

## Evidence-based Medicine in Clinical Curriculum

Samkaew Wanvarie,<sup>1MD</sup>, Boonmee Sathapatayavongs,<sup>2FRCP</sup>, Sayomporn Sirinavin,<sup>3MD</sup>, Atiporn Ingsathit,<sup>4MD</sup>, Artit Ungkanont,<sup>2MD</sup>, Chomchaba Sirinan,<sup>5MD</sup>

### Abstract

**Introduction:** The teaching of evidence-based medicine (EBM) has now been incorporated as an integral part of medical curriculum at the Faculty of Medicine, Ramathibodi Hospital but there is little research into the effectiveness of the course. The purpose of this report is to evaluate the EBM skills of medical students and competency of the faculty member. **Materials and Methods:** The EBM course was created by the EBM Working Group at the Faculty of Medicine, Ramathibodi Hospital for 3<sup>rd</sup>- to 6<sup>th</sup>-year medical students. The principles of EBM, clinical epidemiology and biostatistics were gradually instilled during the 4 years of medical school. Information technology infrastructure was also provided to facilitate critical appraisal skills. At the end of the Community Medicine clerkship, students anonymously evaluated aspects of the course regarding their EBM skills and faculty member competency with Likert scale questions. **Results:** Medical students generally gave high evaluations to all aspects of the EBM course taught in the Community Medicine Department. For each of the evaluation questions, the means were higher for faculty member competency. **Conclusions:** The teaching of EBM course at the Faculty of Medicine, Ramathibodi Hospital is useful for medical students to enhance their critical thinking skills, and they seem to value the sessions positively.

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**Key words:** Community Medicine, Critical thinking skill, Evaluation, Medical curriculum

### Introduction

Evidence-based medicine (EBM) is “the conscientious, explicit, and judicious use of the best evidence in making decisions about the care of individual patients.”<sup>1</sup> Considering the vast amount of medical knowledge available today through various media outlets with almost no boundaries, it is essential that our medical graduates should have the skills to search for information, appraise that information and apply the valid information to solve clinical problems (EBM practice). Thus, the Faculty of Medicine, Ramathibodi Hospital has incorporated this subject matter into our new curriculum since the academic year 2002. The newly-revised medical curriculum incorporates EBM by integrating it into all 4 years of medical school (3<sup>rd</sup> to 6<sup>th</sup>). The basic concept of EBM is introduced in the 3<sup>rd</sup> year, epidemiology and research methodology in the 4<sup>th</sup> year, EBM skills (the 4 steps of EBM : ask, acquire, appraise and apply) for prognosis and therapy modules in the 5<sup>th</sup> year and

repetitive process on other modules in the final year. This paper describes the medical students’ evaluation of the EBM course and faculty member competency. They are the first cohort of students in the newly-integrated curriculum to take the EBM course.

### Materials and Methods

The initial step in introducing EBM into all 4 years of our medical school curriculum was the creation of an Evidence-based Medicine Working Group. It consisted of faculty from the Medical Education Unit, Departments of Medicine, Pediatrics, Surgery, Obstetrics, Anesthesiology and Family & Community Medicine. Members met to determine the extent of EBM to be taught and explore new strategies for instruction and evaluation. The 4-year curriculum was introduced in the academic year 2002. The class of 2002 (3<sup>rd</sup>-year medical students) was the first to be exposed to this programme in its entirety.

<sup>1</sup> Department of Community Medicine

<sup>2</sup> Department of Internal Medicine

<sup>3</sup> Department of Pediatrics

<sup>4</sup> Research Center Office

<sup>5</sup> Department of Anesthesiology

Faculty of Medicine, Ramathibodi Hospital, Bangkok, Thailand

Address for Reprints: Dr S Wanvarie, Faculty of Medicine, Ramathibodi Hospital, Bangkok, Thailand.

Email: grswr@mahidol.ac.th

### Programme Design

We use the “Spiral model” from year 3 to year 6, and integrate it into various clinical rotations so that students will have learning experiences in this subject repeatedly throughout the year. Evaluation of students’ performance on EBM is stressed by 5% to 30% contributions to the final grades in each course/clerkship.

### Learning Experience Steps

1. Students, either in groups or individually, choose a clinical problem to work on, usually from their encounters with patients. The tutor then guides them to ask questions properly using the “PICO” approach (Problems or Patients, Intervention or exposure of interest, Comparison group if available, Outcomes of interest).
2. Students will work out their search strategy, and get a list of articles to screen upon and select out the most appropriate ones, thus acquiring the information they need.
3. Using the guidelines for appraising articles, students appraise the validity of the results stated in the articles under the guidance of their tutor and recognise the result which is valid and reliable to use in their clinical problem-solving.
4. Students then apply the new knowledge they have acquired to answer their clinical question in step 1.

The structure of the programme is shown in Table 1.

In Year 3, students attend a lecture on *Introduction to EBM* which is followed by a small group discussion of a case scenario facilitated by faculty staff.

Table 1. Evidence-Based Medicine Programme Components

Courses/Clerkships	Year	EBM component*
Introduction to Medicine	3	Introduction to EBM (1 h)
	3	Small group case discussion (3 h)
Adult Medicine (20 wks)	4	How to search literature electronically (3 h) Small group practicing EBM skills on diagnosis (18 h)
FM & CM I (3 wks)	4	Clinical Epidemiology
FM & CM II (4 wks)	4	Research Methodology
FM & CM III (3 wks)	5	EBM individual work on therapy and prognosis (3 wks)
Adult Medicine (10 wks)	5	EBM group work on therapy (3 h)
Anesthesiology (3 wks)	5	EBM group work on therapy (3 h)
EBM externship	6	EBM individual work on any topics: diagnosis, therapy, or prognosis

EBM: evidence-based medicine; FM & CM: Family Medicine & Community Medicine

\* EBM component activity is only a part of the regular clerkships

In Year 4 in the 3-month adult medicine block, students work on clinical problems regarding “diagnosis”, e.g. physical signs, laboratory tests, imaging studies, etc. They work in a group of 8 students with 1 tutor who guides them along. Each group chooses their own problem and practises all 4 steps above and presents their results to the whole group at the end of the course. Marks are given by all tutors for each student’s participation as well as their presentation by all tutors. Clinical epidemiology, biostatistics and research methodology are taught during the 7-week Family & Community Medicine clerkship rotation.

In Year 5, students work on clinical problems regarding “therapy” and “prognosis”. In each clinical rotation mentioned above, students either work individually or in groups to solve clinical therapeutic problems in that discipline. Due to the limited amount of time in some rotation, students individually work the full 4 steps individually only in the Family & Community Medicine (FM & CM) block and present their report for a final grade. In other blocks, they discuss in groups, stressing on the appraisal of their chosen article on therapy and marks are given for their participation during group discussion.

In Year 6, in which they work as externs with full responsibility in patient care, students choose their own clinical question to work on individually. Questions can be on “diagnostics”, “therapeutics” or other areas of clinical interest. They present their work and interact with their tutors online. Each student has to complete this work before they graduate. The Medical Curriculum Committee has agreed to make this work compulsory.

The first student cohort was asked to anonymously evaluate faculty member performance and rate EBM activity, content taught, and instructional handouts using a 5-point scale questionnaire immediately after the end of the FM & CM block in the 5<sup>th</sup> year. They also self-assessed their confidence on EBM skills at the end of the clerkship in the following aspects: formulate clinical question in PICO format, do literature search in PubMed Medline, do literature search in Ovid Medline, appraise articles on prognosis, appraise articles on therapy and understand statistics for EBM.

### Results

There were 141 5<sup>th</sup>-year medical students in the academic year 2004. One hundred and thirty-six students answered the questionnaire, resulting in a response rate of 96%.

#### *Self-evaluation of the EBM Skills by Medical Students*

Students were quite confident in formulating clinical question and doing literature searches both in PubMed and Ovid Medline with mean scores of 3.93, 3.88 and 3.87 respectively. However, the ability to critically appraise

Table 2. Self-evaluation Score of Medical Students on their EBM Skills

	Mean	SD	Median	Mode	Min	Max
I can formulate clinical question in PICO format	3.93	0.65	4	4	2	5
I can do literature search in PubMed Medline	3.88	0.79	4	4	1	5
I can do literature search in Ovid Medline	3.87	0.74	4	4	2	5
I can appraise articles on prognosis	3.24	0.66	3	3	1	5
I can appraise articles on therapy	3.47	0.71	3	3	1	5
I understand statistics for EBM	3.28	0.71	3	3	1	5

EBM: evidence-based medicine; SD: standard deviation

Table 3. Evaluation on Faculty Teaching by Medical Students

	Mean	SD	Median	Mode	Min	Max
Content taught	3.89	0.71	4	4	2	5
Process activities	3.81	0.78	4	4	0	5
Instructional handouts	4.00	0.89	4	4	0	5
Faculty member competency	4.24	0.79	4	4	2	5

SD: standard deviation

Table 4. Evaluation of Medical Students by the Faculty Members

	Mean	SD	Median	Mode	Min	Max
Final EBM MCQ exam (% correct answers)	63.4	16.6	65	65	25	95
Project assignment grade (0–4)	3.11	0.51	3.25	3.00	2.3	4.0

EBM MCQ: evidence-based medicine multiple choice questions; SD: standard deviation

articles on therapy and prognosis and understand statistics for EBM was only moderate with mean scores of 3.24, 3.47 and 3.28 (Table 2).

#### *Medical Students' Evaluation of Faculty Members*

Medical students' scores of faculty members were quite high in all 4 aspects. The range of means was 3.81 to 4.24 (Table 3).

#### *Faculty Members' Evaluation of Medical Students*

The medical students' grades for their individual EBM project assignment given by the faculty members ranged from 2.3 to 4.0 with a mean of 3.11 (Table 4).

On average, medical students correctly answered 63% of the 30 examination questions [Multiple choice questions (MCQs)].

### **Discussion**

In response to Thai Medical Council accreditation standards in support of EBM, most Thai medical schools include some form of EBM training. This topic is taught in a variety of ways, including implementing separate courses, merging EBM skills training into existing required or elective courses, and integrating EBM longitudinally throughout the curriculum. Our medical school has

incorporated EBM into the newly-revised clinical curriculum with students from the class of 2002 as its first batch.

This report is the first assessment of the efficacy of the EBM course taught at our faculty. Self-evaluation by medical students showed that they were capable of completing the EBM steps. This was confirmed by high grades on EBM individual assignment. However, the result of the final MCQ examination was not very satisfactory, with a mean score of 63%. The data showed that about 20% of students got very high marks (>80%). This implies the possibility of improving the students' learning with assistance from their peers. Previous studies suggest that medical students were able to teach EBM to their fellow undergraduates effectively.<sup>2</sup> With sufficient time allocated for self-directed learning in our new curriculum, we believe that this will be one way of improving our medical students' expertise in EBM skills. To further measure students' competencies, we plan to implement a performance-based examination or objective structured clinical examination (OSCE) next year as it has been proven to be beneficial by several authors.<sup>3,4</sup>

Successful teaching in EBM has been reported earlier by Ghali et al.<sup>5</sup> Their EBM mini-course was similar to our EBM course in the FM & CM block. The 3 key elements

were active student involvement, clinical relevance of exercises and integrated teaching targeting each of the component skills of EBM. A detailed evaluation of the success of our EBM course has yet to be determined. Reports evaluating the teaching methods of EBM continue to be published.<sup>6,7</sup> One conceptual framework for evaluating the teaching of EBM has been advocated by Straus et al.<sup>8</sup> They suggest that instruments for evaluating different methods of teaching EBM must reflect the different learners, interventions and outcomes that can be assessed.

Our evaluation was done immediately after finishing the clerkship. Will this expertise be sustainable in their career or will they be practising EBM in their daily lives? Our ultimate goal as teachers is for our students to use EBM in their daily practice of medicine. Towards this goal, we require further follow-up research of this first cohort of students. Although our study is rather concise and preliminary, it has shown promising results that have motivated us to improve our teaching for undergraduates as well as postgraduates in the near future.

In short, we believe integrating EBM longitudinally throughout the curriculum will provide a certain degree of success for Ramathibodi medical students.

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