

## Answering Questions in Unscheduled and High-Acuity Environments. Do Medical Students Practice EBM?

<sup>1</sup>Ebadi Fard Azar Farbod, <sup>2</sup>Eskrootchi Rogheyeh and <sup>3,4</sup>Kahouei Mehdi

<sup>1</sup>Department of Health, Health School, Iran University of Medical Sciences, Tehran, Iran

<sup>2</sup>Department of Librarian, Management and Medical Informatics School,  
Iran University of Medical Sciences, Tehran, Iran

<sup>3</sup>Department of Para Medical, Nursing and Paramedical School,  
Semnan University of Medical Sciences, Iran

<sup>4</sup>Department of Health Information Management, Management and Medical Informatics School,  
Iran University of Medical Sciences, Tehran, Iran

---

**Abstract:** This study was done to determine the types of information sources that medical students use to answer clinical questions in emergency medicine to assess whether the sources are evidence-based to determine factors which encourage or inhibit the use of the resources and to provide suggestions for evidence based decision making. Questionnaires and observations were used to collect data from seventy medical students at teaching hospitals in Iran University of medical sciences. Analysis of data was conducted by SPSS. Chi-square, two-tailed and bi-variation correlation tests were used to investigate the significant association among the data. The results showed few students used evidence-based sources daily and the most of medical students due to time limitation, poor access to databases, lack searching skills and depriving of handheld computers such as Personal Digital Assistants (PDAs) and pocket cards containing evidence based decision support tools had to preferred traditional information resources such as patient, patient chart and colleagues daily. The results support information professionals participation in increasing and improving the searching skills of the students specially in EBM, the focus on EBM skills of students in predominantly clinical venues, such as morning report, journal clubs, ambulatory care blocks and patient presentations and the use of technologies such as new versions PDAs and pocket cards because of ease of use, time factor and accessibility of clinical decision support tools. These attributes are hallmarks of a modern medical curriculum that have been incorporated into many reformed curricula internationally.

**Key words:** High-acuity, environments, medical students, EBM, information sources, emergency

---

### INTRODUCTION

The medical schools objectives are identified attributes, knowledge and skill sets that medical students should possess at the time of graduation. One of the identified skills is the ability to retrieve, manage and utilize patient-centered information for clinical decision making (Dorsch *et al.*, 2004). Information management is the ability to deal effectively with the vast volume of medical information that is increasing too rapidly for physicians to keep pace (Pluye and Grad, 2004). It focuses on using currently available information resources to remain up to date with new valid information that is relevant to the care of patients and is accessible while taking care of patients and the use of these resources is required for effective practice (Shaughnessy and Slawson, 1999). These information resources are critically appraised for validity

practicing Evidence Based Medicine (EBM) (Slawson and Shaughnessy, 2005). The practice of EBM means the conscientious explicit and judicious use of the best available external clinical evidence in making decisions about the care of individual patients from systematic research in information resources (Joy and Benrubi, 2004). EBM has become the approach developed to help clinicians manage patient-centered information and many medical schools are using EBM to help their learners achieve the practice-based learning and improvement competency (Slawson and Shaughnessy, 2005). So that teaching of EBM with its associated skills of literature searching and critical appraisal took hold in the last decade and has become even more widespread in medical education at the graduate and undergraduate levels (Aiyer *et al.*, 2002; Green, 1999). Most physicians believe that practicing EBM improves patient care (McCull *et al.*,

1998) but in unscheduled and high-acuity environments such as emergency medicine patient care team members must address their information needs quickly and accurately (Reddy and Spence, 2006; Lappa, 2005). In the course of every patient visit, emergency physicians use information resources to communicate with those who have prior information, view patient data, document findings and plans, guide clinical decision making, educate patients and communicate with the next caregiver (Teich and Waeckerle, 1997). In the emergency medicine, physicians have to manage the flow of patients in and out of the unit. These objectives naturally influence the physician's information-seeking activities (Reddy and Jansen, 2008). Several studies have focused specifically on interns and residents information seeking behavior (Ramos *et al.*, 2003; Green and Ruff, 2005). Cohen *et al.* (1982) found out that interns residents and faculty serving in general internal medicine perceived journals to be their most important source of information (Green and Ruff, 2005). Northup *et al.* (1983) revealed that medical students and residents preferred to get information from books, colleagues, journals and other sources (Green and Ruff, 2005). While the clinical encounter is understood to be a significant educational experience little is known about the information seeking behavior of medical students in response to clinical problems in emergency medicine. Identification of information resources that students use to acquire information for clinical practice in emergency medicine could be an important area of research for medical practice. Because nothing study has focused on medical students information seeking behavior especially in emergency medicine in Iran. So there were questions such as what sources do students employ to answer questions generated in the fast-paced, information-intensive environments? Do students usually get answers from colleagues or from yet other sources? As EBM, do the students use evidence-based sources for clinical decision making? What do factors encourage or inhibit medical students in selection information resources? These questions are matters that concern the health of patients, public the organization of institutions and services for training and providing information to students. The implications of this study reveal information professionals can play a significant role in designing programs and systems to encourage the accessibility of resources for students without interrupting the flow of care.

#### **MATERIALS AND METHODS**

This study examines the information searching behavior of medical students (interns) in the Emergency

departments at teaching hospitals (Rasool Akram, Firoozgar, Hashemi Nezhad) in Iran University of Medical Sciences (Tehran, 2008). The emergency departments were staffed by nurse, nursing students, medical students and physicians. The study was approved by management and medical informatics school research board.

In this study, questionnaire and observation were used. In observation, the research of the medical students was observed during their shifts to get a deep understanding of their preferences for information sources. They were asked to indicate their willingness to be volunteer. Informed consent was first obtained and the students were subsequently observed. Also patients were asked for their verbal consent to allow observing the encounter. The students were instructed to practice in their normal manner during the observation period. During the observations, information resources noted by a checklist as they were used by the students. In the checklist information resources were categorized such as patient, patient chart, nursing staff, physicians, students, medical secretaries, print resources and unit information system. Following a review of the literature, a survey instrument was developed that included up to three parts primarily related to demographics use of information resources for retrieval of care information and barriers for electronic resources retrieval. A covered letter described the aims of the study explained that response to the survey implied consent to participate and the participants were assured that all individual responses would be kept confidential. A pilot version of the questionnaire was sent to twenty students randomly selected from the list of educational supervisor of the hospitals. The final version of the questionnaire which was an anonymous questionnaire was given to all students of emergency departments ( $n = 111$ ). The twenty pilot study participants were excluded from selection. The data were interpreted based on observation reports and data from questionnaires.

The categorization of frequency of use of resources was based on daily, weekly, monthly and never. Inter-rater reliability for the categories was assessed and there was found high reliability (0.95). Analysis of questionnaire data was conducted with the SPSS application. Chi-square and two-tailed and bi variation correlation tests were used to investigate significant associations among the data.

#### **RESULTS AND DISCUSSION**

**Observations:** About 648 questions were noted during observation. The students used from several information resources in clinic settings. The results showed that the most students questions were asked from patients

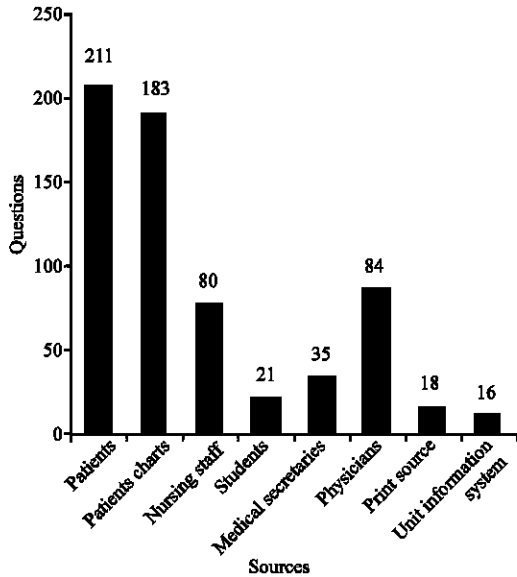


Fig. 1: Question asked of each source by medical students at emergency department of teaching hospitals in Iran University of Medical Sciences 2008 (n = 648)

(n = 211). In 183 questions, the students used from patients' chart. Unit information systems were the least important source of information (n = 16) (Fig. 1).

**Questionnaire:** The overall response rate for the questionnaire was about 63% of the 111 questionnaires sent out 70 were returned. The average number of patients visited by the students per day was 11.9, average age was 26 and 64% were male. About 88.6% of students reported using patient chart and 84.3% of those reported using from interviewing patient daily.

There was a significant positive correlation between patient and patient chart sources ( $p < 0.01$ ). Relatively fewer students reported using websites (22.9%) and E-journals (11.4) daily (Table 1).

The most two barriers in information retrieval from electronic resources were time limitation and the poor access to databases (Fig. 2). There were statistically significant relationships among seeking information from patient and patient's chart and physicians and nursing staff and time limitation and poor access to databases barriers.

The results showed the students had different information seeking behaviors. The observation showed the students depended on finding accurate information quickly and efficiently in order to provide care to their patients. The most of students relied on traditional

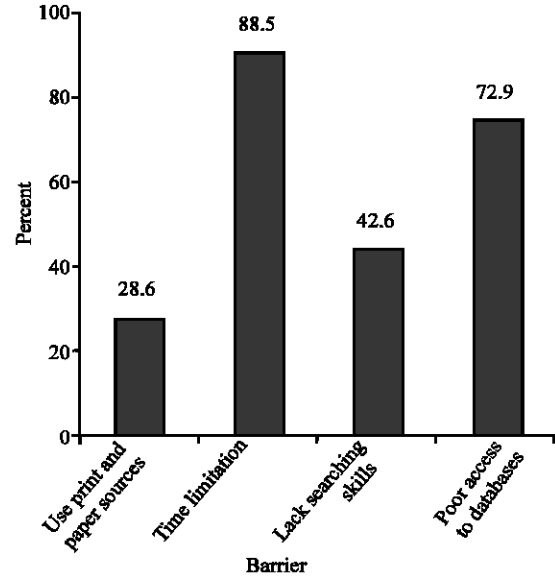


Fig. 2: Medial students' barriers for electronic resources retrieval at teaching hospitals in Iran University of Medical Sciences 2008

information resources such as patient, patient chart and colleagues to help them to find the needed information. Previous research illustrated that physicians frequently consulted another doctor generally a specialist or other colleague (Joy and Benrubi, 2004). It must be noted that although the questionnaire and the observation indicated that human and paper resources were preferred resources, this was not always through choice but often from necessity so that the observations revealed these resources were readily available and other resources such as website and emergency information system were not readily available. This study showed the students relied on books and drug reference manuals to solve doubts and fill information gaps. A preference for them as resources of information was almost unanimous in research with similar populations (Joy and Benrubi, 2004) and similar to the current results, these books and drug reference manuals were often part of a private collection. The results showed the students chose not to use electronic resources sometimes and selected other resources for information retrieval. As they reported that the use of websites was fairly low and of electronic journals less frequently daily. Although, the students reported using the websites and the E-journals weekly but it is noteworthy that the factors of urgency and patient expectation emerged information seeking. As the information seeking that occurs during the week following the patient encounter is therefore more likely to be related to needs that are perceived as less urgent. This

Table 1: Medical students' frequency of use of information sources at teaching hospitals in Iran University of Medical Sciences 2008 (n = 70)\*

Sources	Frequency				Mean (SD)	p-value
	Daily	Weekly	Monthly	Never		
Patient†	59 (84.3)	5 (7.1)	2 (2.9)	4 (5.7)	2.7 (0.78)	0.000
Patients chart†	62 (88.6)	6 (8.6)	1 (1.4)	1 (1.4)	2.8 (0.50)	0.000
Physicians	41 (58.6)	14 (20)	10 (14.3)	5 (7.1)	2.3 (0.96)	-
Other students	18 (25.7)	20 (28.6)	17 (24.3)	15 (21.4)	1.5 (1)	-
Nurses	37 (52.9)	9 (12.9)	12 (17.1)	12 (17.1)	2 (1.18)	-
Textbooks	34 (48.6)	19 (27.1)	9 (12.9)	8 (11.4)	2.1 (1.03)	-
Drug reference manuals	35 (50)	23 (32.8)	6 (8.6)	6 (8.6)	2.2 (0.93)	-
Websites	16 (22.9)	37 (52.9)	10 (14.3)	7 (9.9)	1.8 (0.87)	-
E-journals	8 (11.4)	25 (35.8)	22 (31.4)	15 (21.4)	1.2 (0.93)	-

\*The items were rated on the scale 0 = never, 1 = daily, 2 = weekly, 3 = monthly; †significant relationship between patient and patient chart

investigation showed that because time was such a limiting factor, the students wanted answers to patient care questions that could be located quickly and easily. So that in the questionnaire the most of students (88.5%) reported that time was an important consideration in their retrieval of information. The results showed significant relationships among time limitation factor and the use of traditional information resources. Verhey (1999) also found lack of time to be a significant factor in searching for information. More than seventy percent of the students reported that they had poor access to databases in a convenient central location at their worksites and this problem was one cause of their low level of database searching for patient care questions. The observations revealed that the process of leaving a patient in the exam room going to a computer searching for and reviewing information and then going back to the patient is one process that does not research. The observations revealed that the students deprived from handheld computers such as Personal Digital Assistants (PDAs) and pocket cards containing evidence based decision support tools and they had to preferred traditional information resources in clinical setting. Because the sources were on the patient floors and were easy to access. This reinforced the earlier findings of Lathey and Hodge (2001) that accessibility and convenience were the motivational factors in selection of a health information resource. Handheld computers such as PDAs containing database and patient oriented evidences, clinical decision rules and practice guidelines risk calculators and basic information on drugs can perform more functions than traditional information resources and hold promise in further promoting the practice and learning of evidence based medicine anywhere (Lathey and Hodge, 2001). Providing students with decision support tools on a PDA has the potential to improve their educational experience with evidence based medicine. So that other studies showed improving access to the medical literature through a PDA at the point of care yielded considerable positive changes in actual use of evidence, while clerking patients and seemed to boost students confidence in

clinical decision making generally (Leung *et al.*, 2003). The pocket cards containing information such as the evidence based decision making cycle, levels and sources of evidence and abbreviated guidelines on appraising the relevance and validity of articles about diagnostic tests, prognosis, treatment and practice guidelines remind and prompt students to apply evidence based medicine techniques in their clinical learning (Leung, 2001). The observation of participants indicated that emergency information system was used by those who were skilled in and comfortable using computers. One of reasons why technology is not adopted by health care professionals is lack of training (McKnight *et al.*, 2001). The lack of prior training also clearly contributed to their infrequent database searching. Despite one of the EBM skills is searching skill in the databases but 42.6% of the students reported that had not searching skills. These students affirmed a need to learn more about research techniques. This reported lack of skill in handling databases and other electronic resources has also been noted by others (Hung *et al.*, 2008). These founds reaffirm that important opportunities remain for information professionals to provide access to information resources and educate students in how to efficiently and effectively utilize such tools.

## CONCLUSION

This study showed the most of medical students due to time limitation poor access to databases and lack searching skills could not use evidence-based resources completely. So, they preferred information resources that were immediately available to them for clinical patient care questions. The results revealed rather than practicing EBM the most students managed the information resources and that could impact on the quality of the information by the need for rapid retrieval. This study has the important issues for medical student educators. Educational programs aiming to introduce handheld clinical decision support tools to improve learning of evidence based medicine in medical students are

recommended. However, the findings reinforce the idea that students should use technologies such as PDAs and pocket cards because of ease of use time factor and accessibility.

These attributes are hallmarks of a modern medical curriculum that have been incorporated into many reformed curricula internationally. This study suggests information professionals participation in increasing searching skills of the students. Because they are uniquely qualified to improve the information-seeking capabilities of the students specially in EBM. Also for better practicing EBM it is focused on EBM skills of students in predominantly clinical venues, such as morning report, obstetric rounds journal clubs, ambulatory care blocks and patient presentations. Reinforcement of introductory and advanced EBM principles through these methods can be powerful tools in assisting the students to become more critical clinicians (Reilly and Lemon, 1997; Bazarian *et al.*, 1999). The study has certain limitations.

First in spied of the students were asked to practice in their normal manner but we can not determine whether the students diverged from their normal practice patterns as a result of the study.

The second limitation of this study was the use of a single observer in the ED. We were unable to document information seeking behaviors of the students out of clinical settings during our observations. However, we believe that the data that we gathered represent the students' information seeking behavior during the course of their research. Third, the present research may have limited generalizability to other settings however, similarities between the current results and medical student's information seeking behavior in other studies (Ramos *et al.*, 2003; Green and Ruff, 2005) point to commonality of challenges and preferences among medical students, perhaps independent of geographic location.

#### ACKNOWLEDGEMENTS

The researchers wish to acknowledge the contributions and support of the directors in teaching hospitals, the emergency departments' supervisors and medical students. Also, this study has been supported financially by Iran University of Medical Sciences.

#### REFERENCES

Aiyer, M., P. Hemmer, L. Meyer, T.A. Albritton, S. Levine and S. Reddy, 2002. Evidence-based medicine in internal medicine clerkships: A national survey. *Southern Med. J.*, 95: 1389-1395.

Bazarian, J.J., C.O. Davis, L.L. Spillane, H. Blumstein and S.M. Schneider, 1999. Teaching emergency medicine residents evidence-based critical appraisal skills: A controlled trial. *Ann. Emergency Med.*, 34: 148-154.

Cohen, S.J., M. Weinberger, S.A. Mazzuca and C.J. McDonald, 1982. Perceived influence of different information sources on the decision-making of internal medicine house staff and faculty. *Soc. Sci. Med.*, 16: 1361-1364.

Dorsch, J.L., M.K. Aiyer and L.E. Meyer, 2004. Impact of an evidence-based medicine curriculum on medical students and skills. *J. Med. Lib. Assoc.*, 92: 397-406.

Green, M.L. and T.R. Ruff, 2005. Why do residents fail to answer their clinical questions? A qualitative study of barriers to practicing evidence-based medicine. *Acad. Med.*, 80: 176-182.

Green, M.L., 1999. Graduate medical education training in clinical epidemiology, critical literature appraisal and evidence based medicine: A critical review of curricula. *Acad. Med.*, 74: 686-694.

Hung, P.W., S.B. Johnsona, D.R. Kaufmana and E.A. Mendonça, 2008. A multi-level model of information seeking in the clinical domain. *J. Biomed. Inform.*, 41: 357-370.

Lappa, E., 2005. Undertaking an information-needs analysis of the emergency-care physician to inform the role of the clinical librarian: A Greek perspective. *Health Inform. Lib. J.*, 22: 124-132.

Lathey, J.W. and B. Hodge, 2001. Information seeking behavior of occupational health nurses: How nurses keep current with health information? *Official J. Am. Assoc. Occup. Health Nurses*, 49: 87-95.

Leung, G.M., 2001. Evidence-based practice revisited. *Asia-Pac. J. Public Health*, 13: 116-121.

Leung, G.M., J.M. Johnston, K.Y. Tin, I.O. Wong, L.M. Ho, W.W. Lam and T.H. Lam, 2003. Randomized controlled trial of clinical decision support tools to improve learning of evidence based medicine in medical students. *Br. Med. J.*, 327: 1090-1090.

McColl, A., H. Smith, P. White and J. Field, 1998. General practitioners' perceptions of the route to evidence based medicine: A questionnaire survey. *Br. Med. J.*, 316: 361-365.

McKnight, L., P.D. Stetson, S. Bakken, C. Curran and J.J. Cimino, 2001. Perceived information needs and communication difficulties of inpatient physicians and nurses. *Proc. AMIA Symp.*, 2001: 453-457.

Northup, D.E., M. Moore-West, B. Skipper and S.R. Taef, 1983. Characteristics of clinical information searching: Investigation using critical incident technique. *Acad. Med.*, 58: 873-881.

- Pluye, P. and R.M. Grad, 2004. How information retrieval technology may impact on physician practice: An organizational case study in family medicine. *J. Eval. Clin. Pract.*, 10: 413-430.
- Ramos, K., R. Linscheid and S. Schafer, 2003. Real-time information-seeking behavior of residency physicians. *Family Med.*, 35: 257-260.
- Reddy, M. and P.R. Spence, 2006. Finding answers: Information needs of a multidisciplinary patient care team in an emergency department. *AMIA Annu. Symp. Proc.*, 2006: 649-653.
- Reddy, M.C. and B.J. Jansen, 2008. A model for understanding collaborative information behavior in context: A study of two healthcare teams. *Inform. Process. Manage.*, 44: 256-273.
- Reilly, B. and M. Lemon, 1997. Evidence-based morning report: A popular new format in a large teaching hospital. *Am. J. Med.*, 103: 419-426.
- Shaughnessy, A.F. and D.C. Slawson, 1999. Are we providing doctors with the training and tools for lifelong learning? *Br. Med. J.*, 319: 1280-1280.
- Slawson, D.C. and A.F. Shaughnessy, 2005. Teaching evidence-based medicine: Should we be teaching information management instead? *Acad. Med.*, 80: 685-689.
- Teich, J.M. and J.F. Waeckerle, 1997. Emergency medical informatics. *Ann. Emergency Med.*, 30: 667-669.
- Verhey, M.P., 1999. Information literacy in an undergraduate nursing curriculum: Development, implementation and evaluation. *J. Nurs. Educ.*, 38: 252-259.