

## Evidence Based Medicine, an Innovative Approach to an Old Practice

M S Alkhalifa, E E Elnour, Huda H M Elhassan

Evidence-based medicine (EBM) is a rapidly expanding subject, the aim of this editorial is to give an overview and address some of the practical issues relevant to the developing world.

EBM may be defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients<sup>1</sup>.

Abu bakr Alrazi said “هو ما أجمع عليه الأطباء و”<sup>2</sup>شهد عليه القياس و أيدته التجربة. This is the earliest evidence of EBM we have. However, medicine, since the introduction of the basic sciences in the discipline based medical curricula on 1871 has adopted scientific methodology. With the globalization, revolution of information technology, the expansion of medical knowledge, industry and innovations in the diagnostic and treatment modalities, the need for new standards and benchmarks emerged to keep in pace. Hence, EBM which first appeared in the medical literature under this precise terminology in 1992 by Guyatt *et al.*<sup>3</sup>. The conceptual work which had led to that could be traced to the work of Professor Archie Cochrane in 1972 and to the shift in the research methodology launched by the introduction of large multicenteric international trials in the late eighties of the last century<sup>4</sup>, which paved the way for accepting the concepts behind evidence-based practice.

EBM became a recognized practice with its scientific context and methodology. Three areas of interest and five steps are necessary for practicing EBM<sup>5</sup>.

### Area 1: Establishing the evidence and expressing that in standard terminology:

- a- Level of evidence
- b- Level of recommendation

To determine that three steps are mandatory:

Step 1: Converting the need for information (causation, diagnosis, prognosis, therapy, prevention... etc) into an answerable questions.

Step 2: Tracking down the best evidence to answer these questions.

Step 3: Critically appraising that evidence for its validity (closeness to the truth), impact (size of the effect), and applicability (usefulness in our clinical practice).

### Area 11: Guidelines and managing individual patients

Step 4: Integrating the critical appraisal with our clinical expertise and with our patient's unique biology, values and circumstances. This is

important for setting the guidelines and the best plans for individual patients (which will also be influenced by the available resources).

### Area 111: Promotion of EBM

Step 5: Evaluating our effectiveness and efficiency in executing steps 1-4 and seeking ways to improve them both for next time and promoting EBM.

By setting the standard of classes of recommendations and levels of evidence the following reforms in the clinical research and trials may be noted:

- a- The shift in the study design to meet the best level of evidence and to pass the critical appraisal<sup>1</sup>.
- b- The working groups and societies in almost all disciplines of medicine with their continuous medical education programs, journals, websites, conferences, annual meetings and training courses...ect, mastered the drive of the clinical trials by a comprehensive approach to the pertinent clinical problems and transformed them into questions and designed the best study to give the best answer.
- c- The collaboration between these working groups and medical industries lessen the conflict of interest<sup>6</sup> and convert the medical industries from sellers to promoters and developers of medical research with more transparency and ethical practice.
- d- The critical appraisal led to a better understanding of the level of evidence and recommendation acceptance (table).

The level of evidence ranked from case report and expert opinion to multiple large randomized double blind-controlled trials with more qualifying standards for study design. New concepts and definitions emerged to qualify the impact of evidence<sup>1</sup>.

Based on EBM some of the ideal criteria for a given procedure/treatment to be highly recommended are:

- 1- To have a significant absolute risk reduction (ARR): the difference in the absolute risk (rates of adverse events) between study and control populations<sup>1</sup>.

**Table: Classes of recommendations and levels of evidence of the European Cardiac Society**

<b>Recommendations for various tests and procedures are ranked in three classes</b>	
Class 1	Evidence and/or general agreement that a given diagnostic procedure/treatment is beneficial, useful and effective
Class 11	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy
Class 11a	Weight of evidence/opinion is in favour of usefulness/efficacy
Class 11b	Usefulness/efficacy is less well established by evidence/opinion
Class 111*	Evidence or general agreement that the treatment is not useful / effective and in some cases may be harmful.
<b>The level of evidence related to a particular diagnostic or treatment opinion depends on the available data</b>	
Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses
Level of evidence B	Data derived from a single randomized trial or large non randomized studies
Level of evidence C	Consensus of opinion and/or small studies, retrospective studies or registries.

\*Use of class 111 is discharged unless to alert the medical practitioner for the common unsupported mistakes in practice

2- If the number needed to treat (NNT) is small: the number of patients who must be exposed to an intervention before the clinical outcome of interest occurred; for example, the number of patients needed to treat to prevent one adverse outcome, calculated as the inverse of the absolute risk reduction<sup>7</sup>.

3- To be safe, with low complications or side effects (risk- benefit analysis).

4- To be cost effective

The recommendation will have more influence on the guidelines to be applied in practice if the condition is of high incidence / prevalence and or has a high mortality / morbidity.

The following scenario may clarify these concepts:

If a condition of a high frequency (e.g. 1000 cases per month) and has a mortality of 10 %. If the recommended procedure decreased the mortality to 8%, the ARR will be 2%. So in a month, if left untreated 100 patients will die but if all the patients are treated, 80 patients will die and 20 will be saved (20 out of 1000 i.e. 1 per 50 patients treated) with NNT of 50 but if the mortality was reduced to 5% (with ARR of 5%) only 50 patients will die and 50 will be saved i.e. (1 per 20 patients treated) with NNT of 20, so a highly significant effect will result in a high ARR and a small NNT.

The NNT is not an absolute, e.g. in the above mentioned example if the procedure is highly effective and reduced the mortality to almost zero (0.000001%), the 100 patients who will die if the procedure was not done to them, will all be saved (1 patient per 10 treated) with NNT of 10, which is the best figure can be attained in this case.

Obviously in this example because the condition is of high incidence and mortality, still the procedure with ARR of 2% and NNT of 50 will be recommended but will provoke research questions for a more effective procedure with a resultant NNT approaching 10.

In the era of outcome based medical education and quality assurance, life is getting more demanding e.g. in the past we might have tested the effect and safety of a drug but now more end points are expected such as the risk reduction and long term effects on mortality, morbidity and quality of life, so we need to integrate the critical appraisal with our clinical expertise and with our patient's unique biology, values and circumstances.

Generally with EBM there is a conceptual shift from:

1- The competence of individual consultants and doctors to team work, policies and guidelines.

2- Competition to cooperation (win for others to win).

3- Effect to impact and outcome (better patient care).

4- Isolated medical to a multidisciplinary set up of practice and care.

The limitations of available evidence may include:

1-Not all evidence is made accessible (publication bias).

2- Failure to publish negative trials (conflicts of interest)<sup>6</sup>.

3-Treatment effectiveness reported from clinical studies may be higher than that achieved in later routine clinical practice due to the closer patient monitoring during trials that leads to much higher compliance rates.

The main criticism for evidence-based medicine may be summarized as follows<sup>8</sup>:

1- Lack of evidence and lack of benefit are not the same.

2- EBM applies to populations, not necessarily to individuals.

3- Although EBM is quickly becoming the "gold standard" for clinical practice and treatment guidelines, but most current medical and surgical practices do not have a strong literature base supporting them<sup>5</sup>, this may be attributed to many reasons e.g. in open-heart surgery, conducting randomized controlled trials would be unethical and here it may be reasonable to accept the best attainable level of evidence e.g. Level B – non randomized trial. On the other hand certain groups have been historically under-researched (women, racial minorities, people with many co-morbid diseases), and thus the literature is sparse in areas that do not allow for generalizability<sup>5</sup>.

The developing countries are scarcely part of the multi-center randomized trials which are the source of high level of evidence. However, at least we need to establish our local data and to see if they are conforming to the international recommendations and guidelines.

The real impact may come from the reforms of the set up of practice to enable the application of the recommendations as this in the developed world may mean slight adjustments but for the developing world it may imply a comprehensive revision of the health system and the auxiliary services

One of the positive moves is the projects of combating the endemic diseases such as the control of tuberculosis and the eradication of leprosy which are designed in collaboration between the local health authorities, WHO and the NGOs and adopting an integrated, comprehensive and nationwide approach, with good auditing and reporting system. With such practice these projects will match the criteria for good levels of evidence and will be the source of new recommendations to improve the current practice.

#### Conclusion and future trends:

To improve the application of EBM, there may be a need for:

- 1- Promotion and dissemination of the concepts and values of EBM
- 2- Making use of the EBM atmosphere to improve the set up of practice in the developing countries
- 3- With the rapid evolution of EBM a simple and explicit approach for the busy clinicians is needed.
- 4- More collaboration between health care providers, medical industries and research groups.

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