

## **EDITORIAL ARTICLE**

# **EVIDENCE BASED MEDICINE AND CRITICAL APPRAISAL: PHYSICIANS' MESS**

By

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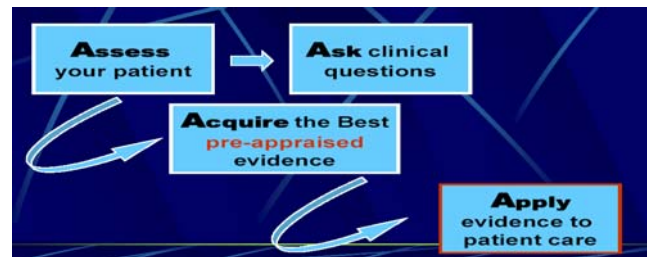
### **What is Evidence based medicine?**

Physicians are judges. They take decisions and doing recommendations which concern people's life.

As it was said by one of the greatest physicians in history; "It is a capital mistake to theorize without having the best evidence", so it will be a great mistake to do medical decisions without powerful scientific evidence.

Evidence Based Medicine (EBM) is still a BIG puzzle to physicians either in understanding it or in its practice. However, there is an increasing need for it in medical profession.

Today students and practitioners of medicine have a huge amount of information resources at their finger tips, yet many feel uncertain about how to find the right articles to read. Information technology (IT) and the internet have resulted in such extraordinary availability of information. The application of EBM practice could be defined as the judicious selection process through this informative invasion.



Evidence based medicine (EBM), has been launched as a process by means of which advances in medical research may come into practical use so as to yield safer, better and more cost-effective health care.

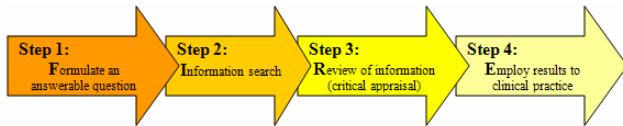
This description has several key components:

- Clinical care: EBM allows clinicians to combine the best of patient assessment with clinical research evidence to assist in patient care.
- Clinical practice guidelines: EBM can help define the strength of evidence supporting a particular practice, and help to rank the importance of interventions.
- Quality improvement: variations in practice can be assessed according to EBM guidelines to assist in minimizing inappropriate practice variation and maximizing the application of useful treatments.

- Clinical research: an assessment of the evidence will highlight those areas of clinical practice where evidence is lacking. This information can be used to plan future research studies to provide evidence for or against treatment.

### How to practice Evidence-based Medicine?

The EBM process consists of four steps: "FIRE"

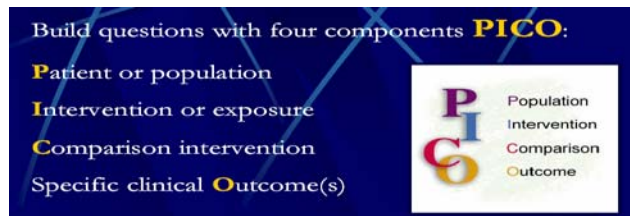


Remember FIRE!

#### STEP 1

##### Formulate an answerable question

It starts with asking a question in a way that can be answered. This involves defining the relevant population, the intervention and control groups comparison, the relevant outcomes, and the optimal design to answer the question (A general formula for the PICO question).



Remember PICO!

Ask yourself important clinical questions about your patients:

- Therapy Question: Concerning the effectiveness of a treatment
- Prognosis Question: Concerning outcome of a patient with a particular condition.
- Diagnosis Question: Concerning the ability of a test to predict the likelihood of a disease.
- Harm Question: Concerning the likelihood of a therapeutic intervention or exposure to cause harm.

Once you created a question, this will affect where you look for the answer and what type of research you can expect to provide answer.

Type of question	Type of evidence
Aetiology	Case-control or cohort study
Diagnosis	Diagnostic validation study
Prognosis	Inception cohort study
Therapy	Randomized controlled trial
Cost-effectiveness	Economic evaluation
Quality of life	Qualitative study

#### STEP 2

##### Information search

It involves finding the best available evidence, efficiently by means of electronic database searches. The key to efficient searching is to know where reliable and relevant information can be found most often.

*In principle, there are four different sources of information:*

1. **Systemic reviews/meta-analyses:** These secondary sources of information consist of compilations of original articles that have been vetted by independent researchers and clinicians. The most important vetting organization is the Cochrane Collaboration.
2. **Clinical Practice Guidelines:** These reviews deal with large disease groups and treatment strategies.
3. **Critically Appraised Topics (CATs):** A CAT is a short pre-appraised summary of evidence on a specific question. It is like a shorter version of a systemic review.
4. **Original articles containing primary data:** What is of interest here is mainly original articles based on randomized-controlled trials (RCTs).

Look for systematic reviews then RCTs then observational studies!

**Secondary information sources (systemic reviews).**

Database	Access via	Authorization
Cochrane Library	<a href="http://www.thecochranelibrary.com">www.thecochranelibrary.com</a>	Subscription; free abstracts.
Clinical Queries	<a href="http://www.pubmed.gov">www.pubmed.gov</a>	Free

**Meta-search engines (search multiple databases).**

Database	Access via	Authorization
Trip Database	<a href="http://www.tripdatabase.com">www.tripdatabase.com</a>	Subscription
Google	<a href="http://www.google.com">www.google.com</a>	Free

**Clinical Practice Guidelines.**

Database	Access via	Authorization
EBM Guidelines	<a href="http://www.ebm-guidelines.com">www.ebm-guidelines.com</a>	Subscription
NICE	<a href="http://www.nice.org.uk">www.nice.org.uk</a>	Free
SIGN	<a href="http://www.sign.ac.uk/">http://www.sign.ac.uk/</a>	Free

**Primary information sources.**

Database	Access via	Authorization
Medline/PubMed	<a href="http://www.pubmed.gov">www.pubmed.gov</a>	Free
OVID	<a href="http://gateway.ovid.com">http://gateway.ovid.com</a>	Subscription
National Cancer Institute	<a href="http://www.cancer.gov">www.cancer.gov</a>	Free

Moreover; the search strategy in those web sites is another skill to be learned!

**STEP 3**

***Review of information (Critical Appraisal)***

It is the process by which we appraising the evidence according to its relevance to the question, the quality of the research, and its validity.

***Critical appraisal is the process of systematically***

***examining research evidence to assess its:***

- Validity: Is the study valid?
- Message: What are the results and what is their strength?
- Utility: Are the results applicable?

***Critical appraisal – Pros and Cons***

### *Advantages:*

- Systematic way of assessing research papers
- Route to closing the gap between research and practice
- Objective assessment of the usefulness of information
- Skills are not difficult to develop and user friendly tools are available

### *Disadvantages*

- Can be time consuming (especially initially)
- Does not always provide the 'easy' answer or the answer one might have hoped for.
- Can be dispiriting if it highlights a lack of good evidence

### *What are the essential skills for critical appraisal?*

- Knowing the important questions to ask
- Basic knowledge of research methodology
- An understanding of relevant technical terms
- Knowing where to find tools / help

### *How to find appraisal tools?*

Critical appraisal tools are research design specific items that address methodological issues that are unique to the study design. At present there is no validated universal generic critical appraisal tool so each research design needs to be evaluated by specific items. Thus, there are specific evaluation tools for experimental, diagnostic, observational

and qualitative studies, as well as for systemic reviews/meta-analyses.

Widely used critical appraisal tools are CONSORT for RCTs (therapy studies), STARD (Standard for Reporting of Diagnostic Accuracy) for diagnostic tests, QUORUM for meta-analyses and AGREE instrument for appraising guidelines

These tools usually are presented as a checklist items in the form of questions. When you appraise a study you must consider whether you can answer "Yes", "Not clear" or "No" to the posed questions. The more the "NO" responses, the less valuable the study is considered.

### **STEP 4**

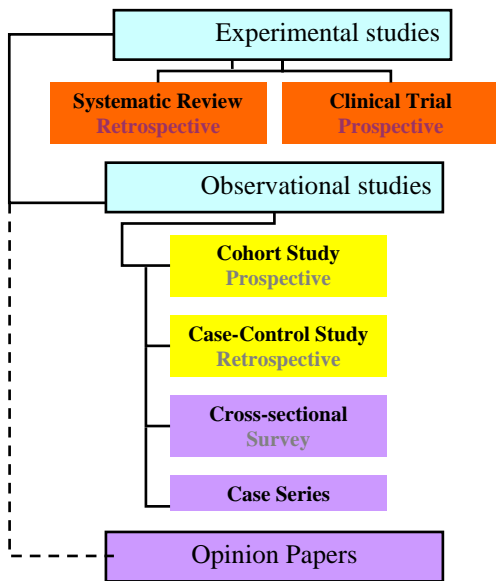
#### *Employ the evidence and evaluate effectiveness*

This step involves the integrating and applying the evidence to the target patient population. Finally; evaluating performance of evidence application is mandatory. This aspect of EBM suggests that clinicians will determine whether their approach has made as difference to the patient of the delivery of health care. This approach can also identify areas for further improvement in performance.

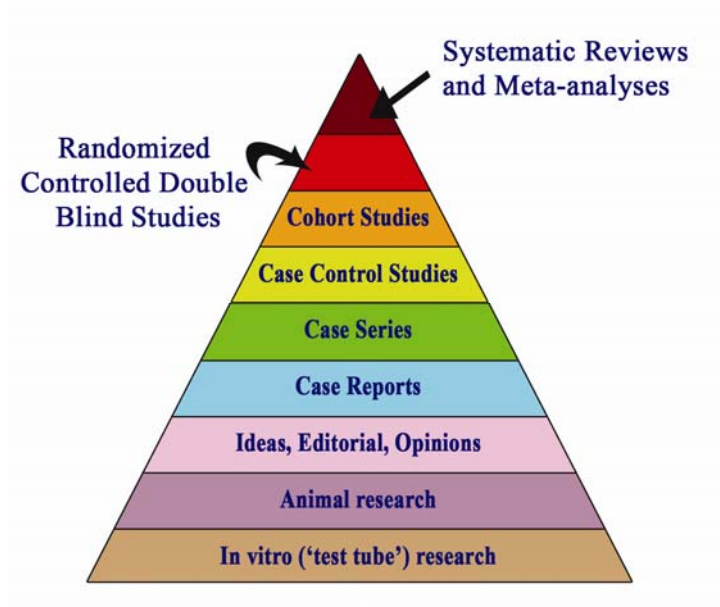
#### *What is the relation between research methodology and levels of evidence?*

Researchers must use an appropriate study design type for the research question asked.

BUT remember – even studies that use an appropriate methodology can be conducted badly!



*Study Design Hierarchy*



*Study Designs Pyramid*

## Levels of Evidence

Level	Description
1++	High quality meta analysis, systemic review of RCTs, or RCTs with a very low risk of bias
1+	Well conducted meta-analysis, systemic review of RCTs, or RCTs with a low risk of bias
1-	Meta analysis, systemic reviews of RCTs, or RCTs with a high risk of bias
2++	High quality systemic reviews of case-control or cohort studies. High quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is casual.
2+	Well conducted case control or cohort study with a low risk of confounding, bias, or chance and a moderate probability that the relationship is casual.
2-	Case control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not casual.
3	Non-analytical studies, e.g. case report, case series
4	Expert opinion

## GLOSSARY of terms in Evidence-Based Medicine

The practice of EBM started to spotlight new terms related to evidence evaluation in medical research. For example; odd ratio (OR), confidence interval (CI), relative risk (RR), number needed to treat (NNT).etc.

Most of these terms are related to statistical assessment which is considered a corner stone in EBM.

Grade	Description
A	At least one meta analysis, systemic review, or RCT rated as 1++, and directly applicable to the target population: or A systemic review of RCTs or a body of evidence consisting principally of studies rated as 1+ , directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or  Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolation of evidence from studies rated as 2+

### SUMMARY

Nowadays, there are huge literature resources for learning and practicing evidence based medicine. It is growing as an inevitable skill for all clinicians. Would you take part?!!

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