

Understanding the Implementation of Evidence Based Medicine in Training and Practice

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Karl Popper suggested there is no ultimate source of evidence, and all evidence must be challenged. The concept of 'critical rationalism' by Popper meant scientific theory is only good as long as the better alternative evidence is not found. When evidence contradicts the theory, a new theory must be developed incorporating the new evidence.¹ But the evidence is neither based on the tradition nor the personal preference. Furthermore, the concept of evidence based practice originated in medicine and was applied to the teaching context in the early 1990s. Evidence based practice relies on systematic reviews (SR) and meta-analysis (MA). It is about utilizing the best current evidence while making decisions of clinical care for individual patient. Practice of evidence based medicine has become quite popular in medicine, allied health therapies and even in educational and sociological research. To delineate the faults and flaws of past evidences of practice so as to correct them to produce effective outcome, early information and rapid access to the recently derived best evidence is the important endeavor of evidence based medicine (EBM).²

Teaching the principles of evidence based medicine (EBM) to medical students improves their knowledge, attitudes and clinical appraisal skills as depicted by Miller's pyramid. There are four elements of evidence based learning and practice which encompasses creating an answerable question, systematic search of evidence, critical appraisal of evidence for quality, robustness and reliability, and lastly consolidating useful information into clinical scenarios. The method has permeated into education as the 'evidence based teaching' that uses the evidence to decide on appropriate teaching strategies and interventions. This helps to monitor student progress and evaluate teaching effectiveness. Primary use of evidence based medicine (EBM) was to educate front-line clinicians about understanding of the results of clinical studies, to assess the reliability of research evidence and the application of the research results to everyday practice of those clinicians. Decisions made by clinicians require considering patient's values and in evidence based medicine, the systematic reviews are said to be the best way to derive the evidences for good practice in medicine. To ensure efficient use of quality information in patient care, practitioners need to be aware of about 20 new articles per year in their area of expertise.³

Nevertheless, three major issues are brought to the spotlight critically against EBM. Firstly, it relies on reductionism of the scientific method and is not the wholesome overview. Secondly, EBM has been seen as "cookbook medicine" that discourages clinical reasoning leading to automatic decision making. This issue has blamed the EBM of neglecting humanistic and personal aspects of medical care moving the focus away from individual. A third criticism is that EBM promotes rule based reasoning instead of experiential thinking. In the next quarter of century, EBM indeed face several challenges of which, optimal delivery of clinical care requires far more efficient production and rapid dissemination of systematic reviews and practice guidelines.⁴ That would require patient friendly and clinician friendly electronic access on all types of devices i.e. smart phones to electronic medical records and even in social media for patients. Since the amount of information has grown exponentially, medical students who do not use evidence based learning strategies using a real world example may not benefit much from text rereading. However, introduction of evidence based methods to ingrain the practice in future physicians, students in their early training days, should be exposed to the practice testing, distributed practice and successive relearning methods. As per the cognitive psychology, mentioned in structure of observed learning outcomes (SOLO) taxonomy, deep learning can only be achieved when learner moves from surface approach to rational and extended abstract levels.^{5,6} However, perception of evidence based medicine (EBM) may be distorted to be an abstract subject for first year medical students due to lack of clinical maturity as they tend to focus more on subjects of core learning in medicine for examples, Anatomy and Physiology.

Students tend to rely on materials that are not peer-reviewed when they access to internet based medical information, thereby, for their use and application in the clinical environment, further evidence is needed to explore student perceptions on EBM and its implementation within the medical curriculum. Undergraduates can apply evidence based approach learning by three steps process, and that include practice testing, distributed practice and successive relearning for learning at higher levels of structure of observed learning outcomes (SOLO) taxonomy. This will help transform and refine towards superior learning outcomes as they transition from student to clinician.⁷ Practice testing is the method to facilitate retrieval that includes formative assessments which involves flashcard and other such items. Practice testing includes two components, the test format and the dosage. However, recent practice includes multiple-choice items to be effective in the classroom for practice testing as this allows students to recognize the lack of understanding of the topic taught and helps students to relearn the topics of lacunae so that they can prepare better for formative or summative assessment. Distributed practice is effective method to learn over time as this fosters long term retention of the content learnt. This methodology requires distribution of material to be learnt over a time course either in a single study session or wide across multiple sessions which is to facilitate the long term retention. In fact, this approach emphasizes schedule and sessions but not the technique per se. Students will practice important concepts and lessons distributed across multiple study sessions. Successive relearning is the essential step forward after the practice testing as the probability of loss of contents in memory is forgotten. Thereby, this approach is necessary to return to the learnt contents at a later time and use practice testing to be accurate to answers for questions to be answered correctly. This is especially useful for topics required to have deep learning and practice should be focused on items that require deep learning.

For universities, the teacher training programs should be designed to prepare teacher for their role as evidence based experts of their own professional teaching practice. Activities, strategies and interventions must be utilized by the universities as a part of robust training for students with objective evidences from metrics of school, teacher and student performance.⁸ One of the suitable example for the evidence based practice in teaching and learning is the incorporation of structured questions during assessment for taught courses of the curriculum. Objective structured practical and clinical examinations along with cognitive structured questions may be best utilized while training of undergraduates in buildup years in medical school. Finally, the rationale behind the evidence based 'medicine', or 'teaching and learning' is to identify plausible methodologies and act objectively as per the findings suggested by the evidences either for the treatment of the patient or for the purpose of research and learning.

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