



# Medical students' attitudes on and experiences with evidence-based medicine: a qualitative study

Morteza Ghojazadeh PhD,<sup>1</sup> Sakineh Hajebrahimi MD,<sup>2</sup> Saber Azami-Aghdash PhD,<sup>4</sup> Fatemeh Pournaghi Azar MD,<sup>5</sup> Majid Keshavarz MSc,<sup>3</sup> Mohammad Naghavi-Behzad MD<sup>7</sup> and Hakimeh Hazrati MSc<sup>6</sup>

<sup>1</sup>Associate Professor of Physiology, Liver and Gastrointestinal Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>2</sup>Professor of Urology, <sup>3</sup>MSc student, Iranian Center for Evidence-Based Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>4</sup>Student of Health Policy, Hospital Management Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>5</sup>Assistant Professor Dentistry, <sup>6</sup>Medical Student, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>7</sup>Medical Student, Medical Philosophy and History Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

## Keywords

attitudes, evidence-based medicine, experiences, medical students, qualitative study

## Correspondence

Mr Saber Azami-Aghdash  
Hospital Management Research Center  
Tabriz University of Medical Sciences  
Tabriz 0411  
Iran  
E-mail: [saberazami@yahoo.com](mailto:saberazami@yahoo.com)

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## Abstract

**Rationale, aims and objectives** This qualitative study was designed to determine the attitudes towards and experiences of medical students on evidence-based medicine (EBM).

**Methods** The study was conducted using the phenomenological method. Medical students' attitudes about and experiences with evidence-based medicine were determined through semi-structured interviews. Forty senior medical students were chosen by purposive sampling from medical sciences students of Tabriz University and Shahid Beheshti University. The context of interviews was analysed using the content analysis method.

**Results** Medical students' attitudes and experiences were ascertained through four main questions, and their answers were divided in to 12 categories and 31 subcategories. According to the subjects of the study, two basic concepts that they understood about EBM were its being up to date and requiring research skills. To the question what is necessary for EBM, the students' answers were summarized as follows: access to information, teamwork and faculty members who could provide modeling and organizational support. Students reported having used EBM for problem solving, thinking and self-confidence. On the other hand, lack of equipment and facilities, human factors and organizational factors were considered the main barriers to EBM use.

**Conclusion** According to the results of this study, providing suitable conditions and appropriate planning to address identified barriers and encouraging students can promote EBM practice. Also, more extensive EBM integration in medical curricula and clinical settings by leading faculty members would prompt medical students to use EBM in their daily practice.

## Introduction

Evidence-based medicine (EBM) is defined as the integration of clinical knowledge with the best available external evidence and patient values [1–3]. EBM is achieved by translating the need for information into an answerable question, then tracing down the most authentic information and critically appraising it to answer that question [4,5]. Evidence-based care began with medicine, but now it has affected all aspects of health [6]. Using evidence potentially leads to treatment and care improvement, cost reduction, trust in health care practitioners and a feeling of satisfaction in patients [7–9]. It seems that evidence-based practice (EBP) has to

start with medical schools, and undergraduate students should be the ones who start asking answerable questions, developing effective literature searching strategies and learning critical appraisal skills to evaluate all research findings [10,11]. Therefore, their habits will gradually change to the utilization of evidence-based clinical guidelines for achieving best-practice results. Some structured quantitative studies have already been done to determine the knowledge, attitudes and practice equality of medical students regarding EBM and EBP [12–14].

In this study, the sample students were taken from the medicine departments of the Universities of Tabriz and Shahid Beheshti because these two universities are well known for having

pioneered EBP in Iran. This study aims to determine medical students' attitudes on and experiences with EBM.

## Methods and materials

This qualitative study was conducted using the phenomenological method. The researchers' aim was to explain phenomenon by assessing clinical experiences, behaviours and opinions in a way that happens in real life [15]. This method thoroughly evaluates individuals' opinions, attitudes and experiences in a natural setting. This study aimed to assess the medical students' attitudes on and experiences with EBM in 2011–2012. Participants were senior medical students of Tabriz and Shahid Beheshti Universities, who were chosen by using the purposive sampling method. After explaining the aims and methods of the study, all students agreed to participate. Consent forms were filled out by the participants at the beginning of the study. In addition, participants were explicitly informed that they were free to leave the experiment at any time. Participants were also assured that their confidentiality would be protected, and the results would be available to them.

Forty students who had a background in EBP, taken part in EBM workshops, and had at least one year of clinical practice experience were recruited in this study.

Semi-structured interviews were used for data collection. The central questions of the interview were the following: what are the impacts of applying evidence-based medicine in a clinical setting?; what benefits did you gain from using EBM in your own practice?; describe your experiences with using EBM. To encourage students to explain adequately, some probing questions were added. For instance: by employing authentic literature and evidence, what strengthening capabilities did you notice in your own practice on patients' care?; how could capabilities in clinical care be developed by using evidence? The duration of the interview was 30 to 45 minutes and the conversation recording would be stopped if the students did not want to continue. Each interview was written on paper as well. Analysing and gathering data was done simultaneously using the content analysis method (Corbine and Srtavous). Each interview was encoded before the next interview, and by extracting key sentences. Researchers compared codes with each other and to previous interview data (constant comparative analysis). Afterward, researchers categorized the codes, and by determining categories, the relationship between main categories and minor categories was checked. Coding and categorizing was done by two people of research team in following process: familiarizing with data, searching for themes, formulating themes, naming themes, assessing reliability of analysis. To increase the rigor of the study, at the end of each interview, the participants were asked to review their answers to make sure that their comments on EBM had been accurately recorded and no misunderstanding had happened (construct validity).

In addition, two other researchers checked the interview text and agreed on the codes, so differences were recognized and modifications were done (inter-rater reliability).

## Results

In this study, attitudes on and experiences with EBM of 40 medical students were collected through semi-structured interviews. At the end of the study, after analysing interview text on four

main subjects, the data was divided into 12 categories and 31 subcategories (Table 1).

Attitude regarding the EBM concept: it was explained in two categories and six subcategories.

### Updating

The updating category includes two subcategories. The first is using the most up-to-date literature, and the second is do not rely on old books. In this regard, one of the participants said, 'Based on our field of study, we have to use the latest results of journals.' Another participant said, 'Since our books are old, we cannot rely on them.'

### Research skills

The subcategories of this category include literature search skills; the ability to formulate a research question; searching and data-collection strategies; the ability to analyse, extract and utilize data from the existing studies; and scrutinizing the search results, as well as critical appraisal of evidence. One participant pointed out, 'We need to find our own papers.' Another participant said, '... I need to come up with a good research question to cover my problem in practice, and then I must find an answer for it.' Regarding analysis and the results of studies conducted, one of the participants said, '... We should be able to systematically search databases among conducted studies and then use them accordingly.' Another participant believed that the results of all research and conducted studies are not reliable, and added, 'It's not reasonable to accept the results of all researches. We should have access to all of them, so that we can select the reliable ones ...'

The necessity of EBM use was explained in four categories and eight subcategories.

### Steadily changing science

This comprises two subcategories: steady growth in knowledge production and distribution, and considering old knowledge as invalid information. One of the participants explained, 'Considering that everyday new information can be generated, we should know about them.' Another participant added, 'You can see the earlier method is wrong now and must not be used anymore.'

### Group interaction

This category includes cooperation and consultation and relationships. One of the students commented, 'In evidence-based medicine, I could share my information with my medical team. ... I would not only trust my own knowledge' (participant 1). This statement forms a minor category of consultation. Cooperation is another piece of this category, defined as members' inclination to get involved in teamwork and to actively contribute to one another to make sure that the most reliable evidence is being used in practice. One of the participants elucidated that 'It was necessary to consult with other members of our training group to check details and be able to offer better care' (participant7).

### Teacher's role

This category includes two subcategories: applying EBM in medical educational environments and encouraging students to use

**Table 1** Medical students' attitudes on and experiences with on evidence-based medicine (categories and subcategories)

Main question	Main themes	Subthemes
What is your attitude regarding the EBM concept?	Updating	Using the latest resources Not relying on olds books
	Research skills	Research ability The ability to design research questions and collect data The ability to analyse and use data Lack of trust in research results and critical evaluation of evidence
What are the necessities and requirements to use EBM?	Rapid publication of new information	High-speed production of knowledge and published text Previous scientific method being wrong
	Group interaction	Cooperation and consultation Relationships
	Teacher's role	EBM usage in classroom and field Encouraging students to use EBM
	Organizational support	Give priority to support chief executive officers Provide suitable equipment and resources
What are the results of EBM usage?	Problem solving	Assessment Objectivity Prudence
		Thinking
	Self-efficacy	Programme implementation Independence Capability
	What are the barriers to using EBM?	Facilities and equipment
Human – individual		Negative attitude and lack of belief in EBM Low skills using EBM Resistance to change
Organizational		Bureaucratic system Lack of organizational culture No support of EBM

EBM. One of the participants specified, 'I think teachers should act as role models, by using EBM in their practices at hospitals and in classrooms.' Another student emphasized that, 'Trainers should try to use EBM and should also encourage their trainees to do so.'

### Organizational support

This is another category that facilitates EBM practice by medical students that includes two subcategories: giving priority to supporting leading medical faculty members who practice EBM, and providing required equipment and resources. One of the participants specified that, 'In practicing EBM, university and faculty members should be in the forefront, and they should be supportive and lead the students toward using EBM. Otherwise, students do not have enough incentive to apply EBM and can't do it alone.' Another participant pointed out: '[A] university must provide suitable facilities and equipment, such as full access to full-text journals.'

### The result of EBM use

The analysis of the students' experiences and attitudes in regard to the results of EBM use has been divided into three categories and nine subcategories. Their explanations follow.

### Problem solving

In evaluating participants' experiences, we determined that the medical students would develop the most productive method in practice when they aligned their efforts to access EBM with patients' needs and values. It was recognized that students determined that the best way to have a good practice is by focusing on patients' wants and problems. One of the participants said, 'When I use journals to find answers to my questions, I try to find appropriate ways and measures that also address the needs and problems of patients.' Some of the participants believed that it would help them to better solve the needs of patients by gaining new knowledge, about which one of the students said, 'When a patient's problems were determined, the next step would be to search and apprise the evidence and apply it in practice' (participant 27). These kinds of experiences formed the category of prudence. In students' opinions, EBM would help create an accurate line of treatment tailored to meet the patients' needs and values.

One of the participants said, 'When the problem I want to solve is recognized, I would objectively try to solve it' (participant 5). This kind of statement can be put into the objective practice category. This minor category of assessment means recognizing patients' needs to reach a solution. Regarding this, one of the

participants said, 'For patient care, it is necessary to recognize their needs . . . I also get more complete information on disease and treatment approaches and how to assess patients' needs by using evidence' (participant 4). Therefore, the problem-solving theme includes case assessment, objectivity and prudence.

### Critical thinking

Participants believed that to provide reasonable answers to questions and to deliver care for patients, one is required to meticulously analyse the concept. One of the participants commented, 'I analyze problems to be able to solve them, so I need to study and ponder upon the case and explore sufficient reasoning to answer the question. The last step is to critically appraise the solution before reaching a conclusion and, in the end; the solution needs to be criticized for conclusion and coordination . . .' (participant 11).

In fact, students evaluate patients' problems to find sound reasons and solutions to be able to make accurate decisions.

These kinds of student experiences form a minor category called ratiocination. This study also elucidated on the importance of having an open mind in medical practice. To be open-minded, the participants believed that EBM should be supplemented with curiosity, contemplation and being vigilant. In the participants' opinions, EBM accompanied curiosity, contemplation and thinking. According to one of the students, 'This process fosters curiosity and the contemplation of problems . . . I ascertain more interesting approaches using EBM . . .' (participant 16). Another part of applying evidence in practice is to employ it in order to analyse data and make a suitable decision. One of the participants pointed out that 'In patient care, in order to make a sound decision, only reliable resources should be utilized, and I usually check details and analyze problems by thoroughly studying scientific, peer-reviewed literature, relevant data and statistics.'

Common emerging productive patterns in the participants' attitudes towards EBM comprised reasoning, comparing and analysing relevant data, and validating information.

### Self-confidence

Self-confidence in this study refers to the students' belief in their own abilities. A sense of this self-efficacy was associated with confidence. Also, independently following EBM steps in treatment was another positive finding regarding EBM. One of the students commented, 'I think I can develop an aptitude to independently solve problems by acquiring comprehensive information and having a systematic approach in problem solving . . .' Accordingly, self-efficacy strengthens students in doing their medical duties and mitigates their need for supervision.

One of the students said, 'When I search for answers by systematically studying up-to-date text books and journals, I feel I have less need for the continuous presence of a supervising trainer . . .' (participant 21).

### Barriers to using EBM

Students' perspectives regarding the barriers of EBM use have been divided into three categories and nine subcategories.

### Facilities and equipment

This category includes two subcategories: lack of access to authentic data sources such as Cochrane and journals, and lack of proper facilities such as computers, Internet and an equipped library. One of the participants explained, 'Unfortunately, we do not have access to many journals.' Another participant said, 'Our libraries are not well-equipped with up-to-date, authentic books,' and, in regard to 'inadequate equipment,' another student expressed his/her concern by saying, 'The internet speed at our facility is very low.'

### Personal attitude and aptitude

In students' opinions, negative attitudes, not believing in EBM, having inadequate skills in retrieving relevant literature and applying it to answer a research question are the barriers to applying EBM. One participant noted, 'Some professors, especially those who are older, don't believe in EBM. Another participant stated, 'Some students also don't have the proper skills to use EBM, or they don't want to, I don't know.'

### Organizational

In students' opinions, organizational factors are also barriers to using EBM. By analysing students' comments and experiences, these barriers have been divided into three subcategories: the national bureaucratic system, inefficient organizational culture and not believing in or supporting EBM. One participant mentioned that 'According to the current circumstances in our hospitals, there are a lot of regulations and restricting policies and, even if you want to practice based on evidence, you'll give up. It's very difficult to follow EBM within this administrative system.' Another participant stressed inefficient organizational culture and elucidated by saying, 'Our healthcare practitioners in hospitals are not accustomed to applying EBM.' One other participant noted that, in our hospitals, the EBM method is not supported and expressed: 'There isn't sufficient support for employing EBM.'

### Discussion

This study was designed to evaluate students' attitudes and experiences in regard to EBM by asking four general questions. Eventually, students' attitudes and experiences were analysed in 12 categories and 31 subcategories (Table 1). According to the medical students participating in this study, doctors using updated knowledge are the main concept of EBM. Many studies on this subject also showed that updated knowledge is the key concept of EBM [16–18]. In Momenzade and colleagues, most doctors stated that EBM means updating doctors' knowledge [19]. In a similar phenomenological study conducted by Hassani and Khachian, opinions of clinical nurses on EBM were divided into three categories and 18 subcategories [20]. In other words, by comparing these two studies on EBM, a lot of similarities are ascertained. These similarities can be summarized as EBM leads health care practitioners towards using updated knowledge in practice. Research capability means that one is able to search the literature and can vigilantly extract required information from authentic

article databases and indexes based on your clinical structured question [21]. The research capability has been lightly covered in this study.

Also, unlike the results of some other studies [7,22–24], in this study, students did not mention the relationship between EBM and patient treatment process. This concept, however, can be guessed at, students are not familiar with the concept of EBM and its implementation in clinical setting. Hence, it is necessary for students to learn how to translate their knowledge of EBM into practice. In our previous study, a urologist mentioned that EBM can improved their outcomes in surgical fields [25]. Students' statements on the necessity of EBM use have been allocated into four categories and eight subcategories. In students' opinions, the main necessities of EBM use were fast pace of knowledge extraction and steady growth in medical knowledge production. In this context, another study conducted by McKenn and colleagues. EBP in primary care also showed that quick access to newly updated knowledge and steady growth in medical knowledge production are the rationale for EBM use [26].

Thus, according to the study's participants, it is necessary to change experience-based medicine to EBM. In this study, some participants stated that to be able to apply EBM, group interactions are of paramount importance. As one of the participants noted, 'EBM is a team effort. We must understand it correctly.' In this context, some resources have emphasized holding educational meetings in clinical departments and in the form of morning reports, case conferences and use of evidence as means of increasing group interactions [27]. To develop the teamwork in clinical settings, creating a positive and productive atmosphere is required. Such a productive environment can be formed by creating networks or positive relationships among doctors, doctors and patients, and other health care practitioners. Students in this study also emphasized providing suitable circumstances for teamwork, under which EBM can be practiced.

Similar to other studies conducted on this subject [15,28–34], students in research established that having organizational support and a productive environment facilitating teamwork are two basic requirements for EBM practice among medical practitioners. According to the participants, enhancing enterprise support, simplifying administrative procedures and the elimination of burdensome legislations are some effective strategies to facilitate EBM use. In this study, the medical students believed that problem solving, thinking and self-confidence were the results of EBM use. Their answers originated from their experiences in hospital settings.

The importance of using evidence in problem solving matched well with previous study results [35,36]. According to Yuping *et al.* [37], the application of evidence means solving problems in a real situation in the best way at the best time. Forrest [38] also stated that integrating clinical needs and problems to form a research question and source searching for answering the question are the evidence-based learning's components. Sharifi and colleagues [39] also showed that trainees get involved in research and use the results to find solutions for any practice or concept problems. In this study, a sense of self-efficacy was comprehended as an advantage of EBM. Self-efficacy means an individual's ability to work independently with confidence [40]. Ghanizade and colleagues [41] showed that updated information and empowerment in trainees can cause independence when facing clinical issues. In

addition to self-confidence, thinking and thoroughly examining a health problem was another category to analyse in the students' experiences with EBM. In this study, another theme of analysing participants' experiences was thinking. Other studies have shown that case-based active problem solving leads to an elevated level of understanding among medical practitioners [16].

In this study, barriers to using EBM have been divided into three categories, including facilities and equipment, personal attitude and aptitude, and organization. In terms of facilities and equipment, a lack of access to the latest updated literature and databases were the major barriers. This problem was not exclusive to Iran and other studies conducted in other parts of the world pointed out similar problems in accessing medical databases. Also, according to previous study results [42–51], barriers were similar to the findings of this study. Hence, it seems that it is necessary to provide suitable equipment, including easy access to authentic journals. In addition to equipment insufficiency, based on the participants' opinion, individual attitudes and aptitudes such as disbelief in EBM, resistance to change and having little skill in literature search methods were foremost as personal barriers in EBM use. Rapp *et al.* also elucidated that having negative attitudes, resistance to change and ineffective search methods are personal impediments in using EBM [52]. Such personal obstacles can be mitigated by offering tutorials on efficiency of EBM use in practice and leading faculty members showing positive attitudes towards EBM in clinical settings.

Personal attitudes might be altered over time, but without a supportive organizational factor, no one could hope for doctors to use evidence in their daily practice. Organizational factors such as a bureaucratic system and lack of organizational support for promoting EBM are the other barriers noted by the participants of the study. According to the compiled results, responsible authorities' neglect and organizational restricting policies are the main barriers for developing EBM use. Besides personal and organizational factors, lack of enough time for doctors, nurses and other health care practitioners was another barrier to achieve EBM [49,53–56]. Time limit was not mentioned by the participating medical students, probably because they had enough time to apply EBM in their practice.

To promote EBM uptake by students, proper planning can be made for education and encouraging students in employing EBM. One bias of the study could be participant selection method because it was difficult to know individuals who had EBP experience. Another limitation of this study, similar to other qualitative studies, is generalizability of the results to other settings and individuals. To elevate the reliability of the study, similar studies in other educational settings and with other medical students should be conducted. Finally, in using the results of this study, the hugely controversial nature of the EBM [57–60] should be considered. Because the present study investigated the attitudes and experiences of medical students and these controversies are not focused on.

## Conclusion

The result of this study showed that EBM, in students' opinions, means having search skills and using updated knowledge. Steady growth in knowledge production, and easy access to updated information, according the subjects of the study, is necessitated for



EBM use. Students who use EBM in clinical settings have more of a sense of self-confidence and empowerment. The trainer's role of modelling for EBP can provide a good environment to understanding all steps appropriately, which means that being up to date is just one circle of EBM's three circles. Participants also believe that low literature search skills, negative attitudes and lack of equipment or organizational support were the key barriers to EBM. So, based on the results of this study, providing suitable conditions, appropriate planning to address identified barriers and encouraging students can facilitate EBM use by medical students. EBM also should be more integrated in educational programmes of medical students.

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