



## Evidence- Based Medicine for Medical Students

Hamidreza Mahboobi<sup>1,2</sup>; Akshay Sharma<sup>3</sup>; Tahereh Khorgoei<sup>1</sup>; Keramat Allah Jahanshahi<sup>1</sup>; Elizabeth Cottrell<sup>4</sup>

1-Hormozgan University of Medical Sciences (HUMS), Research Mentorship Program (RMP), Iran

2-Payame Noor University (PNU), Iran

3-Kasturba Medical College, Mangalore. Manipal University, India

4-University Hospital of North Staffordshire NHS Trust, England

### STUDENT EDITORIAL

Please cite this paper as: Mahboobi H, Sharma A, Khorgoei T, Jahanshahi KA, Cottrell E. Evidence-based Medicine for Medical Students. AMJ, 2010, 1, 3, 190-193.  
Doi 10.4066/AMJ.2010. 188

#### Corresponding Author:

Hamidreza Mahboobi  
Hormozgan University of Medical Science (HUMS)  
[hamidrezamahboobi@yahoo.com](mailto:hamidrezamahboobi@yahoo.com)

Today, scientific knowledge is progressing fast and medicine, with its all important impact on patients' lives, is no exception. Everyday new medications and therapeutic procedures are being adopted or withdrawn following research findings proving them remarkable or worthless respectively. Protocols of treatment procedures are constantly under revision as a result of new evidence. What was new yesterday is old today and may become obsolete tomorrow. In this age of information technology, such is the pace of change and patient awareness that any physician who does not follow the latest recommendations may be awarded a professional death sentence. To date, several clinicians may actually be practicing age old remedies and treatments quite profitably, the authors are of the opinion that the scenario is likely to change quite soon. With rapid advancement in medical sciences, the ability of doctors to gather more and more information and remain up to date becomes difficult; if not impossible. At the same time, patients are armed to the tooth with latest information about their respective conditions. Even before the doctors tell them about their condition, the patients sometimes already know the differential diagnosis with the available treatment options. In this age of information technology, it is not just useful but also mandatory for the clinicians to stay abreast of developments and choose the best treatment option for their patient.

There is an evident time lag between discovery of new facts and evidence their inclusion in medical texts to be transmitted to the readers. Medical textbooks are often out of date by the time they are published. Moreover, they are often not based on best and latest available evidence and research findings.(1)

Hence one may argue that textbooks alone aren't sufficient to ensure optimum, appropriate and up-to-date clinical decision making for the doctors. For example one can find almost nothing in the latest version of Harrison's Principles of Internal Medicine 17th Edition (2008) about the recent Influenza H1N1 Pandemic.(2) So what does one do? How does a doctor provide up-to-date care? Through the implementation of Evidence-Based Medicine (EBM). It's probably the best way of decision making in the clinical environment.(3) EBM refers to the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.(4, 5)

EBM includes the following five steps:

1. Question your practice.
2. Find the evidence.
3. Appraise the evidence.
4. Act on the evidence.
5. Check you are acting on the evidence.(6)

It is acknowledged that many aspects of medical care are abstract, and hence cannot be quantified, or depend on individual factors, such as quality-of-life, which are only partially subject to scientific methods. Therefore EBM is applied to those areas that are subject to scientific scrutiny. It aims to apply these methods to ensure that the best prediction of outcomes in medical treatment. As discussed by Rosenberg et al. (1995), there is strong academic consensus that scientific evidence should be the platform that supports medical decisions; and it is precisely in this scenario where EBM is considered a new paradigm for medical practice.(7)

Commonly, clinicians take decisions based on their experience and guided by indirect evidence provided by relevant biological disciplines such as physiology, biochemistry and microbiology, which do not interact with medical practice in a direct way. For example (a) using an evidence based approach, a physician can evaluate and communicate the value of prostate cancer screening by finding the latest data on the number needed to screen to prevent one death(8). (b)



understanding how theory relates to real life and actual practice (9)

The use of direct evidence to take clinical decisions has boosted clinical studies, moving one step forward towards the genesis of a new “medical science” known as clinical epidemiology (10). This is a discipline that uses the scientific method to solve relevant medical issues, becoming the main source of evidence that nourishes the EBM. The scientific basis of clinical epidemiology, and by consequence of EBM, is to explain the causes of observed phenomenon through universal laws and to represent these laws in mathematical terms. Sacket et al. (1996) clearly stated that one of the main advantages of EBM’s paradigm when taking medical decisions is the introduction of mathematical terms to predict an important clinical outcome. (4) Thus decisions regarding the advantage of a particular method or technique over another have a quantifiable evidence base.

Although EBM attempts to express clinical information using mathematical models, statistical data alone are not sufficient to direct clinical practice due to the plethora of individual patient specific variables. Thus EBM does require pragmatic interpretation and careful application of absolute data values.

However, in summary, the application and advantages of clinicians actively engaging in EBM include:

1. The number of published books and journals are very low in comparison with the pace of progress in sciences
2. Rapid progress in sciences results in even the annually updated textbooks and monthly published journals to include outdated information.(11)
3. EBM can be helpful to prevent inappropriate variations in clinical practice.(12)

### Why medical students need to apply it

Nowadays patients have access to large volume of medical information online. A quick internet search can yield a ream of information about any condition. Therefore patients may well approach medical students for further information or discussion of the information they have found. Thus it is important for a medical student to understand and evaluate evidence and information to establish that which is reliable and that which is not and to be able to communicate this to patients. (13) Honing such skills while a student will ensure that such practices are second nature after graduation.

Medical students' knowledge about EBM is currently low as it is not always routinely taught in medical schools, nor is a part of formal training. However, short term course and workshops are frequently available and can increase students’ knowledge and improve their attitudes towards EBM. (14-21) The result is improved proficiency in forming medical questions, identifying the best clinical evidence(15) and literature

searching skills(15, 19). Workshops and courses can also improve students’ familiarity, receptivity,(20) and their attitudes towards EBM as well as their self perception of EBM skills. (15, 21)

Time constraints within the curriculum and limited faculty support may represent some barriers for teaching EBM to medical students. (18) Some medical students have disproportionate ‘fear of numbers’ and find it difficult to adopt methods which involve mathematical calculations or statistics.(22) Orsat et al have observed that training systems in some countries are not adequately developed to incorporate teaching of EBM(23)

Medical students need the opportunities to put EBM into practice in real cases while maintaining patients' safety. (24)

Recently some teaching models for applying EBM for medical students in clinical practice have been developed. PEARLS (Presentation of Abstracted from Reaserch Literature to solve real people's problem) is one example. (25) This model attempts to guide medical students to follow the EBM steps to answer a focused clinical question raised by their contact with a real patient. Most of students are able to find useful information about a clinical question suggested by resident or attending physician. (26) But PEARLS also has a special focus on students' ability to pick a good and well-framed question. (25) this can improve their knowledge, confidence, and patient care skills. (27) Also Schwartz etal described a 10 step guideline for improving residents' critical appraisal skills.(28)

Suggestions for improving medical students' knowledge and their use of EBM are:

**Group working:** this allows medical students to share their ideas and their knowledge, to evaluate each others' outcome and may stimulate motivation to learn and use EBM.

**Active participation:** For critical appraisal of medical literature a medical student needs to actively participate in research projects to encounter the limitations and try different ways to solve them. Without this, a medical student may not be able to comprehensively critique research methodology.

**Real patients:** Medical students need to utilise their experience and knowledge of EBM on the real patients at their bedsides. Indeed medical student should take advantage of such opportunities to test his/her experience because any fault after graduation while practsing unsupervised medicine may prove disastrous for their patients.



## References

1. Firooz AR, Khatami AR; A review on evidence-based medicine. *Iranian Journal of Dermatology* 2004; 26(7): 111-101
2. Influenza; Chapter 180. *Harrison's textbook of Internal Medicine*. 17th Ed; 2008
3. Shah HM, Chung KC. Archie Cochrane and his vision for evidence-based medicine. *Plast Reconstr Surg*. 2009 Sep; 124(3):982-8.
4. Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS. Evidence based medicine: What it is and what it isn't. It's about integrating individual clinical expertise and the best external evidence. *BMJ* 1996; 312:71-2.
5. Timmermans S, Mauck A. The promises and pitfalls of evidence-based medicine. *Health Aff* 2005; 24 (1):18-28
6. Dawes M, Lens M. Knowledge transfer in surgery: skills, process and evaluation. *Ann R Coll Surg Engl*. 2007 Nov; 89(8):749-53.
7. Rosenberg W, Donald A. (1995) Evidence based medicine: an approach to clinical problem-solving. *BMJ* 310(6987): 1122-6.
8. Schroder FH, Hugosson J, Roobol MJ, Tammela TLJ, Ciatto S, Nelen V, et al. Screening and Prostate-Cancer Mortality in a Randomized European Study. *N Engl J Med*. 2009 March 26, 2009; 360(13):1320-8.
9. Zehtabchi S, Tubridy C. Evidence-based emergency medicine/systematic review abstract. Resuscitation of hypovolemic emergency department patients: hypertonic or isotonic crystalloids? *Ann Emerg Med*. 2009 Jul; 54(1):128-31.
10. Henao DE, Jaimes FA. (2009) Medicina Basada en la Evidencia: Una aproximación epistemológica. *Biomédica* 29:33-42.
11. Covell, DG, Uman, GC, Manning, PR. Information needs in office practice: Are they being met? *Ann Intern Med* 1985; 103:596.
12. Tomlin Z, Humphrey C, Rogers S. General practitioners' perceptions of effective health care. *BMJ*. 1999 June 5, 1999; 318(7197):1532-5.
13. Marcinkiewicz M, Mahboobi H. The Impact of the internet on the Doctor-Patient Relationship. *AMJ* 2009, 1, 5, 1-6. Doi 10.4066/AMJ.2009.69
14. Lai NM, Teng CL. Competence in evidence-based medicine of senior medical students following a clinically integrated training programme. *Hong Kong Med J*. 2009 Oct; 15(5):332-8.
15. Taheri H, Mirmohamadsadeghi M, Adibi I, Ashorion V, Sadeghizade A, Adibi P. Evidence-based medicine (EBM) for undergraduate medical students. *Ann Acad Med Singapore*. 2008 Sep; 37(9):764-8.
16. Keim SM, Howse D, Bracke P, Mendoza K. Promoting evidence based medicine in preclinical medical students via a federated literature search tool. *Med Teach*. 2008; 30(9-10):880-4.
17. Rhodes M, Ashcroft R, Atun RA, Freeman GK, Jamrozik K. Teaching evidence-based medicine to undergraduate medical students: a course integrating ethics, audit, management and clinical epidemiology. *Med Teach*. 2006 Jun; 28(4):313-7.
18. Kljakovic M. Practising GPs teaching medical students evidence based medicine--a questionnaire survey. *Aust Fam Physician*. 2006 Dec; 35(12):999-1002.
19. Gruppen LD, Rana GK, Arndt TS. A controlled comparison study of the efficacy of training medical students in evidence-based medicine literature searching skills. *Acad Med*. 2005 Oct; 80(10):940-4.
20. Cayley WE, Jr. Evidence-based medicine for medical students: introducing EBM in a primary care rotation. *WMJ*. 2005 Apr; 104(3):34-7.
21. Dorsch JL, Aiyer MK, Meyer LE. Impact of an evidence-based medicine curriculum on medical students' attitudes and skills. *J Med Libr Assoc*. 2004 Oct; 92(4):397-406.
22. Ben-Shlomo Y, Fallon U, Sterne J, Brookes S. Do medical students with A-level mathematics have a better understanding of the principles behind evidence-based medicine? *Med Teach*. 2004 Dec; 26(8):731-3.
23. Orsat M, Bigot P, Roupret M, Campillo B, Beley S, Chautard D, et al. [Evidence-based medicine and French medical students: an appraisal]. *Prog Urol*. 2009 Mar; 19(3):215-20.
24. Caspi O, McKnight P, Kruse L, Cunningham V, Figueredo AJ, Sechrest L. Evidence-based medicine: discrepancy between perceived competence and actual performance among graduating medical students. *Med Teach*. 2006 Jun; 28(4):318-25.
25. Stockler MR, March L, Lindley RI, Mellis C. Students' PEARLS: successfully incorporating evidence-based medicine in medical students' clinical attachments. *Evid Based Med*. 2009 Aug; 14(4):98-9.
26. Thibodeau LG, Mayer D. Can medical students use Evidence-Based medicine to answer clinical queries at the point of care? *Annals of Emergency Medicine*. 2004; 44(Supplement 1):S76-S.



Australasian Medical Journal AMJ, 2010, 1, 3, 190-193

27. Patient-specific clinical questions: Medical student tools for evidence-based learning on dermatology rotations. *Journal of the American Academy of Dermatology*. 2005; 52(3, Supplement 2):AB4-AB.

28. Schwartz MD, Dowell D, Aperi J, Kalet AL. Improving journal club presentations, or, I can present that paper in under 10 minutes. *Evid Based Med*. 2007 June 1, 2007; 12(3):66-a-8.

**PEER REVIEW**

Not commissioned. Externally peer reviewed.

**CONFLICTS OF INTEREST**

The authors declare that they have no competing interests.