



Introductory EBM

Evidence-Based Medicine

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Objectives

□ **What**

- What is evidence-based medicine?
- What does it look like in practice?

□ **Why**

- Why Teach and Practice EBM?

□ **How**

- 4 steps of EBM practice

Evidence

- What do you think about evidence?
 - Smoking is hazard to your Health
 - Vitamin C is good to keep you from cold

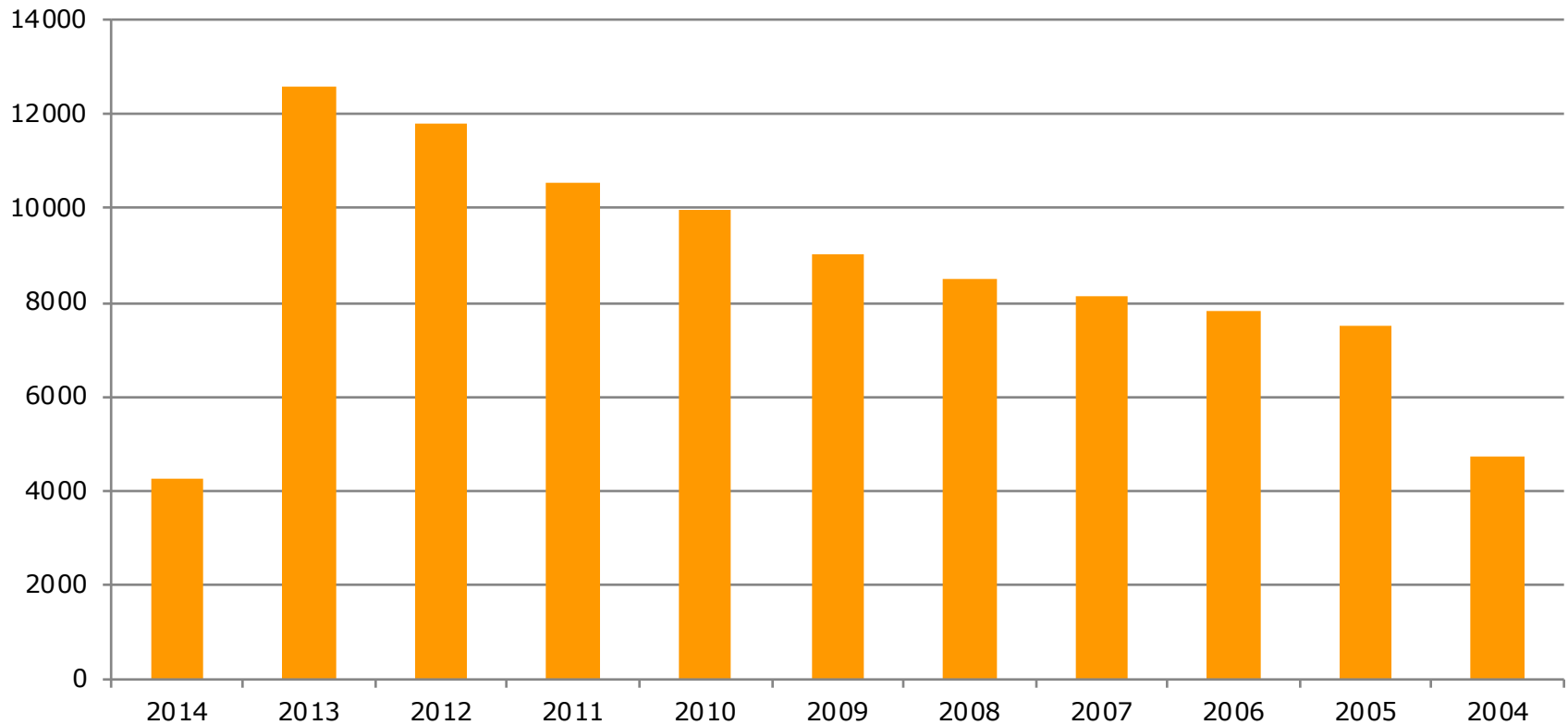
Medical decision

- How do you make decision on treatment for a patient?
 - Personal experience?

- How many patients does a qualified physician treat for the whole career span?
 - $40\text{ys} * 200\text{ds} * 10\text{ps} = 80,000$
 - A big figure? If just focus on lung cancer?

Papers published (totally 94,834 to 4.9,2014)

count of papers published with key words 'lung cancer'



Big data

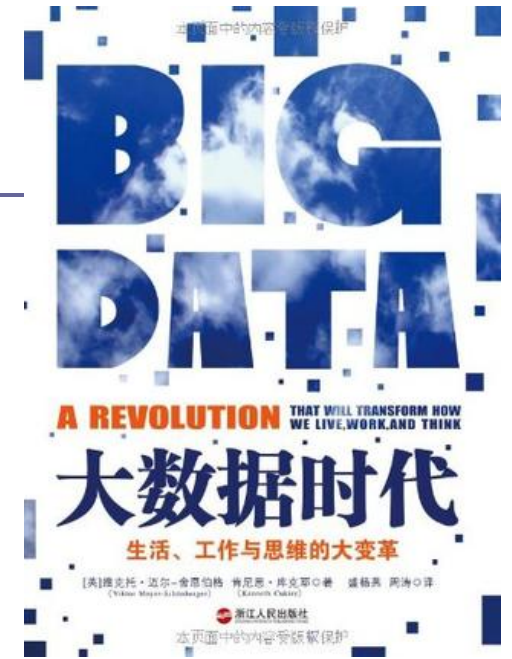
- *“If millions of electronic medical records reveal that cancer sufferers who take a certain combination of aspirin and orange juice see their disease go into remission, then the exact cause for the improvement in health may be less important than the fact that they lived.*”

Big Data: A Revolution That Will Transform How We Live, Work, and Think



Big data

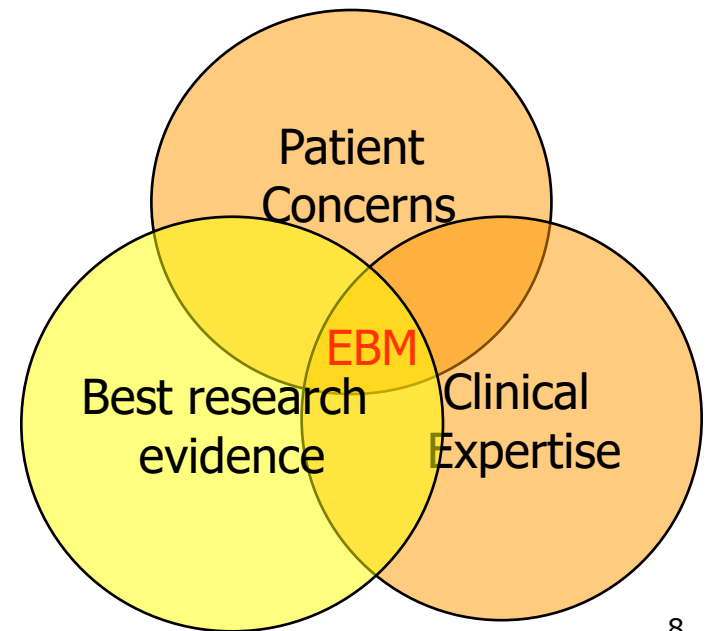
- Evidence
- Data
- Information
- We need approaches to search, collect, appraise, analysis data as evidences to make conclusion
- More important, we need thinking on the importance of using evidence to practice.



What is evidence-based medicine?

“Evidence-based medicine is the integration of best research evidence with clinical expertise and patient values”

- *Dave Sackett*



What is evidence-based medicine?

“EBM is nothing more than a process of life-long, self-directed learning in which caring for patients creates the need for clinically important information about diagnosis, prognosis, therapy, and other clinical and health care issues.”

□-- The EBM Working Group

What is evidence-based medicine?

- EBM is... “an evolutionary progression of knowledge based on the basic and clinical sciences and facilitated by the age of information technology.”
- -- Doherty, Steve. "Evidence-based medicine: Arguments for and Against." *Emergency Medicine Australasia* 2005; 17: 307-13.

Why Teach & Practice EBM?

- ❑ **I**t is required to be taught in Medical University.
- ❑ **R**esearches show that patients who do receive evidence-based therapies have better outcomes than those who don't.
- ❑ **I**t may be a more efficient means of remaining current than traditional methods (e.g. journal subscriptions).
- ❑ **A** host of **developments** make EBM more possible than ever.

Developments

- ❑ Efficient **strategies** for tracking and appraising evidence.
- ❑ Availability of evidence-based **journals**.
- ❑ Creation of **systematic reviews(SE)** & concise summaries.
- ❑ Information systems allowing access to resources in seconds.
- ❑ The skills to deal with evidences like **Statistics, bioinformatics**.

A dilemma

- You are very ill ...

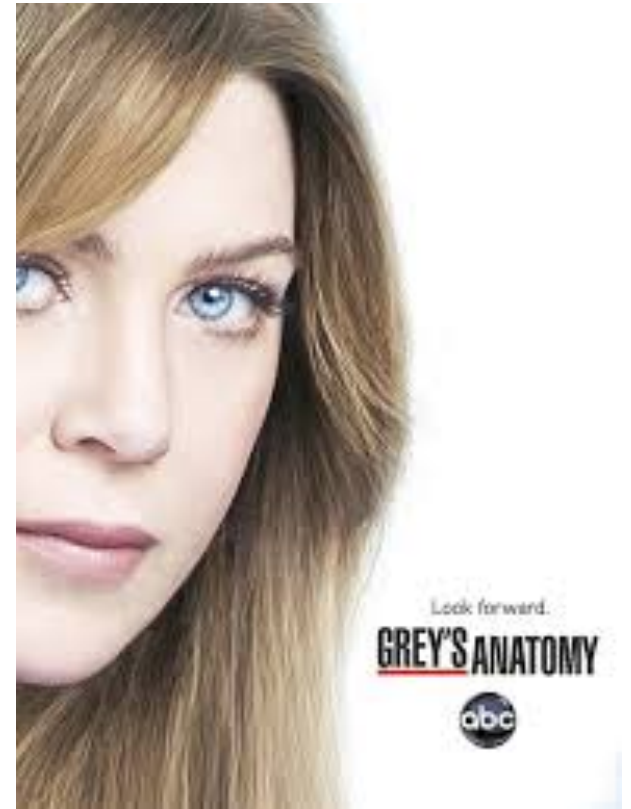


"How bad is it, Doctor?
Should I start dating?"

Which doctor do you trust?



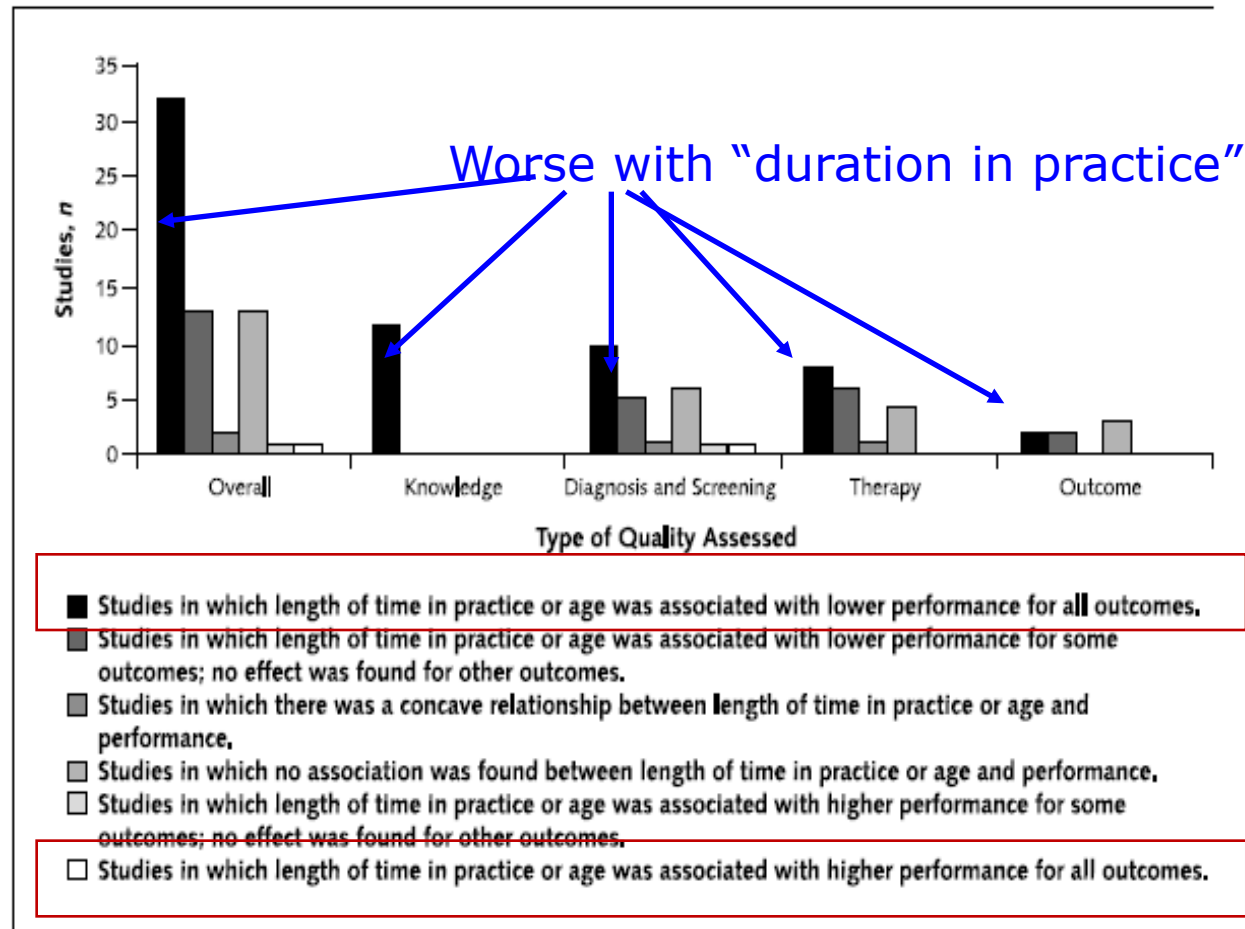
Doctor House



Systematic Review: The Relationship between Clinical Experience and Quality of Health Care

Niteesh K. Choudhry, MD; Robert H. Fletcher, MD, MSc; and Stephen B. Soumerai, ScD

Figure 2. Distribution of study results relating physician age to clinical performance in various domains.



Do we know the right things?

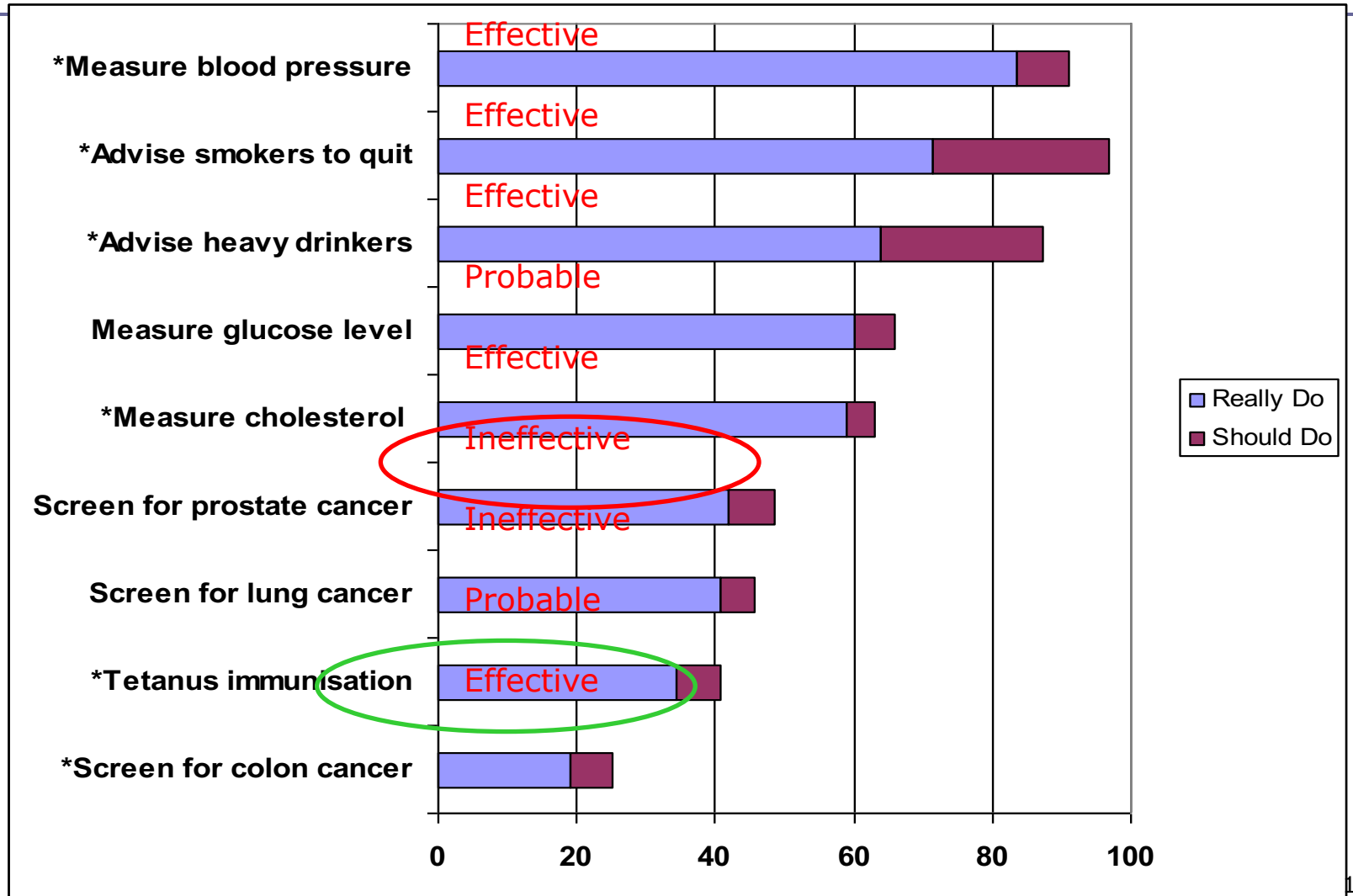
GP beliefs about prevention for a 52 yr male

The second part of the questionnaire had two clinical scenarios, the first involving a 52-year-old male and the second a 57-year-old female, both of whom are visiting the GP for the first time with a trivial problem. They have no Previous check-ups or tests, no personal or family history of any major condition and they do not have known risk factors. GPs were asked to mark a list of preventive and health promotion activities that they believe should be done in each scenario (**should do**) and, at the same time and in a different column, if they **actually do** them in clinical practice.

Prev Med. 2005 May;40(5):595-601.

Prevention and health promotion in clinical practice: the views of general practitioners in Europe.

Do we know the right things?



Putting Skills into Practice

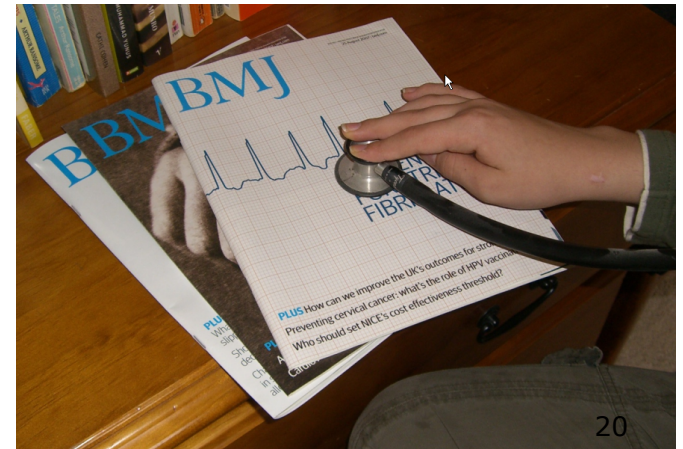
- ❑ Find evidence supporting one clinical decision made on **each** of your patients.
- ❑ Find evidence supporting one clinical decision made on **one patient** per clinic day.
- ❑ Encourage the students & **colleagues** you work with to follow your lead.
- ❑ Work as **a team** to find evidence-based answers.

Limitations*

- ❑ Time.
- ❑ Shortage of coherent and consistent **scientific evidence** (therapeutic nihilism).
- ❑ Challenges of applying evidence to care of individual patients.
- ❑ General barriers to the practice of quality medicine (e.g. costs, patient expectations, etc.).

4 steps of “Full” EBM

1. Formulate an **answerable** question
2. Track down the best evidence
3. Critically appraise the evidence
4. Individualize, based clinical expertise and patient concerns



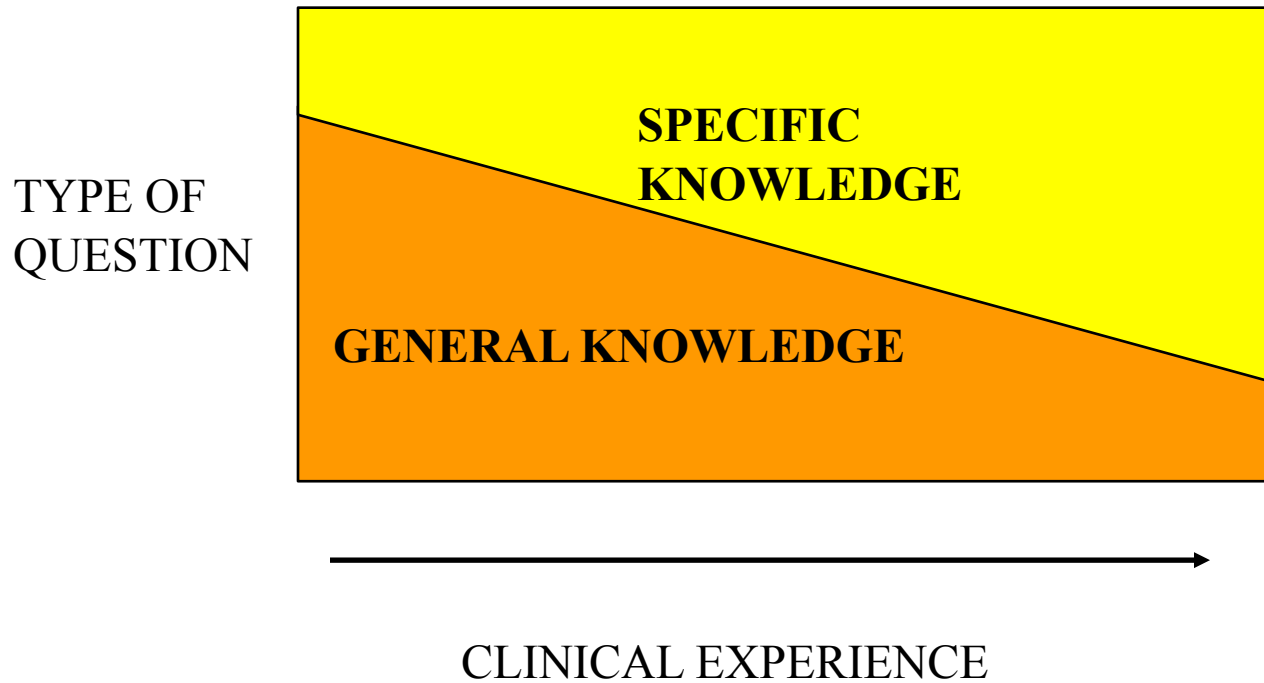
Step 1 Formulate an answerable question

•What is good question?

Good questions are the backbone of practicing EBM.

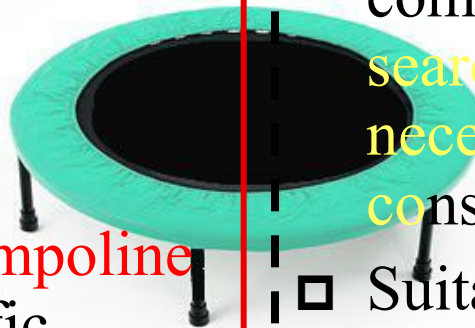
It takes practice to ask the well-formulated question.

The nature of the question asked is critically experience dependent.



Differences in Type of Q's

- ❑ **General** “Background” question composed of question modifier and condition.
- ❑ Cover the full range of biologic, psychological, or sociologic aspect of human illness
- ❑ Can be answered by reference works.*
- ❑ Can be used as a **trampoline** for generating specific questions to be answered by EBM.



- ❑ **Specific** “Foreground” question composed of patient and/or problem, intervention (therapy, diagnostic test, etc.), comparison and outcome.
- ❑ Often requires more comprehensive and intensive **search** strategies (not necessarily more time consuming).
- ❑ Suitable to answering using the techniques of EBM.

Well-Built Clinical Q's

- ❑ Directly relevant to the care of the patient and our knowledge deficit.
- ❑ Contains the following elements:
 - the **patient** or problem being addressed
 - the **intervention** or exposure(therapy, diagnostic) being considered
 - the **comparison** intervention or exposure, when relevant
 - the clinical **outcomes** of interest.

Formulate an answerable clinical question



www.cebm.net

Author:	Ref:
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Structure of researchable questions – PICO-T

- Population/Patients
- Intervention
- Comparison
- Outcome
- Time

		Description	Numbers	
Question	P Patients			
	I Intervention			
	C Comparator			
	O Outcomes		CER (%)	IER (%)
		1		
		2		
Appraisal	R Randomized			
	A Ascertainment			
	M Measures			
Outcomes	RD Difference	CER – EER		
	RRR	RD/CER		
	NNT	1/RD		

Clinical Bottom-line:

Further Actions:

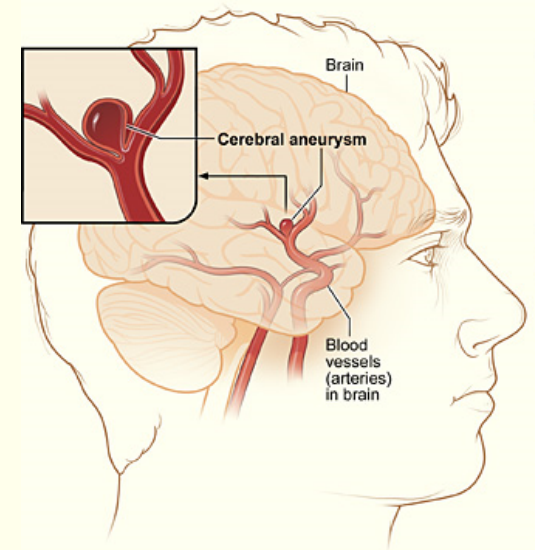
Example Questions

- ❑ Are antidepressants safe in adolescents?
- ❑ Is **atenolol** OK for hypertension?
- ❑ Should all diabetics take aspirin?
- ❑ **Do probiotics prevent AB diarrhoea?**
- ❑ Does ‘bibliotherapy’ help depression?
- ❑ What is the impact of **Tamiflu** on flu?
- ❑ **Are combined inhalers better in asthma?**
- ❑ **Pelvic floor exercises for ED ?** [erectile dysfunction](#)

What are your clinical questions?

- A 35 year old man says his brother recently died of a **ruptured cerebral aneurysm**.

He is worried about whether he might have one and what the chances are that it would rupture.



Personal Decision

- ❑ The 38-year-old actress opened up for the first time about her decision to undergo a preventative mastectomy in an interview with Entertainment Weekly.
- ❑ “I’m great! I’m very happy I **made the decision**. I was very fortunate to **have great doctors** and very, very fortunate to have a good recovery and have a project like ‘Unbroken’ to have something to be really focused on, to be getting healthy for, and to be able to just get right back to work,” ...the “Maleficent” star told EW, referring to her second stint in the director’s chair.



Steps in Practicing EBM

1. Formulate an **answerable** question
2. Track down the best evidence
3. Critically appraise the evidence
4. Individualize, based clinical expertise and patient concerns

Q: How do you find current best evidence?

A: Ask your librarian!

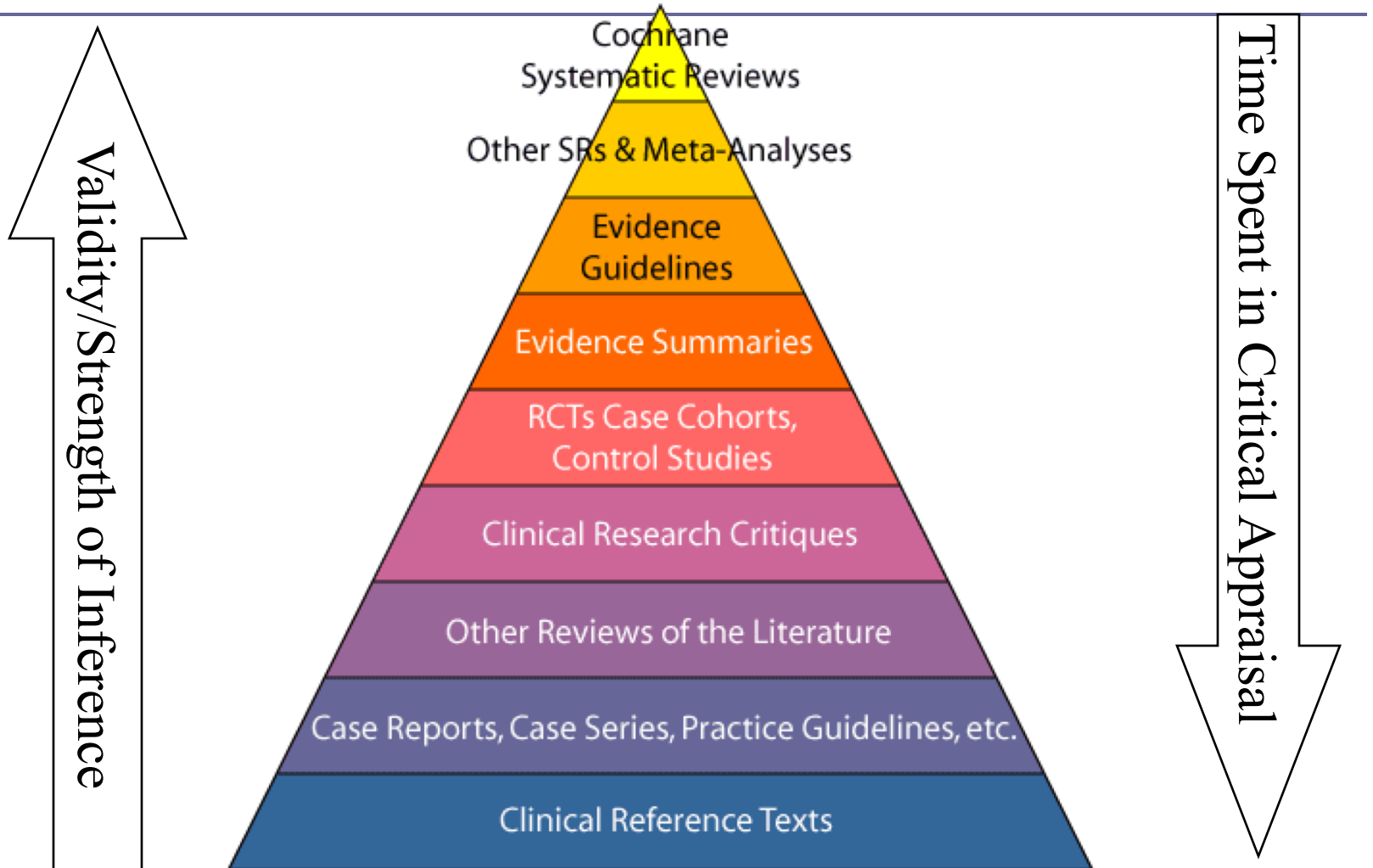
The “best” evidence depends on type of question

Level	Treatment	Prognosis	Diagnosis
I			
II	Randomised trial	Inception Cohort	Cross sectional
III			

The “best” evidence depends on the type of question

Level	Treatment	Prognosis	Diagnosis
I	<i>Systematic Review of ...</i>	<i>Systematic Review of ...</i>	<i>Systematic Review of ...</i>
II	Randomised trial	Inception Cohort	Cross sectional
III			

The Evidence Pyramid



Levels of Evidence

CEBM - Centre for Evidence Based Medicine - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Address http://www.cebm.net/levels_of_evidence.asp#notes Go

Links Mindscape Library Amion WebPine Metacrawler MICROMEDEX NY Times BBC Democracy Now! gimres Welcome! PrimeAnswers

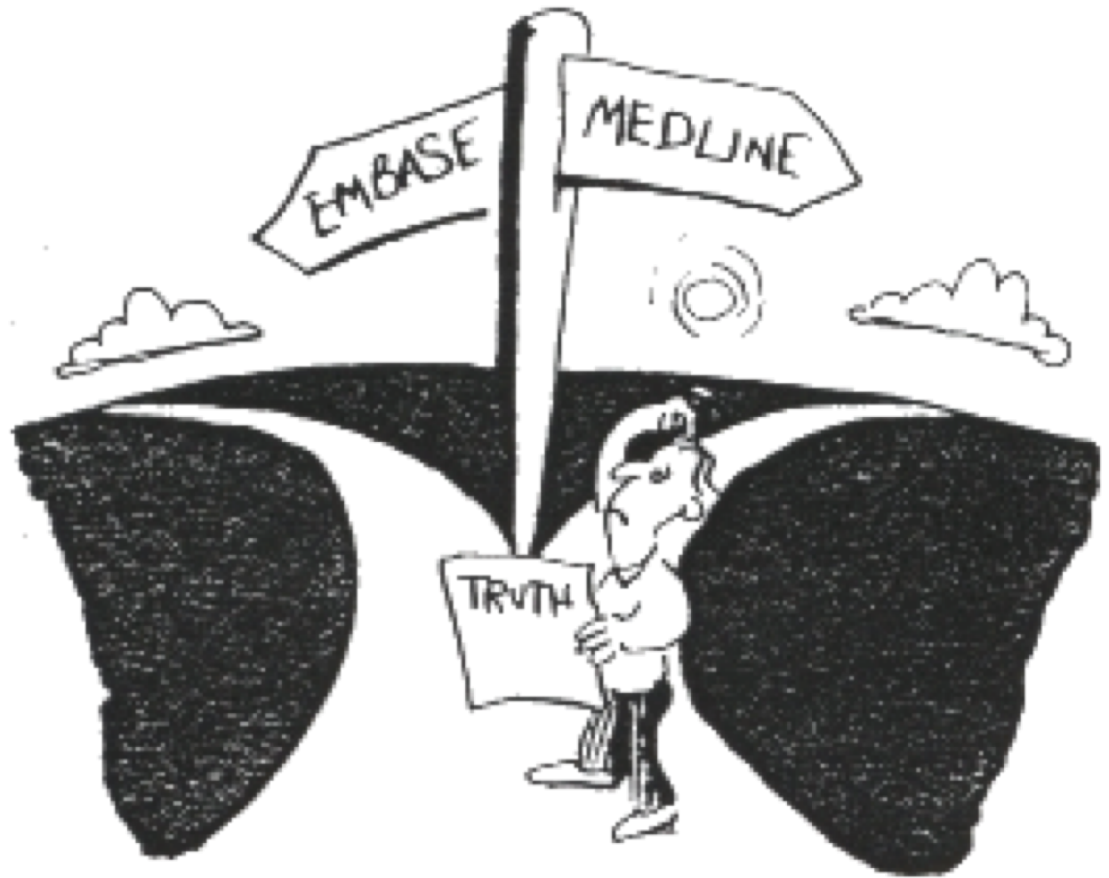
Oxford Centre for Evidence-based Medicine Levels of Evidence (May 2001)

Level	Therapy/Prevention, Aetiology/Harm	Prognosis	Diagnosis	Differential diagnosis/symptom prevalence study	Economic and decision analyses
1a	SR (with homogeneity*) of RCTs	SR (with homogeneity*) of inception cohort studies; CDR† validated in different populations	SR (with homogeneity*) of Level 1 diagnostic studies; CDR† with 1b studies from different clinical centres	SR (with homogeneity*) of prospective cohort studies	SR (with homogeneity*) of Level 1 economic studies
1b	Individual RCT (with narrow Confidence Interval‡)	Individual inception cohort study with ≥ 80% follow-up; CDR† validated in a single population	Validating** cohort study with good††† reference standards; or CDR† tested within one clinical centre	Prospective cohort study with good follow-up****	Analysis based on clinically sensible costs or alternatives; systematic review (s) of the evidence; and including multi-way sensitivity analyses
1c	All or none§	All or none case-series	Absolute SpPins and SnNouts††	All or none case-series	Absolute better-value or worse-value analyses ††††
2a	SR (with homogeneity*) of cohort studies	SR (with homogeneity*) of either retrospective cohort studies or untreated control groups in RCTs	SR (with homogeneity*) of Level >2 diagnostic studies	SR (with homogeneity*) of 2b and better studies	SR (with homogeneity*) of Level >2 economic studies
2b	Individual cohort study (including low quality RCT; e.g., <80% follow-up)	Retrospective cohort study or follow-up of untreated control patients in an RCT; Derivation of CDR† or validated on split-sample§§§ only	Exploratory** cohort study with good††† reference standards; CDR† after derivation, or validated only on split-sample§§§ or databases	Retrospective cohort study, or poor follow-up	Analysis based on clinically sensible costs or alternatives; limited review(s) of the evidence, or single studies; and including multi-way sensitivity analyses
2c	"Outcomes" Research; Ecological studies	"Outcomes" Research		Ecological studies	Audit or outcomes research
3a	SR (with homogeneity*) of case-control studies		SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies
3b	Individual Case-Control Study		Non-consecutive study; or without consistently applied reference standards	Non-consecutive cohort study, or very limited population	Analysis based on limited alternatives or costs, poor quality estimates of data, but including sensitivity analyses incorporating clinically sensible variations.
4	Case-series (and poor quality cohort and case-control studies§§)	Case-series (and poor quality prognostic cohort studies***)	Case-control study, poor or non-independent reference standard	Case-series or superseded reference standards	Analysis with no sensitivity analysis
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on economic theory or "first principles"

Produced by Bob Phillips, Chris Ball, Dave Sackett, Doug Badenoch, Sharon Straus, Brian Haynes, Martin Dawes since November 1998.

Start | Evidence-Based_Medicine... | Evidence-Based Practice -... | CEBM - Centre for Evid... | 12:39 PM

Step 2 Searching: finding good evidence?



Resources

META-SEARCH ENGINES

PrimeAnswers

TRIP+

SUMSearch

SYSTEMATIC REVIEWS/META-ANALYSES

Cochrane Library

PubMed Clinical Queries using Research

Methodology Filters

EVIDENCE GUIDELINES/SUMMARIES

AHRQ Evidence Reports

Clinical Evidence

AHRQ Preventive Services

CLINICAL RESEARCH CRITIQUES

ACP Journal Club 1996-

Bandolier 1994-

BestBETs

CASE REPORTS/SERIES, PRACTICE GUIDELINES, ETC

National Guideline Clearinghouse

PubMed

The screenshot shows the HealthLinks website interface. At the top right, there is a logo for HealthLinks (University of Washington) and a link for MyUW | UW Home. Below the logo is a navigation bar with tabs for BioResearcher, Care Provider, PrimeAnswers, Nurse, and Ph. A breadcrumb trail reads: HealthLinks > Care Provider > Evidence Based Practice. The main content area is titled "Evidence-Based Practice" and contains a section "FIND THE EVIDENCE" with a bullet point: "Evidence-Based Practice Resources" (table of EBP resources including full-text and UW availability). Below this are three sections: "META-SEARCH ENGINES" (listing PrimeAnswers, TRIP+, and SUMSearch), "SYSTEMATIC REVIEWS/META-ANALYSES" (listing Cochrane Library and PubMed Clinical Queries using Research Methodology Filters), and "EVIDENCE GUIDELINES/SUMMARIES" (listing AHRQ Evidence Reports).

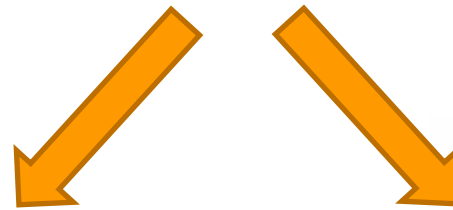
[AHRQ Evidence Reports](#)

Searching made easy 😊



Step 3. Rapid Critical Appraisal

It's peer-reviewed, therefore it must be OK?



Step 3: Appraise the evidence

Did you find good quality studies?

How to assess the quality of literatures?

we have different criterions
or different type of evidences!

(That will be talked in lecture on Systematic Review
and meta analysis)



Step 4: Applying to the individual

- What do the results mean on average?
- What do they mean for this individual?



Summary On EBM

- **What is EBM?**
- **What are the 4 steps in EBM?**
- **What is a good clinical question?**

Thank you very much!

