

**Curriculum Overview**  
**Evidence-based Practice/Information Mastery**

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**1. Introduction and explanation of the rationale used to create this document**

According to the standards approved by the LCME, " *the objectives of the educational program must be stated in outcome-based terms that allow assessment of student progress in developing the competencies that the profession and the public expect of a physician.*"<sup>1</sup> Further, " *The curriculum must also introduce students to the basic principles of clinical and translational research, including how such research is conducted, evaluated, explained to patients, and applied to patient care.*"<sup>2</sup>

This document provides guidance for integrating the teaching of concepts, skills, and attitudes related to evidence-based medicine and information mastery into our four-year curriculum, aiming to create graduates who can competently practice medicine using an evidence-based approach using the best information tools at their disposal.<sup>3</sup> This curriculum uses a spiraling approach, teaching basic concepts in year one, and reinforcing and expanding these concepts in context-specific exercises as the students progress through medical school in years two to four.

The objectives are outcomes based, requiring demonstration by students that they know what to do, that they can do it, and that they understand the importance of these practices in the care of patients. The objectives are linked with one or more curriculum blocks or themes, where the content should be taught and where assessment should occur.

In this approach, we suggest to teach or refresh epidemiology and biostatistics in the first

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<sup>1</sup> New standard approved by the LCME in June 2008, effective immediately

<sup>2</sup> New standard approved by the LCME in February 2007, effective as of July 1, 2008.

<sup>3</sup> Slawson DC, Shaughnessy AF. Evidence-Based Medicine: Should We Be Teaching Information Management Instead? *Acad Med* 2005; 80:685-689.

year. The basic concepts of are taught in the epi/bio class (PBL1). These concepts are applied in the 10 hours of info mastery/EBM (PBL II), using examples that have relevance to the health of the (preclinical) student. Sensitivity, specificity, and predictive values would be integrated into the physical diagnosis training (Foundations of Patient Care II).

In the second year, information mastery and evidence-based medicine exercises are incorporated into the Integrated Case-Based Learning process and perhaps into the preceptorship.

In years three and four, evidence-based medicine concepts and information mastery skills and attitudes are incorporated into clerkships. This approach will reinforce students' understanding, abilities, and attitudes as well as help change the culture throughout the institution.

## **2. General Goals of curriculum in Evidence-based Practice/Information Mastery**

### *Attitudes*

1. Demonstrate an anticipation and acknowledgement of gaps in personal knowledge
2. Develop a practice that incorporates the principles and basic practices of evidence-based practice and information mastery.
3. Display a questioning attitude regarding the evidence base for many areas of routine clinical practice
4. Explain the need for a practice of continuous learning and information management

### *Skills:*

1. Identify one's own clinical information needs based, in part, on the values and preferences of each patient.
2. Formulate clinical questions that can be answered.
3. Retrieve relevant and valid information using efficient and systematic strategies
4. Demonstrate facility with point-of-care information tools
5. Evaluate the usefulness of tools for finding answers to questions (hunting tools) and for keeping up with changes in medicine (foraging tools)
  - a. Evaluate different types of information for validity and relevance to one's practice.
6. Interpret the validity and clinical significance of evidence as it applies to the care of individual patients.
7. Communicate evidence to patients.
8. Develop a system for effectively managing information consisting of appropriate hunting and foraging tools
9. Demonstrate computer literacy and basic computer skills

### *Knowledge:*

1. Demonstrate an understanding of basic concepts in clinical epidemiology, clinical reasoning, and decision analysis.
2. Appraise primary literature
  - a. know types of questions
  - b. know quality criteria for different questions/study designs
  - c. rank importance of outcomes
3. Appraise hunting and foraging tools
  - a. Know quality criteria
4. Store and retrieve references in a reference manager program

### 3. Assessment Methods for Students

Assessment should occur longitudinally throughout the medical school curriculum and should be based on Miller's pyramid, i.e., students should "know," "know how," "show," and "does."<sup>4</sup> The objectives are aimed at all four levels.

The assessment methods must fit the objective. Knowledge ("Know") can be assessed via a post-course multiple-choice test. Assessment of skills ("Know how") may be incorporated into existing OSCEs, standardized patients, independent computer-based exercises, or other hands-on assessment. Students may show their mastery of the content ("Show" and "Does") through demonstration and application of the concepts and practices during rotations under direct observation or via completion of specific exercises. Students can be asked to maintain a learning portfolio of how they approach questions related to their clinical experiences to demonstrate their evidence-based practice during their clinical rotations.

### 4. Evaluation of the Curriculum

The following aspects of the curriculum should be evaluated:

- 1) The degree to which the objectives have been integrated into the targeted courses and clerkships.
- 2) Student satisfaction with the teaching of evidence-based medicine, both at a course level and an overall view
- 3) Students self-perceived knowledge and comfort with evidence-based medicine/information mastery. Tools available:
  - a) West CP, McDonald FS. Evaluation of a longitudinal medical school curriculum: A pilot study. *J Gen Intern Med* 2008;23:1057-9.
  - b) Slawson DC, Shaughnessy AF. Teaching information mastery: creating informed consumers of medical information. *J Am Board Fam Pract* 1999;12:444-9.
  - c) Students' actual knowledge, skills, and attitudes. There are a few instruments already developed, but none assesses the information mastery aspect. A portfolio may be the best approach.

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<sup>4</sup> See: <http://www.amee.org/documents/Introduction%20to%20Medical%20Education%20-%20Norcini.pdf>

- d) Faculty satisfaction with the additions
- e) The degree to which the curriculum satisfies LCME requirements.

## **5. Appendices**

- a. A matrix of objectives, mapped to one or more classes or clerkships. Course and clerkship directors will need to develop mechanisms for integrating this teaching into their existing curricula. This matrix may need to be adjusted by someone more familiar with the current class content.
- b. Examples of exercises. Three exercises are given as examples of projects that could be completed during clerkships in the third year.
- c. ESP curriculum schematic

Appendix 1: [EBM Info Mastery matrix 3-25-09](#)

## Appendix 2. Exercises

### Exercise example #1

#### **Example of an EBM training module for third year students during a ward clerkship rotation (3-25-09)**

This proposal outlines an EBP training module that can be implemented during the attending teaching rounds of a third year student's clerkship rotation.

#### **Goals:**

1. Periodically review a seminal article in a the domain of the clerkship which relates to a prototypical clinical question or a key clinical management question
2. Optimize synergy between acquiring knowledge in the domain, practice appraisal skills and application of conclusions to clinical practice
3. Enhance the third year medical student's role in enriching the learning experience of the clerkship team
4. Build on existing divisional journal club activities

**Setting:** EBM module 30 minutes during attending rounds once a week

**Teaching tools/Infrastructure:** 1) a portfolio with a collection of "journal club articles" on key issues in the field. 2) generic instructions on how to read a particular type of study; 3) a one page work sheet with questions or suggestions for the review of the particular article. 4) possibly stats or methods resource for consultation on specific issues. This could build on an existing divisional journal club, where study specific materials are generated

Alternatively, there could be a portfolio of "clinical questions" related to real clinical practice scenarios in the domain, where the role of the medical student is to look up answers with a "hunting tool" and present process and yield to the team.

**Process:** During third year elective medical students liaise with resident and take the initiative to run the EBM module on attending rounds once a week.

Each week, ward attending or resident and student will identify a study (or question) from the portfolio of "journal club articles" or "clinical questions". Ideally the study or question would be pertinent to the clerkship theme as well as a particular real management question.

Third year Medical Student will review the study following the generic instructions for the type of study and the specific prompts for the study. At the attending round EBM module, the student will present the study and provide his/her interpretation and appraisal. Resident will provide additional critique.

Team will then examine how to apply the conclusions to actual patient care. Attending will provide input as domain expert.

## **Prototype questions and corresponding study design for studies in the portfolio**

1. Treatment efficacy (RCT, or MA of RCTs)

Examples: treatment of ACS, dialysis dose

2. Diagnostic accuracy (study of diagnostic accuracy)

For example VQ scan vs spiral CT for PE (Pioped)

3. Screening (RCT of screening test, or diagnostic test study and RCT of treatment efficacy).

Example 1: Direct evidence from RCT on using screening test or not, for example PSA, colonoscopy, mammography, cholesterol screening, or genetic testing

Example 2: Indirect evidence from a study of diagnostic accuracy combined with an RCT for the condition

4. Risk relationship or stratification (cohort study or risk prediction instrument)

Examples: Framingham risk score, score for renal artery stenosis, TIMI score

5. Treatment harms: RCT of adverse events of an intervention, observational study, registry or post marketing study

Example: ACE and fetal malformations

6. Association or causality (case report)

Example:

7. Cost benefit and cost effectiveness analyses

Example: anticoagulation for a fib

### **Additional topics:**

1. Surrogate outcomes and their validation

Examples: cholesterol and CVD, BP and CVD

2. Subgroup analyses

3. Composite outcomes

4. Standards of reporting RCTs, diagnostic test studies, studies of adverse events, guidelines, meta-analyses, observational studies

## Exercise #2

### Information Mastery Exercise

The goal of this exercise is to practice identifying and answering clinical issues that arise in practice by formulating an answerable question, using the secondary medical literature to answer this question, with the result being a useful solution that will improve the health of the patient.

Step 1. Identify a question. The question can concern a treatment or a diagnosis

Step 2. Convert this question to one that can be searched by using the PICO format

Describe the **P**atient or population, **I**ntervention, **C**omparator, and **O**utcome. See: <http://healthlinks.washington.edu/ebp/pico.html>

Step 3: Select one or more of the following resources to find the answer:

[Cochrane Database of Systematic Reviews](#)  
[ACP Physician's Information & Education Resource \(PIER\)](#)  
[ACP Journal Club](#)  
[DynaMed](#)  
[BMJ Clinical Evidence](#)  
[TRIP Database](#)

Links to all of these resources can be found on the databases page of the medical school library.

Step 4. Determine the answer to your clinical question. What is the strength of your recommendation?

A “Strength of recommendation” is based on the quality of the available evidence and the degree to which the evidence has evaluated patient-oriented outcomes. Several of these resources offer a rating of the evidence quality and you will need to convert this ranking to a strength of recommendation. See: [Strength of recommendation taxonomy](#)

**SOR = A** consists of high quality evidence focused on patient-oriented outcomes

**SOR = B** consists of inconsistent or limited-quality evidence focused on patient-oriented outcomes

**SOR = C** Low quality evidence or evidence focused on disease-oriented outcomes or risk factors

Step 5. Apply the answer to the original patient situation.

From this exercise, develop a presentation (10 minutes) with the following slides:

1. The original clinical question

2. The PICO question
3. The method you used to search the resources (e.g., “I started with BMJ Clinical Evidence and then checked Dynamed)
4. What you found
5. From what you found, your conclusions, and the strength of your recommendation
6. What you did with the answer.

Exercise 3. Educational Prescription. This exercise can be printed on both sides of a 5x7 card and distributed to learners when a clinical question arises. The learner completes the prescription and presents the information at a later time.



## Educational Prescription

The Patient or Population (how would I describe a group of patients similar to mine?)

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The Intervention (a cause, prognostic factor, a treatment, etc.)

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Comparison, if necessary (What is the main alternative to compare with the intervention?)

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Outcome/s (What can I hope to accomplish?)

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Date \_\_\_\_\_ The Learner: \_\_\_\_\_

Presentations will cover:

1. HOW you found what you found, i.e. Search Strategies;
2. WHAT you found (the bottom line);
3. the RELEVANCE and VALIDITY of what you found (the critical appraisal);
4. How what you found will ALTER your MANAGEMENT of such patients;
5. How WELL you think you DID in filling this Rx.

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Appendix #3 ESP curriculum schematic

**First Year**

<b>Problem Based Learning I</b> <b>EBM/Info Mastery</b> <b>Ethics/Professionalism</b>	<b>MedFound II</b> (Anatomy, Gen Path, Intro Pharm, Intro Physio, Musculosk I)	<b>The Brain</b> (Neuroscience, Psychopath, Addiction Med, H&N Anatomy)
<b>Problem Based Learning II</b>		
<b>Found. Patient Care II</b> (Physical Diagnosis)		
<b>Selectives</b>		
<b>Key Themes</b>		

**Second Year**

<b>FHD I</b> (CPR: Cardio, Pulm, Renal)	<b>FHD II</b> (Micro/ID, Heme/Onc,	<b>FHD III</b> (Repro, Endo, GI, Nutrition, Derm)
<b>Foundations of Patient Care IV</b> (Preceptorship II)		
<b>Integrated Case Based Learning</b>		

FHD = Integrated Physiology, Pathophysiology, Systemic Pathology and Pharmacology

Intersession (mid Mar to early May): Board Review Course, Clinical Skills Center for Clerkship Prep, Students take Step I

**Third Year** Clerkships start in early May: Medicine, Surgery, Family Medicine, Psychiatry, Ob-Gyn, Pediatrics, Electives

**Fourth Year** starts early May: Neurology, Subinternships (2), Ambulatory Rotation, Translational/Applied Science or Teaching Rotation, Electives