, Persian textbooks are not updated in a timely manner. Specialists are usually looking for information that has been recently produced in English, whereas residents are looking for basic information that is available in Persian-language books that have been recommended by specialists. This can explain the difference in the level of confidence between specialists and residents relating to Persian-language books.

Discussions with colleagues has the most effect on physicians' decision making, compared to other information sources (10). In addition, discussions with colleagues were sometimes mentioned as the easiest and most quickly accessible source of information among physicians (18, 23-28). However, in the current study, discussions with colleagues was the fourth preferred source for specialists and the second among the residents, with only average levels of confidence cited by both groups.

Among the different sources studied in this research, the media, professional newsletters, and CME courses were mentioned as the less frequently used ones by both groups. Reviewing confidence levels in these sources showed that

they also had the least level of physicians' confidence. Despite the positive features of these sources, such as their low cost and being in Persian, it seems that physicians do not use these sources. More effort and better programs are needed to improve the level of use and confidence in these potentially useful sources. The confidence of specialists with more work experience was higher for "CME courses." Also, specialists had more confidence in the CME, as compared to residents. It seems that the specialists, as lecturers and organizers of these courses, have more confidence in them, compared to the residents who participate in the courses as learners.

Despite the strengths of this study, which include its high response rate, it has some limitations. First, this study was carried out in a specific area, which makes its generalization for other areas difficult. Second, the participants of this study belonged to different specialty fields; hence, the next studies might be done about different specialties separately, where comparisons might lead to different, valuable conclusions. Another limitation of the study is related to its sampling method. The authors selected the samples here based on availability and willingness to participate.

In conclusion, available, trusted, and up to date in-

formation sources can improve treatment results and health care services by contributing to the efficient use of sources and a reduction of the time spent by physicians researching information. As continuing medical education is seldom used as a popular information source, attention should be paid to revising current educational programs and methods. Also, improving access to English-language resources through hospital libraries could be effective, considering the high confidence of the physicians in English-language medical literature.

Footnotes

Authors' Contribution: Saeid Eslami and Masoumeh Sarbaz carried out the design and participated in most of the research sections. Saeid Eslami coordinated the study. Masoumeh Sarbaz drafted the manuscript. Mohammad Hassan Aelami and Hamid Reza Naderi provided assistance in the design of the study, coordinated and carried out all research sections, and participated in the manuscript's preparation. All authors have read and approved the content of the manuscript.

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References

- Charles C, Gafni A, Freeman E. The evidence-based medicine model of clinical practice: scientific teaching or belief-based preaching? *J Eval Clin Pract.* 2011;**17**(4):597-605. doi: [10.1111/j.1365-2753.2010.01562.x](#). [PubMed: [21087367](#)].
- Gonzalez-Gonzalez AI, Dawes M, Sanchez-Mateos J, Riesgo-Fuertes R, Escortell-Mayor E, Sanz-Cuesta T, et al. Information needs and information-seeking behavior of primary care physicians. *Ann Fam Med.* 2007;**5**(4):345-52. doi: [10.1370/afm.681](#). [PubMed: [17664501](#)].
- Kannampallil TG, Franklin A, Mishra R, Almoosa KF, Cohen T, Patel VL. Understanding the nature of information seeking behavior in critical care: implications for the design of health information technology. *Artif Intell Med.* 2013;**57**(1):21-9. doi: [10.1016/j.artmed.2012.10.002](#). [PubMed: [23194923](#)].
- Zafonte B, Szabo RM. Evidence-based medicine in hand surgery: clinical applications and future direction. *Hand Clin.* 2014;**30**(3):269-83. doi: [10.1016/j.hcl.2014.04.005](#). [PubMed: [25066846](#)].
- Kostagiolas PA, Bairaktaris KD, Niakas D. An information behaviour investigation of the community pharmacists in Greece for developing library and information services. *Health Info Libr J.* 2010;**27**(1):46-56. doi: [10.1111/j.1471-1842.2009.00846.x](#). [PubMed: [20402804](#)].
- Singh H. Diagnostic errors: moving beyond 'no respect' and getting ready for prime time. *BMJ Qual Saf.* 2013;**22**(10):789-92. doi: [10.1136/bmjqs-2013-002387](#). [PubMed: [24048615](#)].
- Van Den Bos J, Rustagi K, Gray T, Halford M, Ziemkiewicz E, Shreve J. The 17.1 billion dollar problem: the annual cost of measurable medical errors. *Health Aff (Millwood).* 2011;**30**(4):596-603. doi: [10.1377/hlthaff.2011.0084](#). [PubMed: [21471478](#)].
- Martis R, Ho JJ, Crowther CA. Survey of knowledge and perception on the access to evidence-based practice and clinical practice change among maternal and infant health practitioners in South East Asia. *BMC Pregnancy Childbirth.* 2008;**8**(1):34. [PubMed: [18680603](#)].
- Bennett NL, Casebeer LL, Kristofco R, Collins BC. Family physicians' information seeking behaviors: a survey comparison with other specialties. *BMC Med Inform Decis Mak.* 2005;**5**:9. doi: [10.1186/1472-6947-5-9](#). [PubMed: [15784135](#)].
- Kapiriri L, Bondy SJ. Health practitioners' and health planners' information needs and seeking behavior for decision making in Uganda. *Int J Med Inform.* 2006;**75**(10-11):714-21. doi: [10.1016/j.ijmedinf.2005.10.003](#). [PubMed: [16343988](#)].
- Dawes M, Sampson U. Knowledge management in clinical practice: a systematic review of information seeking behavior in physicians. *Int J Med Inform.* 2003;**71**(1):9-15. [PubMed: [12909153](#)].
- Wallace RL, Woodward NJ, Clamon TS. A mixed-methods analysis of a library-based hand-held intervention with rural clinicians. *Health Info Libr J.* 2014;**31**(3):215-26. doi: [10.1111/hir.12076](#). [PubMed: [25155980](#)].
- Katikireddi SV. HINARI: bridging the global information divide. *BMJ.* 2004;**328**(7449):1190-3. doi: [10.1136/bmj.328.7449.1190](#). [PubMed: [15142931](#)].
- Davarpanah M, Azami M. Nurses' information behaviour and information need [Persian]. *JPLF Ardebil Uni Med Sci.* 2011;**17**(3):427-53.
- Barikani A. Sources of Information in General Physicians. *J Med Educ.* 2009;**11**(3&4):4).
- Rahimi A, Ghahnaviyeh H. Faculty Members' Informational Needs and their Methods of Access to information in Isfahan University of Medical Sciences. *Iran J Med Educ.* 2010;**10**(3):255-61.
- Kazemi Z. A survey on information behaviour of specialists, assistants and intern of Ahvaz University of Medical Sciences [Persian]. *JHIM Isfahan Uni Med Sci.* 2004;**2**.
- Callen JL, Buyankhishig B, McIntosh JH. Clinical information sources used by hospital doctors in Mongolia. *Int J Med Inform.* 2008;**77**(4):249-55. doi: [10.1016/j.ijmedinf.2007.06.003](#). [PubMed: [17646126](#)].
- Bernard E, Arnould M, Saint-Lary O, Duhot D, Hebbrecht G. Internet use for information seeking in clinical practice: a cross-sectional survey among French general practitioners. *Int J Med Inform.* 2012;**81**(7):493-9. doi: [10.1016/j.ijmedinf.2012.02.001](#). [PubMed: [22425281](#)].
- Kloda LA, Bartlett JC. Clinical information behavior of rehabilitation therapists: a review of the research on occupational therapists, physical therapists, and speech-language pathologists. *J Med Libr Assoc.* 2009;**97**(3):194-202. doi: [10.3163/1536-5050.97.3.008](#). [PubMed: [19626145](#)].
- Cullen RJ. In search of evidence: family practitioners' use of the Internet for clinical information. *J Med Libr Assoc.* 2002;**90**(4):370-9. [PubMed: [12398243](#)].
- Kitchin DR, Applegate KE. Learning radiology a survey investigating radiology resident use of textbooks, journals, and the internet. *Acad Radiol.* 2007;**14**(9):1113-20. doi: [10.1016/j.acra.2007.06.002](#). [PubMed: [17707320](#)].
- Brown PJ, Borowitz SM, Novicoff WM. Information seeking in the NICU: resident and faculty perspectives. *AMIA Annu Symp Proc.* 2003:796. [PubMed: [14728301](#)].
- Jones TH, Hanney S, Buxton MJ. The information sources and journals consulted or read by UK paediatricians to inform their clinical practice and those which they consider important: a questionnaire survey. *BMC Pediatr.* 2007;**7**:1. doi: [10.1186/1471-2431-7-1](#). [PubMed: [17224061](#)].
- Kim GR, Bartlett EL Jr, Lehmann HP. Information resource preferences by general pediatricians in office settings: a qualitative study. *BMC Med Inform Decis Mak.* 2005;**5**:34. doi: [10.1186/1472-6947-5-34](#). [PubMed: [16225686](#)].
- Rappolt S. Family physicians' selection of informal peer consultants: implications for continuing education. *J Contin Educ Health Prof.* 2002;**22**(2):113-20. doi: [10.1002/chp.1340220207](#). [PubMed: [12099120](#)].
- Dwairy M, Dowell AC, Stahl JC. The application of foraging theory to the information searching behaviour of general practitioners. *BMC Fam Pract.* 2011;**12**:90. doi: [10.1186/1471-2296-12-90](#). [PubMed: [21861880](#)].
- Gagliardi AR, Wright FC, Davis D, McLeod RS, Urbach DR. Challenges in multidisciplinary cancer care among general surgeons in Canada. *BMC Med Inform Decis Mak.* 2008;**8**:59. doi: [10.1186/1472-6947-8-59](#). [PubMed: [19102761](#)].