Preparing Medical Students for Residency: Efficacy of Evidence-Based Medicine Instruction

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5/18/14

Setting and Research Question

- UNC SILS, Spring of 2013
  - EBM Course, Angela Myatt and Connie Schardt
- Are residents retaining the evidence-based medicine skills learned during medical school and applying those EBM skills to improve patient outcomes?
  - Reviewed published literature indexed in:
    - ProQuest' Library and Information Science Abstracts (LISA)
    - MEDLINE
    - EBSCOHost‘s Library Literature & Information Science Full Text (LLIS).

Is EBM an Important Competency for Residents?

- Dorsch et al. (2006) conducted a longitudinal study of students from University of Illinois College of Medicine at Peoria (UICOMP).
- Study concluded that EBM is a core competency of residency training, and is critical for improving patient outcomes.
  - Residency programs include informal EBM curriculums such as journal clubs, teaching rounds, and morning reports.
  - Residents reported a “positive attitude toward EBM” in their programs.

Dorsch, J. L., Aiyer, M. K., Gumidyala, K., & Meyer, L. E. (2006). Retention of EBM Competencies. *Medical Reference Services Quarterly*, *25*(3), 45–57. doi:10.1300/J115v25n03_04

Is EBM an Important Competency for Residents?

- However, residents are not given extensive formal training in EBM.
  - 2.56 average hours of training per month
  - Attending physicians model EBM behavior “only about 50 percent of the time.”
  - Less than 50 percent of residents were given any formal EBM training in their residency program.

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Are Students Retaining EBM Skills?

- Willingham on the role of practice in the teaching and learning process:
  - "It is virtually impossible to become proficient at a mental task without extended practice"
  - Practice enables low level skills to become automatic, freeing up cognitive "space" for higher level tasks
  - "Memory is more enduring when practice is spaced out"

Willingham, D. T. (2009). *Why don't students like school?: a cognitive scientist answers questions about how the mind works and what it means for the classroom*. San Francisco, CA: Jossey-Bass.

Are Students Retaining EBM Skills?

- **Thus, medical students will not retain high levels of EBM knowledge and skills into residency unless they are:**
  - Exposed to EBM instruction repeatedly and consistently throughout their medical education
  - Given opportunities to practice applying EBM skills in settings that simulate clinical scenarios

Willingham, D. T. (2009). *Why don't students like school?: a cognitive scientist answers questions about how the mind works and what it means for the classroom*. San Francisco, CA: Jossey-Bass.

Are Students Retaining EBM Skills?

- Dorsch et al. found that residents consistently overestimated their EBM skills
  - Majority rated themselves as “very or extremely competent” in “searching” as well as “application.”
- Residency program directors rated less than one third of these residents as “very or extremely competent” in these skills.

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Are Students Retaining EBM Skills?

- Cullen et al. (2011) found similar results, determining that clinicians "were more confident in their abilities than their performance would merit."
- Early career clinicians in this study:
  - Had confusion over what constituted a database
  - Rarely understood how to use the MeSH thesaurus
  - Did not know how to combine single search terms using Boolean operators
  - Searched databases by typing in "whole phrases or sentences as in Google."
  - Rarely demonstrated the ability to evaluate and critically appraise articles for validity and relevance.

Cullen, R., Clark, M., & Esson, R. (2011). Evidence-based information-seeking skills of junior doctors entering the workforce: an evaluation of the impact of information literacy training during pre-clinical years: Information-seeking skills of junior doctors. *Health Information & Libraries Journal*, *28*(2), 119–129. doi:10.1111/j.1471-1842.2011.00933.x

Are Students Retaining EBM Skills?

- Participants that performed best in these exercises:
  - Were required to complete additional EBM training during their residency programs
  - Worked with senior clinicians who encouraged junior clinicians to develop and apply these skills

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Are Students Retaining EBM Skills?

- Current EBM instruction creates a foundational knowledge during medical school, but residents need to receive additional EBM training and practice in order to retain high levels of skill.
- The demands of patient care already stretch residency programs to the breaking point – these programs are not likely to devote additional resources to EBM instruction.

How Can Libraries Increase Skill Retention Rates?

- Remember: students retain knowledge when given additional time to practice skills, and when these skills are modeled consistently.
- Libraries need to partner with medical school curriculum directors to provide additional and more effective EBM instruction to students.

How Can Libraries Increase Skill Retention Rates?

- Libraries should consider:
  1. Creating online tools to supplement in-person instruction
  2. Increasing the pervasiveness of EBM instruction within the medical school curriculum
  3. Implementing active learning exercises that utilize team based learning and student peer assessment

Online Instructional Tools

- Online tutorials are not a passing fad
  - Fifteen year history in medical education
- Meyer et al. (2001), Otter et al. (2009), and Bogoch et al. (2012) demonstrate ways libraries can leverage online tools to supplement traditional instruction.
- Advantages of online tools include:
  - Allow students to create knowledge actively
  - Online materials are persistently available

Bogoch, I., Cavalcanti, R., Weinberg, A., & Davis, B. (2012). Web-based blog supplement to evidence-based physical examination teaching. *Medical Education*, *46*(5), 508–508. doi:10.1111/j.1365-2923.2012.04236.x

Mayer, J., Schardt, C., & Ladd, R. (2001). Collaborating to Create an Online Evidence-Based Medicine Tutorial. *Medical Reference Services Quarterly*, *20*(2), 79–82. doi:10.1300/J115v20n02_08

Otter, M. E., Whittaker, S., & Spriggs, S. (2009). Using Wikis and Peer Evaluation to Teach Medical Students How to Find and Assess Evidence Based Resources: A Pilot Study. *New Review of Academic Librarianship*, *15*(2), 187–205. doi:10.1080/13614530903240502

Pervasive EBM Instruction

- Growing movement to integrate EBM into all four years of the medical curriculum, rather than limiting instruction to either preclinical or clinical years (Lynn 2010; MacEachern et. Al 2012).
- Allows medical students to reinforce knowledge over an extended period of time

Lynn, V. A. (2010). Foundations of Database Searching: Integrating Evidence-Based Medicine into the Medical Curriculum. *Medical Reference Services Quarterly*, *29*(2), 121–131. doi:10.1080/02763861003723176

MacEachern, M., Townsend, W., Young, K., & Rana, G. (2012). Librarian Integration in a Four-Year Medical School Curriculum: A Timeline. *Medical Reference Services Quarterly*, *31*(1), 105–114. doi:10.1080/02763869.2012.641856

Active Learning: Team Based Learning & Student Peer Assessment

- Students are engaged by pedagogy that involves them in knowledge creation, such as team based case study discussions (Gagliardi et al., 2012).
- Student peer assessment shows some promise as a method for increasing student skill development and knowledge retention of EBM instruction (Eldredge et al., 2013).

Eldredge, J. D., Bear, D. G. ., S. J., & Perea, P. P., (2013). Student peer assessment in evidence-based medicine (EBM) searching skills training: an experiment. *Journal of the Medical Library Association*, *101*(4), 244–251. doi:10.3163/1536

Gagliardi, J. P., Stinnett, S. S., & Schardt, C. (2012). Innovation in evidence-based medicine education and assessment: an interactive class for third- and fourth-year medical students. *Journal of the Medical Library Association : JMLA*, *100*(4), 306–309. doi:10.3163/1536-5050.100.4.014

Challenges

- Online Tutorials:
  - Creating online materials is time consuming. Making these digital objects persistently available will likely lead to other issues, such as preservation and accessibility.
- Pervasive EBM Instruction:
  - Medical schools don't just give away their students' time – instruction librarians must advocate for an expanded role in the curriculum
- Active Learning:
  - Moving away from a traditional lecture form of instruction can be scary

Lessons Learned: Implications for Medical Education

- The literature supports the “flipped classroom” model of instruction and team based learning
  - Use online tutorials to introduce concepts
  - Use class time to discuss case studies in teams and how evidence based practice fits into those cases.

Lessons Learned: Implications for Medical Education

- Sample EBM Learning Outcomes:
  - Students will be able to use PICO to develop a clinical question
  - Students will understand why a well-built clinical question will return relevant search results within PubMed

Lessons Learned: Implications for Medical Education

- EBM Flipped Classroom Sample Lesson Plan
  - Before class, students complete online tutorials on how to use PICO to design a clinical question, and are assigned case studies to read
  - In class, students in teams use PICO to develop clinical questions for an assigned case study
  - Teams present their clinical question, search terms, and the evidence they found in medical literature
  - Compare and contrast clinical questions, search terms, and evidence found
  - Discuss how different evidence may lead to different patient outcomes

Lessons Learned: Applying this at UMD

- At UMD Libraries, our Teaching & Learning Department works with English 101 classes to provide first year library instruction to students.
  - Students learn fundamentals of ACRL Information Literacy Standards
    - Topic development, Boolean operators

Lessons Learned: Applying this at UMD

- How effective are these library sessions for first year undergraduates?
  - Are these same learning retention issues we saw with medical students affecting undergraduates?
  - Is a one shot library session in a freshman English class enough practice for retention?

Lessons Learned: Applying this at UMD

- Professional Writing Program (PWP)
  - Required upper leveling writing class
  - Classes are loosely connected by topic
    - Ex: Writing for Health Professions, Writing for the Environment
- Library offers a one shot library session for these classes as well
  - Upper level undergraduates are not retaining all of the information literacy skills they learned in their English 101 courses.

Lessons Learned: Applying this at UMD

- How can we make these sessions more effective for students?
  - Developing online tutorials that will reinforce information literacy concepts to students before the in-person session.
  - Goal of creating a library classroom session that is student centered, with active learning and knowledge creation rather than passive knowledge absorption through lecture
  - This “flipped classroom” will give students additional guided practice time, key for learning retention

Information Literacy Concepts

- Backing it Up: Using Evidence to Support a Rhetorical Argument
- What is a "Good" Source? Determining the Validity of Evidence
- Who Decides What Is Valid? The Peer Review Process
- So What Should I Write On? Researching and Developing a Topic You Like
- I Like It, But Will It Work? Developing a Feasible Topic
- What Is Wrong With My Search? Using Boolean Operators
- How Do I Even Read That? Understanding Scholarly Articles
- Why Do I Have To Do That? Scholarship, Attribution, Citation, and Plagiarism
- What Research Came Later? Cited Reference Searching
  - Google Scholar
  - Scopus
  - Web of Science
- Who Is Going To Read This? Writing for a Specific Audience

Audience

Finding Information

- Business
- Background Information (Google)
- Government Resources: Federal, State, and Local
- Business Resources: For-profit and Non-profit
- Educational Resources: School sources and UMD
- Health
  - Searching Health Databases Effectively
- Government Information

Last edited by Alexander Carroll 19 days ago Page history

Searching Health Databases Effectively

In the previous module **Finding Information: Health**, you were provided an extensive list of databases where you can find information for your research assignment. The following tips can ensure that you are able to effectively use these health databases to find information that is relevant to your topic.

Improving Your Search: *PICO Method*

PICO is a technique for designing a well developed search in a health science database, and can be utilized effectively for scientific research in many disciplines. PICO helps a researcher identify all of the key terms that should be included in a search. PICO is an acronym that stands for:

P - Patient: what is the patient population that are you interested in? Think of this as the subject of your research.

I - Intervention: what is the exposure or intervention that you are interested in? Think of this as the independent variable in an experiment.

C - Comparison: what is the comparison to the current intervention? What other factors could be considered as an alternative to the main intervention? For many types of research, this step can be omitted.

O - Outcome: what condition are you hoping to measure, change, or improve? Think of this as the dependent variable in an experiment.

While this process may seem formulaic, it helps identify terms that should be included in your search strategy. By doing this BEFORE you attempt to do a search, you can ensure that you will not waste your time looking at search results that are not relevant to your research.

Want more information on how to create a PICO search for your topic? Consult this guide , or download and try completing a blank PICO worksheet.

Improving Your Search: *Medical Subject Headings (MeSH)*

MeSH are a distinctive feature of PubMed (MEDLINE). PubMed's inclusion of MeSH allows researchers like you to use consistent vocabulary when searching for biomedical information.

Why use MeSH when searching PubMed?

Example: You want to do research on how sugar can impact cancer development in laboratory mice. In PubMed, you could do the following search:

Common Pages
Front Page
Searching Health Databases
Who Or What Is Boolean? Using Se...
Newspaper Sources
Government Information
Recent Changes
Public Opinion Research
University Newspapers / Wire
Why Do I Have To Do That? Scholarshi...
more...
All Pages
show all...
Edit this Page
Delete this Page
Create a New Page

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