It's not about the stats…

TEACHING EVIDENCE-BASED MEDICINE 20+ YEARS INTO THE MOVEMENT

Objectives

Participants should be able to:

- Discuss the meaning and goals of "evidence-based practice."
- Discuss ideas for creating an environment supportive of learning evidence-based medicine.
- Compare and contrast an "information mastery" curriculum and an "evidence-based medicine" curriculum.

Considerations…

WHY ME?

BEWARE OF STRAW MEN

In the chat - don’t take the bait...
Share your innovations instead...

Meaning and goals

What is evidence-based medicine?

Evidence-based medicine is the conscientious, judicious and explicit use of current best evidence in making decisions about the care of individual patients.

Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. BMJ. 1996 Jan 13;312(7023):71–2.

What is evidence-based *practice*?

The integration of individual clinical expertise, and the best available external clinical evidence from systematic research.

- Expertise: proficiency and judgment that clinicians acquire through clinical experience and practice
- Evidence: clinically relevant research especially from patient centered clinical research, but often also from basic science

Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. BMJ. 1996 Jan 13;312(7023):71–2.

What evidence-based medicine is NOT

"Old hat"

Something that everyone is already doing.

Impossible to practice.

Practiced only from ivory towers and armchairs.

Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. BMJ. 1996 Jan 13;312(7023):71–2.

What has EBP become?

A bludgeon

A marketing label

A synonym for guidelines

A focus on narrow-scope quality metrics

Hard to practice (at least as originally described)

Relegated to ivory towers and armchairs?

Shifting objectives

- Biostatistics
  - P-value, odds ratio, absolute risk reduction, sensitivity/specificity, [meta-analysis]
  - AUROC, I-squared test for heterogeneity, likelihood ratios...
- Study design
  - RCT, case-control, retrospective cohort
  - Cluster-randomized controlled trial with stratified & blocked randomization, non-inferiority study, network meta-analysis...
- Synthetic research (systematic review, meta-analysis, decision analysis, statistical modeling)

What is the goal?

My two previous TEACH talks...

Importance of **Objectives** in directing teaching and educational research.

- “Begin with the End in Mind”

What is our goal in teaching evidence-based medicine nowadays?

Poll Question

For MY learners, the most important objective of instruction in evidence-based medicine is:

1. Critical appraisal of original research articles.
2. Design and implementation of a research study.
3. Use of the most authoritative guidelines in clinical practice.
4. Conducting quality improvement in the clinical setting.
5. Enable the learner to argue endless arcane biostatistical points.

Discussion Question (for the chat)

What are our goals and objectives for teaching our learners evidence-based medicine?

Challenges teaching traditional EBM

Medical School

- De-emphasized relative to other courses (time, placement, grading)
- Substituted for biostats/epidemiology
- "Waste basket" courses
- Integration is challenging – faculty development

Residency

- Learner baselines extremely variable
- Lumped with research/scholarly activity/quality improvement
- Integration is challenging – faculty development

Continuing MedEd

- Ha!
- Focus on shifting information seeking behavior/reference use

EBM Conceptual Framework

Doer role

- Full EBM for frequently encountered conditions

User role

- Pre-appraised resources

Replicator role

- Follow “respected EBM leaders”

Straus SE, Green ML, Bell DS, Badgett R, Davis D, Gerrity M, et al. Evaluating the teaching of evidence-based medicine: conceptual framework. BMJ. 2004 Oct 28;329(7473):1029–32.

EBM Framework – "on the ground"

Doers

- Few clinicians
- Those that generate evidence-based products or who directly critically appraise evidence.

Users

- Most clinicians most of the time (ideally)
- Rely on pre-appraised sources

Replicators

- Most clinicians most of the time (really…)
- Ideally – evidence-based leaders
- Really – Loudest? Most authoritarian? Easiest to talk to?

What is evidence-based practice? A Delphi study of experts in the field

2004, unpublished

Delphi process, Snowball sampling for experts

Questions

- General: What is evidence-based practice?
- Specific: List the characteristics that make a physician “evidence-based.”
- Specific: List the criteria you would use to evaluate the ‘evidence-based-ness’ of a physician practice type or habits.

What is evidence-based practice? A Delphi study of experts in the field

Table 1. Rank ordered items from stimulus question 1:
List the characteristics that make a physician "evidence-based."

Statement Description	Average	Range
Changes practice by incorporating new valid information	89.19	20 - 100
Admits knowledge deficits	89.05	20 - 100
Integrates the best evidence with the preferences and circumstances of individual patients	88.76	20 - 100
Understands the limits of evidence based medicine	87.19	30 - 100
Integrates clinical experience with current best evidence	87.10	30 - 100
Realizes that acceptable evidence can be generated from studies other than randomized controlled trials	85.05	20 - 100
Clearly communicates with patients as part of evidence-based decision making	84.95	30 - 100
Is willing to be questioned	84.52	10 - 100
Possesses a healthy skepticism toward status quo	84.10	20 - 100
Values higher quality evidence over lower quality evidence	83.57	20 - 100
Possesses a healthy skepticism toward new information	82.48	20 - 100
Balances benefits and harms when making medical decisions	81.95	20 - 100
Regularly asks clinical questions from practice	81.33	10 - 100
Knows best evidence sources	81.14	20 - 100
Clearly distinguishes disease-oriented (laboratory values and technical measurements) and patient-oriented (morbidity, mortality, quality of live) evidence.	79.90	20 - 100

What is evidence-based practice? A Delphi study of experts in the field

Table 2. Rank ordered items from stimulus question 2:
***List the criteria you would use to evaluate the 'evidence-based-ness' of a physician practice type or habits*.**

Statement description	Average	Range
Understands that all evidence does not have equal validity	87.38	20 - 100
Thoughtfully integrates clinical expertise with evidence	85.24	20 - 100
Consistently applies the best available evidence	82.05	20 - 100
Values morbidity, mortality and quality of life outcomes over surrogate outcomes.	81.14	20 - 100
Understands own limitations	79.25	10 - 100
Asks and answers questions developed from recent clinical experience	78.95	20 - 100
Examines own decisions using an EBM approach	78.86	20 - 100
Understands what information matters in measuring outcomes	75.60	20 - 100
Involves patients in the decision process	75.14	20 - 100
Understands that there is a lack of evidence for some conditions	74.71	20 - 100
Clearly explains evidence to patients	73.76	20 - 100
Assesses patient outcomes, including quality of life and patient satisfaction, as part of decision-making	70.86	20 - 100
Is curious	70.00	20 - 100
Is skeptical	69.95	20 - 100
Uses sound evidence in making all decisions	69.52	20 - 100

Evidence-based practice

Study-design, stats, critical appraisal

- Straightforward to teach and evaluate
- Yet we don't do that well...

Personality characteristics, relationship-orientation

- Are these taught or selected?
- Hard to teach
- Hard to evaluate

Our current system of EBM teaching is based on what's easiest to teach.

Enviroment and Culture

Poll Question

Which is ***most*** characteristic of your experience with teaching/learning EBM?

1. Long, confusing learner presentations of the critical appraisal of articles they don't really understand.
2. Boring statistical presentations by the "research guy" in the department who doesn't see patients.
3. Invigorating discussions about the strength of evidence answering a clinical question and the issues with applying this evidence to a patient.
4. Faculty arguments that devolve into fisticuffs over which clinical guideline should be followed.

Discussion question for the chat

What does the EBM teaching culture look like in your setting?

Changing role of teacher

Evolution of teacher

- from teaching facts and providing explanations...
- to *creating a rich, safe and challenging learning environment...*
- *...and helping learners learn*

(Great quote from somewhere)

Recent focus of ACGME and LCME on learning environment

- Not just mistreatment, but also hidden curriculum

Learning theory

- Traditionally focused on cognitive and behavioral learning theory
- Medicine evolved from apprenticeship model, strong social learning history
- Social learning theory and constructivism both emphasize importance of learner's milieu.

EBM Teaching Culture Survey

Survey of Family Medicine Program Directors - 2015

Details of programs

Adapted survey on learner's perceptions of environment for EBM teaching – focusing on what program director could answer about the faculty and the program.

Response rate 61%

Epling J, Heidelbaugh J, Woolever D, Castelli G, Mi M, Mader E, et al. Examining an Evidence-Based Medicine Culture in Residency Education. Family medicine. 2018;50(10):751–755.

EBM Teaching Culture Survey

Table 2: EBM Culture Score Means by Statement (1=Strongly Disagree, 5=Strongly Agree)

Question	Mean (SD)
In our family medicine residency program…	
…there is a commitment to life-long learning in our practice environment.	4.72 (0.45)
…our faculty members promote an atmosphere of mutual respect.	4.68 (0.53)
…residents are encouraged to become problem solvers.	4.68 (0.58)
…the use of clinical evidence is part of the routine for clinical practice in our practice environment.	4.55 (0.51)
…there is a high level of acceptance of EBM in our residency practice environment.	4.47 (0.65)
…evidence-based information resources (eg, Essential Evidence, Dynamed, FPIN, etc) are readily available in the residency practice environment.	4.47 (0.86)
…our faculty members model evidence-based practice during rounds and case discussions in the clinical setting.	4.26 (0.60)
…our faculty members promote the application of EBM in solving clinical problems for individual patients.	4.25 (0.62)
…faculty members serve as collaborative facilitators in the residents' EBM learning process.	4.20 (0.73)
…the integration of EBM into clinical practice is met with skepticism by clinicians in our practice environment.	4.18 (0.94)
…we protect resident time for EBM training.	4.09 (0.95)
…there is a high level of faculty involvement in teaching EBM at our residency training site.	4.08 (0.81)
…our faculty members provide residents with clear feedback on their EBM practice.	3.64 (0.90)

Epling J, Heidelbaugh J, Woolever D, Castelli G, Mi M, Mader E, et al. Examining an Evidence-Based Medicine Culture in Residency Education. Family medicine. 2018;50(10):751–755.

Other studies

Doctors Perceptions and Use of EBM

- Systematic review of qualitative studies, 2013
- Group norms for safe communication
- Shared learning across career stages

Swennen MHJ, van der Heijden GJMG, Boeije HR, van Rheenen N, Verheul FJM, van der Graaf Y, et al. Doctors' Perceptions and Use of Evidence-Based Medicine: A Systematic Review and Thematic Synthesis of Qualitative Studies. Academic Medicine. 2013 Sep;88(9):1384–1396.

Knowledge, attitudes and practice of physicians toward EBM

- Systematic review of teaching studies, 2017
- "Poor knowledge and skills", but positive attitude toward EBM
- Workload is a major barrier to practice
- Availability of pre-appraised sources key

Barzkar F, Baradaran HR, Koohpayehzadeh J. Knowledge, attitudes and practice of physicians toward evidence-based medicine: A systematic review. J Evid Based Med. 2018 Nov;11(4):246–51.

EBM Teaching Culture – "on the ground"

The "EBM person"

- Research, scholarly activity, quality improvement
- Effective role modelling? (is often a "doer")

"We have met the enemy and he is us."

Rare formal socialization of the information-seeking process

- Faculty as "experts"

Faculty development

- Focus on critical appraisal – big turnoff!
- Failure to develop the "user" skills
- Skills in evaluating EBP in learners?
  - Focus on outcome rather than process?

Evidence-based Medicine vs. Information Mastery

EBM competencies review

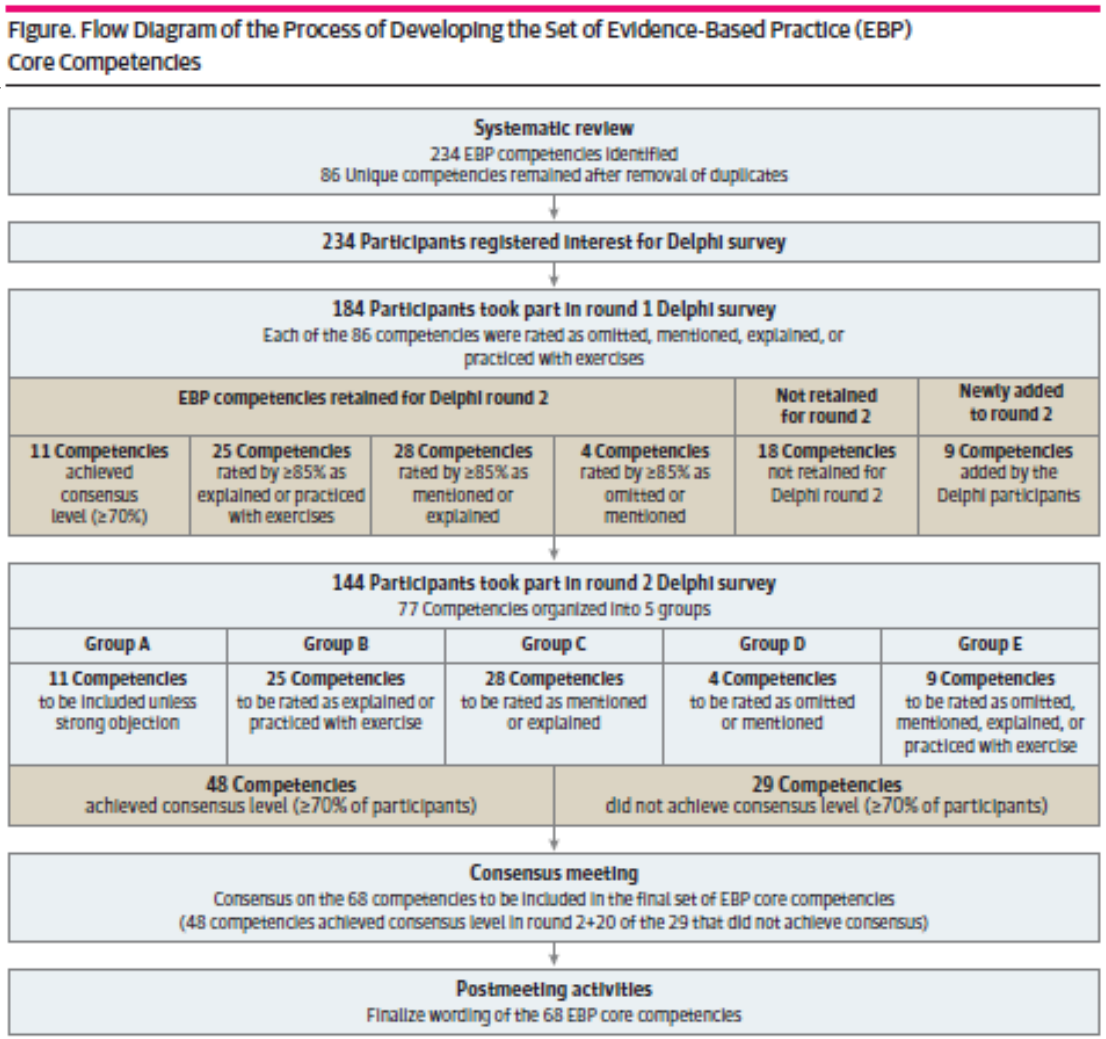
Systematic Review to extract competencies

Delphi study to rate competencies

- "significant experience in teaching and practicing EBM"

Ratings – Competency should be:

- Mentioned
- Explained
- Practiced with examples



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2018 Core EBP competencies

Introductory

- 0.1 Understand EBP defined as the integration of the best research evidence with clinical expertise and patient's unique values and circumstances E
- 0.2 Recognize the rationale for EBP M
  - The daily clinical need for valid information to inform decision making, and the inadequacy of traditional sources for this information M
  - The disparity between diagnostic skills and clinical judgment, which increase with experience, and up-to-date knowledge and clinical performance, which decline with age and experience M
  - Lack of time to find and assimilate evidence as a clinician M
  - The gaps between evidence and practice can lead to suboptimal practice and quality of care M
  - The potential discordance between a pathophysiological and empirical approach to thinking about whether something is effective M
- 0.3 For each type of clinical question, identify the preferred order of study designs, including the pros and cons of the major study designs E
  - Classify the major study designs for each type of clinical question E
- 0.4 Practice the 5 steps of EBP: ask, acquire, appraise and interpret, apply, and evaluate P
- 0.5 Understand the distinction between using research to inform clinical decision-making vs conducting research M

2018 Core EBP competencies

Ask

- 1.1 Explain the difference between the types of questions that cannot typically be answered by research (background questions) and those that can (foreground questions) E
- 1.2 Identify different types of clinical questions, such as questions about treatment, diagnosis, prognosis, and etiology P
- 1.3 Convert clinical questions into structured, answerable clinical questions using PICO P
  - Recognize the importance of and strategies for identifying and prioritizing uncertainties or knowledge gaps in practice M
  - Understand the rationale for using structured clinical questions E
  - Identify the elements of PICO questions and use variations of it when appropriate (eg, PICOT, PO, PECO—Exposure) to structure answerable clinical questions P

2018 Core EBP competencies

Acquire

- 2.1 Outline the different major categories of sources of research information, including biomedical research databases or databases of filtered or preappraised evidence or resources E
  - Outline the advantages of using filtered or preappraised evidence sources and recognize relevant resources E
  - Indicate the differences between the hierarchy of evidence, level of processing of evidence, and types of evidence-based medicine resources E
- 2.2 Construct and carry out an appropriate search strategy for clinical questions P
  - Know where to look first to address a clinical question P
  - When necessary, construct a search strategy that reflects the purpose of the search P
  - Apply a general search strategy including the use of search terms, and the role of Boolean operators; truncation; and search filters for more efficient searches E
- 2.3 State the differences in broad topics covered by the major research databases M
- 2.4 Outline strategies to obtain the full text of articles and other evidence resources E

2018 Core EBP competencies

Appraise and Interpret

- 3.1 Identify key competencies relevant to the critical evaluation of the integrity, reliability, and applicability of health-related research E
  - Understand the difference between random error and systematic error (bias) E
  - Identify the major categories of bias and the impact of these biases on the results E
  - Interpret commonly used measures of uncertainty, in particular, confidence intervals P
  - Recognize that association does not imply causation and explain why E
  - Recognize the importance of considering conflict of interest and funding sources M
  - Recognize the uses and limitations of subgroup analysis and how to interpret its results M
- 3.2 Interpret different types of measures of association and effect, including key graphical presentations P
  - Identify the basic types of data such as categorical and continuous E
  - Recognize the meaning of some basic frequency measures M
  - Identify the difference between “statistical significance” and “importance,” and between a lack of evidence of an effect and “evidence of no effect” E

2018 Core EBP competencies

Appraise and Interpret (continued)

- 3.3 Critically appraise and interpret a systematic review P
  - Recognize the difference between systematic reviews, meta-analyses, and nonsystematic reviews M
  - Identify and critically appraise key elements of a systematic review P
  - Interpret presentations of the pooling of studies such as a forest plot and summary of findings table P
- 3.4 Critically appraise and interpret a treatment study P
  - Identify and appraise key features of a controlled trial P
  - Interpret the results, including measures of effect P
  - Identify the limitations of observational studies as treatment studies, and recognize the basics of adjustment methods and their limitations E
- 3.5 Critically appraise and interpret a diagnostic accuracy study P
  - Identify and appraise key features of a diagnostic accuracy study P
  - Interpret the results, including interpret measures to evaluate diagnostic accuracy P
  - Recognize the purpose and use of clinical prediction rules M

2018 Core EBP competencies

Appraise and Interpret (continued)

- 3.6 Distinguish evidence-based from opinion-based clinical practice guidelines P
- 3.7 Identify the key features of, and be able to interpret, a prognostic study E
  - Identify and appraise key features of a prognostic study E
  - Interpret the results including measures of effect (eg, Kaplan-Meier survival curves) and uncertainty E
  - Recognize the purpose and use of clinical prediction rules M
- 3.8 Explain the use of harm and etiologies study for (rare) adverse effects of interventions E
  - Indicate that common treatment harms can usually be observed in controlled trials, but some rare or late harms will only be seen in observational studies E
- 3.9 Explain the purpose and processes of a qualitative study E
  - Recognize how qualitative research can inform the decision-making process M

2018 Core EBP competencies

Apply

- 4.1 Engage patients in the decision-making process, using shared decision making, including explaining the evidence and integrating their preferences P
  - Recognize the nature of the patient's dilemma, hopes, expectations, fears, and values and preferences M
  - Understand and practice shared decision-making P
  - Recognize how decision support tools such as patient decision aids can assist in shared decision-making M
- 4.2 Outline different strategies to manage uncertainty in clinical decision making in practice E
  - Recognize professional, ethical, and legal components and dimensions of clinical decision making, and the role of clinical reasoning M
- 4.3 Explain the importance of baseline risk of individual patients when estimating individual expected benefit E
  - Recognize different types of outcome measures (surrogate vs composite endpoints measures) M
- 4.4 Interpret the grading of the certainty in evidence and the strength of recommendations in health care E

2018 Core EBP competencies

Evaluate

- 5.1 Recognize potential individual-level barriers to knowledge translation and strategies to overcome these M
  - Recognize the process of reflective clinical practice M
- 5.2 Recognize the role of personal clinical audit in facilitating EBP M

So, how do we proceed?

Directions

Meaning and goals:

- Focus on "process" not outcome
- Apply "critical appraisal" to all information sources

Culture

- Social learning and constructivism
- Faculty development
  - User skills
  - Evaluating EBP
- Promote integration
  - Teach HOW to learn
  - Discuss "evidence-based (shared) decision making" vs. "outcomes"

==> Information Mastery

Promoting Critical Thinking

We do it for differential diagnoses and clinical reasoning.

- Why not for information seeking and evaluation?

Add: Where will/did you get that information?

Reinforce: What's your specific question?

Consider teaching about cognitive bias and other impairments to decision-making?

Teaching information mastery

Foundation of statistics, study design, critical appraisal

- Examples, basic science
- But we frequently just outline the steps, and hope that the integration happens in the learner

Critically appraise all information sources

- Usefulness = (Relevance X Validity)/Work

Teach "information consumerism"

- Recognize high-quality evidence-based information (beware the labels)
- Focus on appraisal of knowledge synthesis products (reviews, guidelines) and pre-appraised sources

Influencing lifelong learning…

"Mindlines"

- Adoption of EBP happens as a process of socialization and interpretation in context
- "Knowledge-in-practice-in-context"
- How can we improve the knowledge inputs to this process?
- Can we make this process more explicit and intentional?

Gabbay J, Le May A. Evidence based guidelines or collectively constructed “mindlines?” Ethnographic study of knowledge management in primary care. BMJ (Clinical research ed). 2004;329(7473):1013.

Our Residency Curriculum (in progress)

Journal Club
- 1) Review article, 2) original research, 3) systematic review or guideline
- Peer and faculty evaluation
- Limited, ad hoc didactics
- Web site for support

Community Medicine
- Answering questions with pre-appraised sources
- Answering question with original research - six steps of EBM

Clinical Precepting
- Cognitive bias
- Sources of answers (variable)
- Educational prescription – where WILL you find the answers?

Quality Improvement
- Based on evidence...sometimes...

Objectives

- Discuss the meaning and goals of "evidence-based practice."
  - Process over outcome
  - Habits and integration over statistical knowledge
- Discuss ideas for creating an environment supportive of learning evidence-based medicine.
  - Culture by design
  - Look for hidden curriculum
- Compare and contrast an "information mastery" curriculum and an "evidence-based medicine" curriculum.
  - Broaden notion of critical appraisal of all information sources
  - Train users rather than doers

References

1. Albarqouni L, Hoffmann T, Straus S, Olsen NR, Young T, Ilic D, et al. Core Competencies in Evidence-Based Practice for Health Professionals: Consensus Statement Based on a Systematic Review and Delphi Survey. JAMA Netw Open. 2018 Jun 22;1(2):e180281.
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Thank You!

Comments/Discussion…

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