

## **GETTING STARTED ON THE RIGHT FOOT: TEACHING EBM TO MEDICAL STUDENTS**

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Evidence based medicine requires physicians to acquire the skills of efficient literature searching and then to apply formal rules of evidence to evaluate the literature. The hope is that physicians who apply evidence based medicine to their clinical practice will improve patient care.

The Evidence-based medicine working group from McMaster University postulated a new paradigm for medical practice. (1) This paradigm assumes that: 1. Clinical experience and expertise are important especially in areas of clinical medicine that can not be tested. However, all clinicians should strive to systematically record observations in a reproducible and unbiased manner to increase their knowledge with respect to treatment, prognosis, and diagnosis of disease. 2. The understanding of the underlying mechanisms of disease are insufficient guides to clinical practice. 3. It is important to understand certain rules of evidence to interpret the literature.

The components of evidence based clinical practice include: identifying the patient problem, identifying the information required, conducting a literature search, applying the rules of evidence, identifying the strengths and weaknesses of the studies, selecting the best studies, and applying the information to the patient problem.

Controlled trials have evaluated the effectiveness of teaching evidence based medicine / critical appraisal skills to medical students. Several trials have included some form of control group and some measure of performance outcome. (2 – 7) Although some of these studies are not particularly well designed, several conclusions can be drawn from this work.

Critical appraisal skills can be taught early in the undergraduate medical curriculum, but may require re-enforcement as students progress in their education. Riegelman (2) introduced a 16 hour course on critical appraisal skills to first year medical students. He evaluated the students' perceptions of the effectiveness of the course, perceptions of their competence in the skills taught, their actual knowledge of study design and statistics, and their use of the medical literature. Riegelman showed that it is possible to introduce the concepts of critical appraisal to medical students early in their training and positively change their perceptions, knowledge, and reading habits. Students showed a deterioration of their knowledge skills over time; their test scores were higher immediately after the course, than when tested 3 years later.

Critical appraisal skills can also be taught in the clinical years of the medical curriculum through the addition of a seminar series. Heller and Peach (3) introduced the concepts of critical appraisal in 12 sessions of 1 ½ hours each, given to groups of 12 to 13 students. These students performed better on the Community Medicine portion of the London MB BS final examination than did students who did not receive the course.

Irrespective of when students receive training in critical appraisal during their clerkship year, their skills are improved by formal seminar teaching. Frasca et al (4) introduced 10 to 12 weekly 1.5 hour sessions into the medical clerkship that taught evaluation of research methodology, statistical analysis and literature searching techniques. These students had more library and critical appraisal skill questions correct in the post-testing. Students taught either earlier or towards the end of the clerkship year scored equally well, indicating that the course not their medical training in general impacted on the results. The "control" students did not improvement in their test scores.

Unless clearly incorporated as part of their clinical training, the other clinical demands of students will overpower their attention. Radack and Valanis (5) met with 4 to 7 clinical clerks in a 50 minute seminar weekly for 5 weeks to cover the areas of clinical measurement, diagnostic testing, evaluation of therapeutic efficacy and clinical trials. In contrast to the previous studies, absentee rates for the seminars varied from 15 to 50%.

There was no significant difference in the scores on a test exercise for participating or control students. The authors suggest that although the students found the material interesting and important the demands of the clerkship year were too high and that this seminar series should be introduced earlier into the medical training.

Relatively few but focused sessions on critical appraisal may be effective in improving knowledge and attitudes in critical appraisal. Landry et al (6) introduced two 90 minute seminars given during weeks 7 and 8 of the medicine clerkship that covered types of medical articles, types of study design, and appraisal of diagnostic test and therapy articles. Students taught these skills showed improved scores in a test of knowledge and more positive attitudes towards critical appraisal. Unfortunately, this did not translate to more effective use of the literature in patient write-ups.

Bennett et al (7) gave special training to tutors and introduced special problem based education material that emphasized the critical appraisal of clinical evidence into the clinical clerkship year. In this study, tutorials of 4 to 5 students met for 2 hours once weekly for 8 weeks. Experimental students had a significant rise in their ability to critically appraise articles on diagnosis and therapeutics. There was a dose response relationship between the students' reports of the attention given to critical appraisal in their tutorials and their post-test scores. Control students' scores fell from pre to post testing, suggesting that unless specifically taught, critical appraisal skills are not acquired as part of undergraduate training..Possibly, the single most crucial question is whether the use of critical appraisal skills

taught at the undergraduate level can affect future clinical practice. Unfortunately there is no direct research that answers this question. At McMaster University Medical School education is based on active problem based, self-directed learning. When surveyed years after graduation these students were more up to date in knowledge of the management of hypertension compared to students from a more traditional medical education based on didactic passive teaching.(8) It is not clear if teaching the tools of critical appraisal can lead in the same way to changes in clinical practice after medical school graduation.

Medical students gain knowledge of clinical epidemiology as assessed by written tests. However, it is unclear if the students can apply these skills to critically review the literature, (9) and even less clear if critical appraisal skills will be applied to clinical practice.

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