



## EVIDENCE BASED MEDICINE: BASIC PRINCIPLES OF PRACTICE

E.E. Effa<sup>1,4</sup>, E.B. Esu<sup>2,4</sup>, M.M. Meremikwu<sup>3,4</sup>

<sup>1</sup>Department of Internal Medicine, University of Calabar/University of Calabar Teaching Hospital

<sup>2</sup>Department of Public Health, University of Calabar

<sup>3</sup>Department of Paediatrics, University of Calabar/University of Calabar Teaching Hospital

<sup>4</sup>Cochrane Nigeria, Calabar Institute of Tropical Diseases Research and Prevention, University of Calabar Teaching Hospital, Calabar

### INTRODUCTION

Evidence based medicine (EBM) revolves around three interrelated factors namely: Clinical expertise, best research evidence and patients' values as well as preferences (see Figure 1). It has been defined as:

*'the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patient'*

EBM necessarily recognizes the long acquired expertise of individual clinician or even a community of practitioners, the value of systematic research as the conduit for best evidence as well as other often overlooked factors such as patients' legitimate concerns, values, fears and preferences. Integrating these factors in a timely and contextual way has been the hallmark of the practice of EBM.

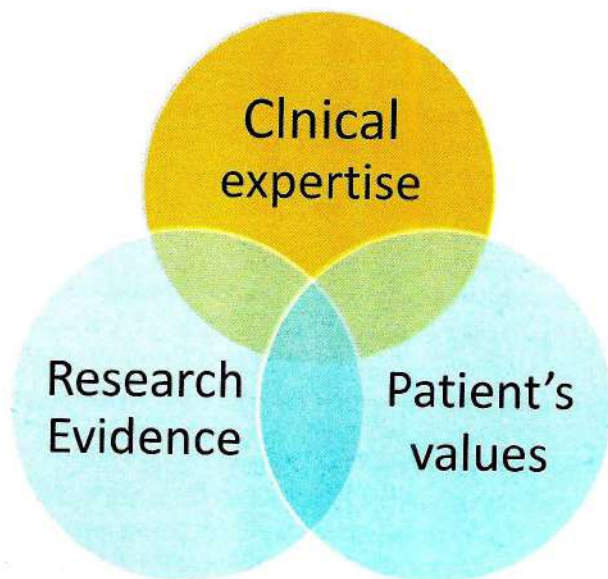
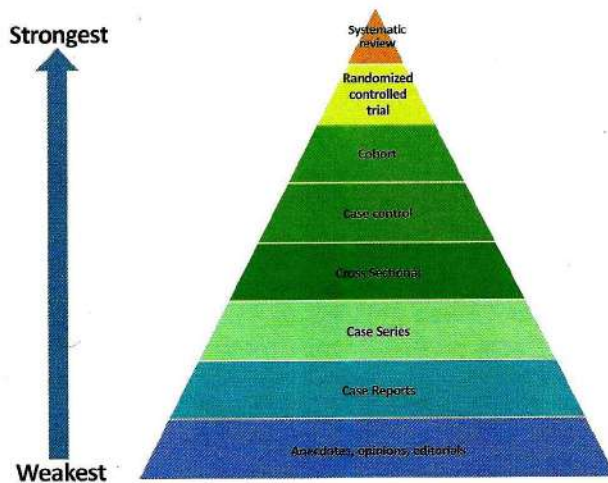


Figure Components of EBM (Adapted from Sackett D et al BMJ 1996; 312)

In the context of one-on-one patient care, this understanding of EBM has been aptly summarized as the application of the evidence "to the right patient, at the right time, in the right place, at the right dose, and using the right resources"<sup>2</sup>. However, EBM can be extended to include a wide range of evidence based decision processes involving global and national health systems, health management, health policy as well as legislation sometimes with direct impact on public health<sup>3</sup>. In this circumstance, Evidence Based Health Care (EBHC) would be a more appropriate term. To the extent that EBM seeks the integration of clinical expertise usually acquired overtime through training with systematic research and patients' legitimate preferences, it promotes critical thinking, open-mindedness and the courage to discard what has proven to be ineffective or frankly harmful<sup>4</sup>.

### The Hierarchy of Evidence

Decision making on what preventive, diagnostic, therapeutic, rehabilitative or prognostic healthcare intervention to implement depends greatly on how confident one is on the evidence that is available. These questions can be answered using specific study designs. For instance, questions of treatment and prevention are best answered through well done systematic reviews of properly conducted randomized controlled trials whereas questions of prognosis are best answered by conducting cohort studies. All study types are at risk of bias although the risk is heightened for some and greatly diminished by introducing deliberate methodological strategies to minimize the effect of bias on the results of the study. Overall, well conducted systematic reviews with or without meta-analysis are now generally accepted as the best evidence for a wide range of questions (Figure 2).



### Principles of Evidence Based Medicine

There are five universally accepted principles that guide the practice of EBM<sup>5</sup>. These principles in practical terms are also the steps famously known as the **5 As** and include:

1. Asking answerable clinical questions
2. Assessing or finding answers to these questions
3. Appraising the evidence found in the light of how valid, useful and relevant they may be
4. Applying the evidence to patient care in a model that may include shared decision making
5. Auditing or evaluating how well one is performing with the intention of ensuring quality.

### Asking answerable questions

We are often confronted with clinical problems for which we either do not have immediate answers, have a vague grasp of them or have been told the answers are controversial. For instance, we may have been wondering if at all honey is useful for dressing wounds. A few issues to consider would be what sort of wounds (burns, surgical), what location, what is currently being used (standard treatment) and of course the measures of success (efficacy). A very elegant and useful framework has been proposed to situate these elements. Known as the **PICO** format, it consists of the following:

- P** - Population, patient or problem of interest
- I** - Intervention, test, or exposure of interest
- C** - Comparisons or controls
- O** - Outcome(s) of interest

For the example we are looking at, the key components would be: **P**- patients with wounds, **I**- topical honey, **C**- standard treatment and **O**- healing, incidence of infections, duration of hospitalization, adverse events etc.

So an answerable clinical question from this would be: *In children or adults with, burns or surgical wounds, does the use*

*of honey-based topical dressing compared with others improve the chances of healing and reduce wound infection rates?*

### Assessing or finding answers to these questions

Finding answers to the question posed above will necessitate a search of the literature. Most importantly, the search has to be systematic and unbiased in terms of which relevant databases are searched and which language is used. The majority of databases are in English. Generating key words for the search is a useful first step. Deciding which database to search is an important second step as this will guide how to string the search terms together. Several databases warehouse summarized evidence on a wide range of therapeutic, diagnostic and prognostic topics. The Cochrane Library (<http://www.cochranelibrary.com/>) is arguably the single most regularly updated electronic information resource containing research on effectiveness of diverse healthcare interventions. As it lends itself to the simultaneous search of six evidence based practice databases, one of which is the Cochrane Database of Systematic Reviews, we recommend searching here first. The other database is Cochrane CENTRAL which is a repertoire of randomized controlled trials. The Cochrane library is subscription based but is freely available in Nigeria. Other bespoke electronic databases include clinical evidence (<http://www.clinicalevidence.com/>) and national databases such as National Institute for Health & Clinical Excellence (NICE) (<http://www.nice.org.uk/>). Medline freely accessible via PubMed (<http://www.ncbi.nlm.nih.gov>) is both a primary and secondary research database and is easy to search using available filters for randomized controlled trials, systematic reviews and guidelines. For drug related and pharmaceutical studies, the EMBASE database can be searched using appropriate filters for randomized controlled trials.

### Appraising the evidence

This is a necessary step to answer the question as it relates to how good the evidence is namely: is the evidence valid, robust and applicable? This entails critical appraisal of the retrieved evidence for quality issues such as trustworthiness (validity), the size (magnitude) of the effect as well as the relevance for the particular patient population. There are several useful Critical Appraisal Tools (CATs) available online although one has to equally be wary of many that are not validated and reportedly lack vigour in their development and application<sup>6</sup>. The Critical Appraisal Skills Programme (CASP) (<http://www.casp-uk.net/criticalappraisal>) checklist developed by a team at Oxford is one of such tools applicable for specific study

designs. The Centre for Evidence Based-Medicine also at Oxford has some useful CATs that can be used to 'judge' presented evidence such as the one found here (<http://www.cebm.net/criticals-appraisal/>). The assessment of Risk of bias of RCTs and non-randomized studies is a crucial and very informative quality related activity. Furthermore, as clinical practice guidelines are hugely dependent on RCTs and systematic reviews, the evidence derivable from these study types are typically graded. The GRADE (Grading of Recommendations Assessment, Development and Evaluation) framework is used to rate the certainty of the available evidence as well as guide the strength of recommendations made<sup>7</sup>.

### Applying the evidence

In deciding to subject patients, population groups or health systems to particular interventions, several considerations are necessary. These include patients' particular preferences, values, sociocultural circumstances, the real or perceived benefits and accompanying risks, access as well as peculiar health system issues. The shared decision making model where health care providers are engaged in a dialogue with patients/populations on these complex variables is essential<sup>8,9</sup>. In particular circumstances where there is clinical equipoise arising from uncertainties in the clinical course of action as well as anticipated significant trade-offs between benefits and harms, decision aids are useful to enable patients make informed choices<sup>10</sup>.

### Auditing or evaluating

One of the objectives of implementing the practice of EBM is to scale up the quality of care. The flip side of this is self-improvement using standard benchmarks or criteria. An assessment of both measures through periodic evaluation of how well we are doing on all previous principles as well as compositely is crucial. Questions such as: do we routinely ask well formulated and focused questions, are we more efficient in searching for reliable answers to these questions, do we critically appraise the evidence before implementing them, are very pertinent. In addition, an audit of adherence to these principles at institutional levels is important in determining what further deliberate strategies are needed for effective and efficient delivery of different aspects of care.

### CONCLUSION

Evidence Based Medicine or EBHC when practiced following the principles discussed should ultimately lead to more efficient and perhaps cost-effective delivery of care. Healthcare providers have both an ethical and moral responsibility to ensure that their decisions are guided by results of reliable research for the benefit of patients and society.

### Conflict of Interests

The authors are associate staff of Cochrane Nigeria, an entity of the Cochrane Collaboration. Otherwise, there are no conflicts of interest to declare.

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