# EBM - 1


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# Objectives

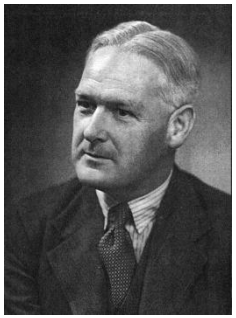
- Identify the principles of evidence based health practice
- Justify why EBM is important with historical background
- Explain how to practice EBM by 5 steps approach
- Explain Step 1- PICO formulation
- Explain benefits of asking focused questions

# HISTORY

- They were consolidated and named EBM in 1992 by a group led by Gordon Guyatt at McMaster University in Canada[i].
- Since then, the number of articles about evidence-based practice has grown exponentially (from 1 publication in 1992 to about a thousand in 1998) and international interest has led to the development of 6 evidence-based journals (published in up to 6 languages) that summarize the most relevant studies for clinical practice and have a combined world-wide circulation of over 175,000.

# Some milestones in the history of EBM

**James Lind**
publishes review & clinical trial in *Treatise on Scurvy*



**Bradford-Hill**
publishes *Principles of Medical Statistics &*
MRC trial of streptomycin

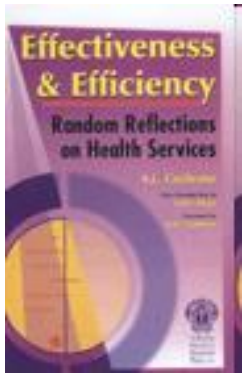

900 AD 1780 1840 1937/48 1967 1970's


Al-Rhazi

For I once saved one group by it, while I intentionally neglected another group. By doing that, I wished to reach a conclusion .


**Pierre Louis**
Develops his "numerical method" and changes blood letting practice in France

**Alvan Feinstein**
publishes his book *Clinical Judgement*



# IMPORTANCE

1. Our daily need for valid information about diagnosis, prognosis, therapy and prevention (up to 5 times per in-patient and twice for every 3 out-patients).

2. The inadequacy of traditional sources for this information because they are out-of-date (textbooks), frequently wrong (experts), ineffective (didactic continuing medical education) or too overwhelming in their volume and too variable in their validity for practical clinical use (medical journals).

# IMPORTANCE

4. The disparity between our diagnostic skills and clinical judgment, which increase with experience, and our up-to-date knowledge and clinical performance, which decline.

4. Our inability to afford more than a few seconds per patient for finding and assimilating this evidence, or to set aside more than half an hour per week for general reading and study.

# WHAT HAVE BEEN DONE

- The development of strategies for efficiently tracking down and appraising evidence.
- The creation of systematic reviews and concise summaries of the effects of health care (the cochrane collaboration).
- The creation of evidence-based journals of secondary publication (that publish the 2% of clinical articles that are both valid and of immediate clinical use).
- The creation of information systems for bringing the foregoing to us in seconds.
- The identification and application of effective strategies for life-long learning.

# Motivation: EBM "Successes"

- Theophylline and asthma
  - We were doing the wrong thing
    - Littenberg, 1988
- Beta blockers and MIs
  - We weren't doing the right thing
    - Yusuf, 1987

# Uses of "EBM"

- Use of empirically-verified treatments in the care of patients
- Incorporation of research results into the process of care
- Ability to critically appraise research results

# What is Evidence-Based Medicine?

- "The integration of individual clinical expertise with the best available clinical evidence from systematic research."
  - David L Sackett, W Scott Richardson, William Rosenberg, R Brian Haynes *Evidence Based Medicine--How to Practice and Teach EBM*, 1996
    - Various definitions


Individual Clinical Expertise
Improved Patient Outcomes
Patient's Values and Expectations
Best Available Clinical Evidence

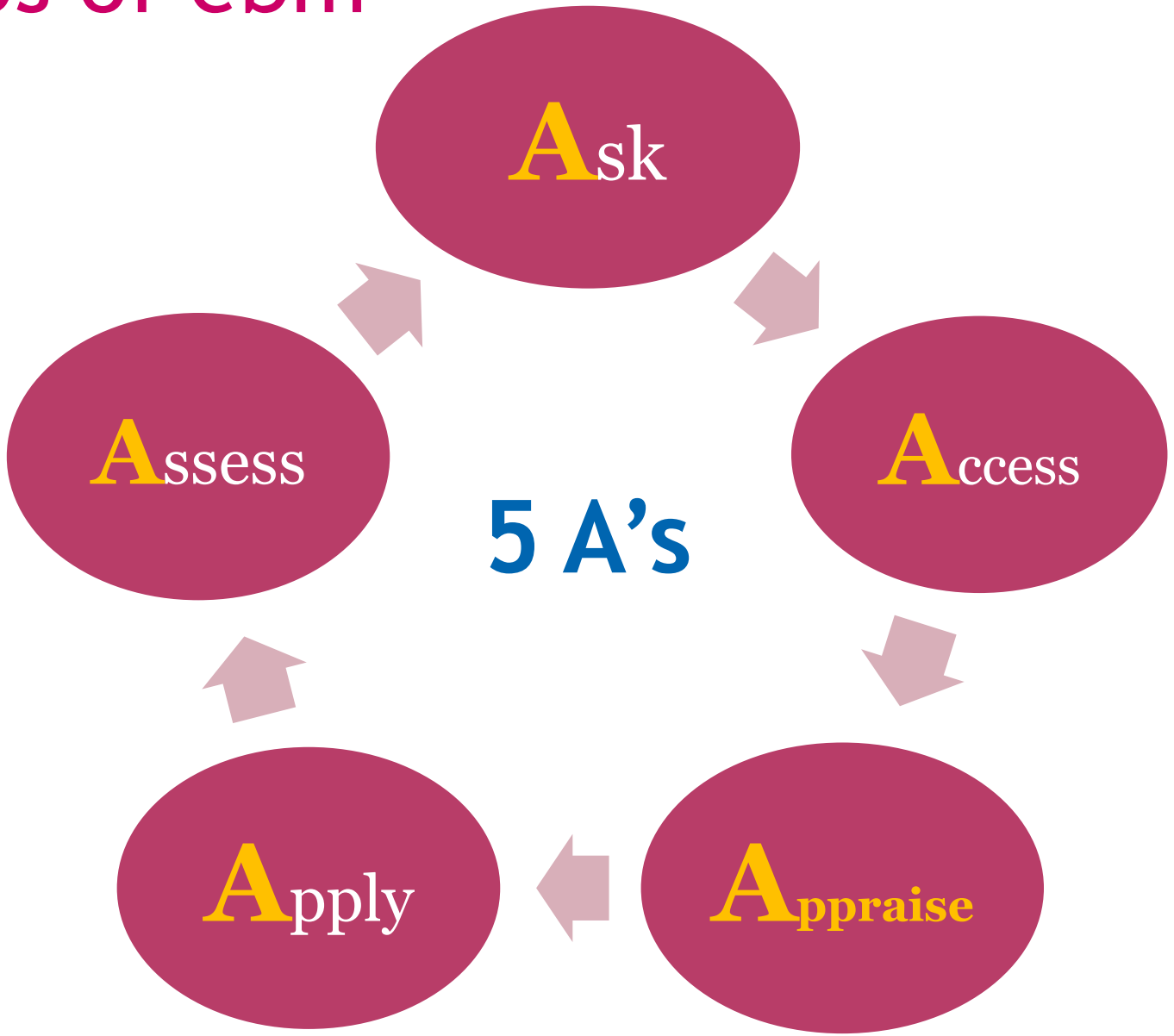
About 10% of published evidence is worth reading

About 1/3 of worthwhile evidence is eventually refuted or attenuated

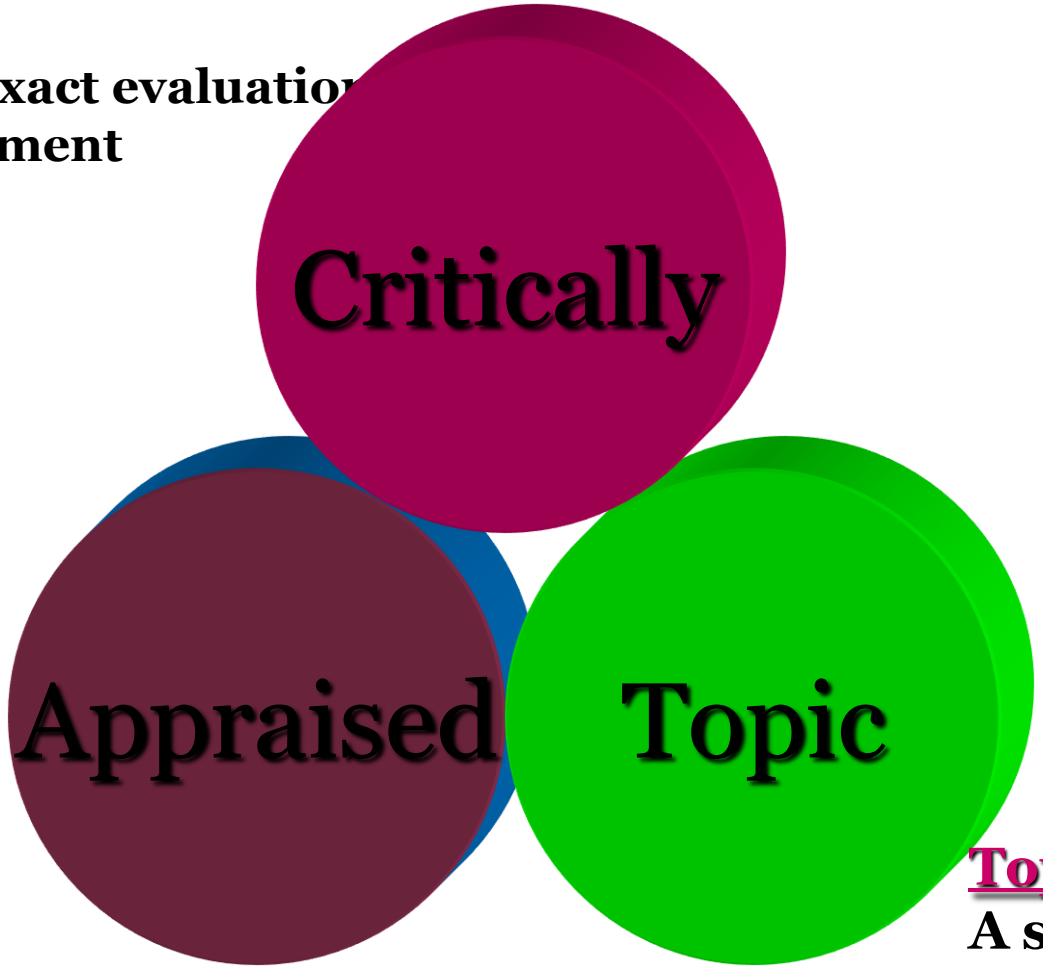
About 1/2 of relevant evidence is not implemented

"...and, as you go out into the world, I predict that you will, gradually and imperceptibly, forget all you ever learned at this university."

# Steps of ebm



**Critical:**
careful, exact evaluation
and judgment




**Appraise:**
To evaluate, & estimate the quality, amount of validity, results and applicability

**Topic:**
A subject of discussion or conversation

# Formulating Answerable Clinical Questions

- Every time we see a patient, we need new information about some element of the diagnosis, prognosis or management. Because our time to try to find this information is often limited, we need to be very efficient in our searching.
- To achieve this efficiency, we need to become skilled at formulating clinical questions.

# Background and Foreground Questions

**Background Questions**

**Foreground Questions**

# Foreground Questions

- Complex clinical questions are best answered by going to the primary or pre-assessed studies in the literature.
- **These patient-centered problematic questions, involve interpretation and consideration of the risks vs. benefits for a patient or group of like patients.**

# Foreground Questions

- This can be approached efficiently and effectively if you start by first systematically clarifying the question (PICO M), understanding what type of clinical question it is and what type of study design is appropriate before searching the literature.
- Using the PICO acronym will help you organize your query into a searchable foreground question.

# PICO (M):

- **Patient/Problem**
- **Intervention**
- **Comparison/Control**
- **Outcome/Effects**
- **Methodology**

# Question Categories:

- **Identify the question type to consider appropriate studies and data sets.**
- Diagnosis
- Diagnostic Test
- Harm/Etiology
- Prognosis
- Prevention/Therapy

# Case 1

- A 2-year-old boy presents in an outpatient clinic with fever and severe pain in his right ear. He has a history of recurrent ear infections, and his mother expresses a concern that he has been on the antibiotic amoxicillin for the past few weeks. She is worried about the consequences of the long-term antibiotic use. She is also concerned about the outcome associated with recurrent ear infections. She wants to know if the prescribed amoxicillin is effective, or it can be substituted with another antibiotic because of its side effects such as frequent diarrhea.

# Case 1: Background Questions

- These questions generally ask what, when, how, and where about the disease, disorder, or treatment for instance, “What is otitis media?” or “How does amoxicillin work?” etc.
- These types of questions can be answered by going through review articles or text books.

# Case 1: Foreground Questions

- The patient-oriented questions involving interpretation of a therapy or disease and consideration of risk vs. benefit for a patient or a group of patient.
- These types of complex clinical questions are best answered by primary or pre-assessed studies in the literature.

# Case 1

- In children with acute otitis media (P), is cefuroxime (I) effective in reducing the duration of symptoms (O) as compared to amoxicillin (C)?
- In children suffering from otitis media, will cefuroxime result in the improvement of symptoms and reduction in developing resistance?
- Does treatment with amoxicillin increase the risk of developing resistance in children suffering from otitis media?
- Does surgical procedure has better outcome for the treatment of otitis media in children after repeated antibiotic therapy?

# Case 2


- After careful consideration of the clinical manifestations, you suspect that your patient has acute cholecystitis. In order to confirm a Dx you plan to order a test. You know that cholescintigraphy / HIDA (radionuclide) scan has been shown to have the highest sensitivity and specificity. However, the attending tells you to order an ultrasound because “it is the best first test.” Seeking further evidence you decide to consult the literature and then frame the question..

# Case 2: PICO


- **Patient/Problem**
- **Intervention**
- **Comparison/Control**
- **Outcome/Effects**
- **Methodology**

# Case 2: PICO


- "In patients with suspected acute cholecystitis, without previous gallbladder disease, is ultrasound a better first test than cholescintigraphy or hida / radionuclide scan?"
- **A Question of ……**
- [A background question would be: "…… ……?"]

# Case 3

- As a resident you have just seen a 58-year old patient with type 2 diabetes with normal blood pressure. You consider treating this patient with ace inhibitors because the attending said treatment could delay progression to diabetic nephropathy. What is the Clinical Question?

# Case 4

- In children with asthma, are inhaled corticosteroids more likely to result in growth delay than standard therapy with beta-agonists?
  P= .....
  I= .....
  C= .....
  O= .....
- A PubMed search strategy might look like this:
  inhaled corticosteroids AND asthma AND growth delay
- Limits Activated: All Child: 0-18 years

# Case 5

- The patient is a 65 year old male with a long history of type 2 diabetes and obesity. Otherwise his medical history is unremarkable. He does not smoke. He had knee surgery 10 years ago but otherwise has had no other major medical problems. Over the years he has tried numerous diets and exercise programs to reduce his weight but has not been very successful. His granddaughter just started high school and he wants to see her graduate and go on to college.

# Case 5

- He understands that his diabetes puts him at a high risk for heart disease and is frustrated that he cannot lose the necessary weight. His neighbor told him about a colleague at work who had his stomach stapled and as a result not only lost over 100 lbs. but also "cured" his diabetes. He wants to know if this procedure really works.

# Case 5

- **Patient Problem**
  - **obese, diabetes type 2, male**
- **Intervention**
  - **stomach stapling (gastric bypass surgery; bariatric surgery)**
- **Comparison**
  - **standard medical care**
- **Outcome**
  - **remission of diabetes; weight loss; mortality**

# Case 5

- **In patients with type 2 diabetes and obesity, is bariatric surgery more effective than standard medical therapy at increasing the probability of remission of diabetes?**

# Case 5

- It is a **therapy question** and the best evidence would be a **randomized controlled trial (RCT)**. If we found numerous RCTs, then we might want to look for a **systematic review**.

# Test 1

- You admit a 75 year old man with a stroke (left sided weakness) who is having trouble ambulating, feeding, bathing and dressing himself. He has hypertension but it is well controlled with a diuretic. He is otherwise well and now that he is medically stable you decide after discussion with him to transfer him to a stroke unit. His family asks to see you because they are concerned about this transfer. They live very close to the acute care hospital and wonder why he can't stay on the general medical ward where he currently is. You arrange to meet with him and his family to discuss their concerns. In the meantime, you decide to review the evidence for the use of stroke units.

# Test 2

- You see a 70 year old man in your outpatient clinic 3 months after he was discharged from your service with an ischemic stroke. He is in sinus rhythm, has mild residual left-sided weakness but is otherwise well. His only medication is ASA and he has no allergies. He recently saw an article on the BMJ website describing the risk of seizure after a stroke and is concerned that this will happen to him.

# Test 3

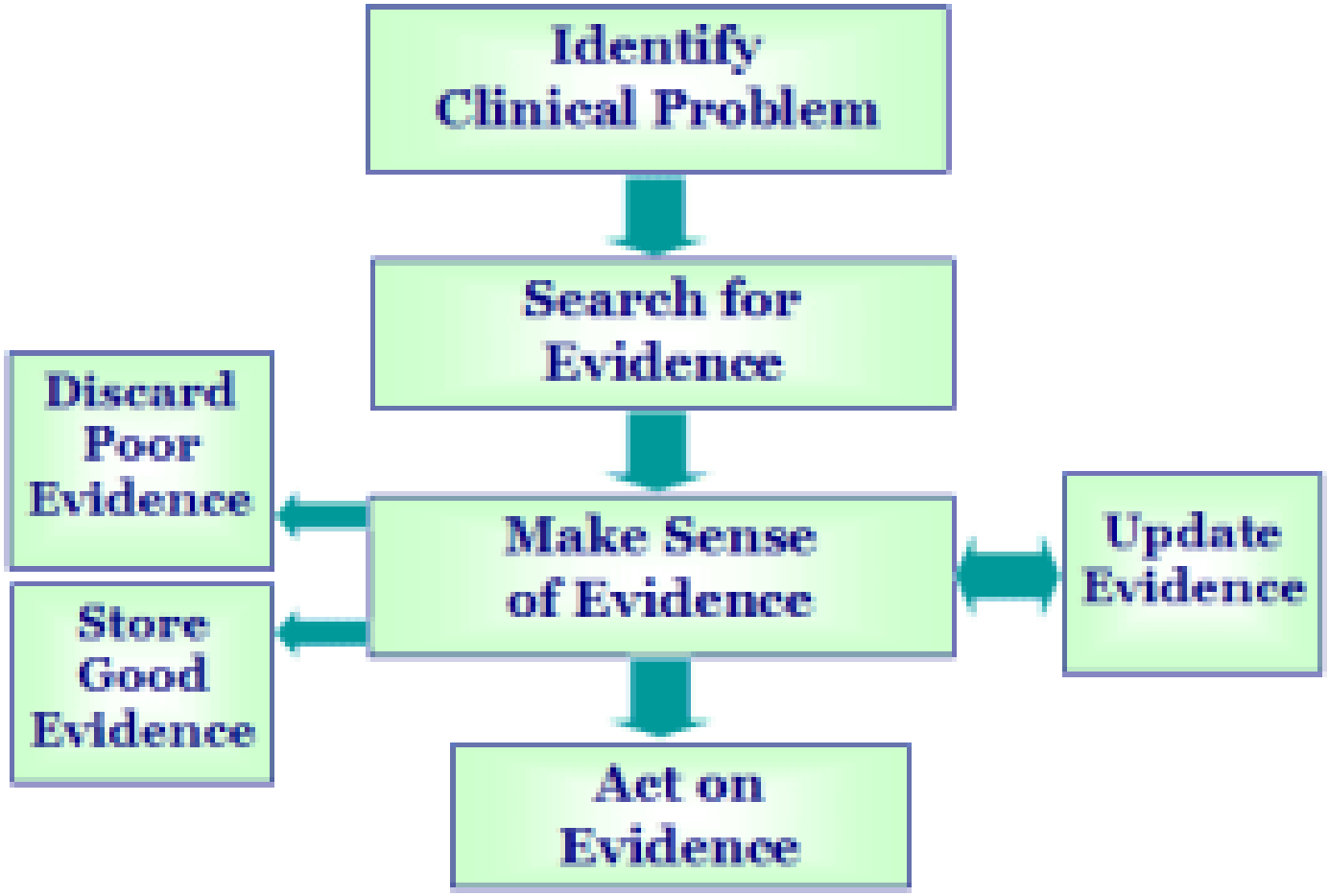
- You admit a 75 year old woman with community-acquired pneumonia. She responds nicely to appropriate antibiotics but her hemoglobin remains at 100 g/l with an MCV of 80. Her peripheral blood smear shows hypochromia, she is otherwise well and is on no incriminating medications. You contact her family physician and find out that her Hgb was 105 g/l 6 months ago. She has never been investigated for anaemia. A ferritin has been ordered and comes back at 10 mmol/l. You admit to yourself that you're unsure how to interpret a ferritin result and aren't sure how precise and accurate it is.

# Test 4

- You see a 50 year old man who asks for a repeat prescription of sotalol which he has been taking for extrasystoles for several years. He has a remote history of an MI. You haven't seen him previously and are concerned about the proarrhythmic properties of sotalol given what is known about other antiarrhythmics.

# Questions: PICO

| | 1<br>**Patient or Problem** | 2<br>**Intervention**<br>(a cause, prognostic factor, treatment, etc) | 3<br>**Comparison Intervention**<br>(if necessary) | 4<br>**Outcomes** |
|---|---|---|---|---|
| Tips for Building | Starting with your patient, ask "How would I describe a group of patients similar to mine?" Balance precision with brevity. | Ask "Which main intervention am I considering?"<br><br>Be specific | Ask "What is the main alternative to compare with the intervention?"<br><br>Again, be specific | Ask "What can I hope to accomplish?", or "What could this exposure really affect?"<br><br>Again, be specific |
| Example | "In patients with heart failure from dilated cardiomyopathy who are in sinus rhythm..." | "...would adding anticoagulation with warfarin to standard heart failure therapy..." | :...when compared with standard therapy alone..." | "...lead to lower mortality or morbidity from thromboembolism. Is this enough to be worth the increased risk of bleeding?" |


Identify Clinical Problem
Search for Evidence
Discard Poor Evidence
Make Sense of Evidence
Update Evidence
Store Good Evidence
Act on Evidence

# USEFULNESS OF MEDICAL INFORMATION

**DISEASE ORIENTED EVIDENCE THAT MATTERS**

**(DOES)**

**PATIENT ORIENTED EVIDENCE THAT MATTERS**

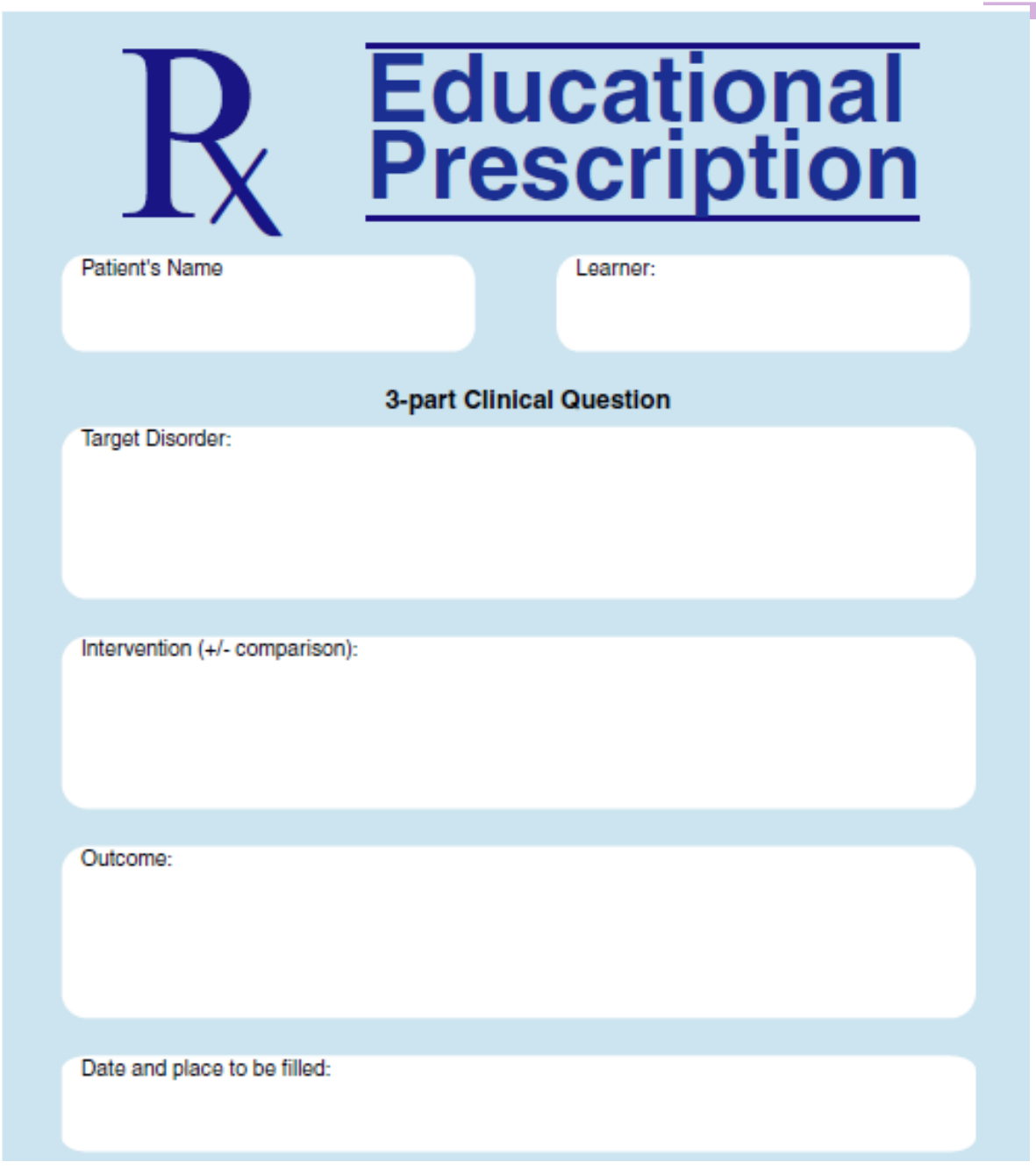
**(POEMS)**

# DOEs ----------→ POEM

| | | |
|---|---|---|
| Drug A lowers cholesterol | Drug A decreases cardiovascular mortality/morbidity | Decreases overall mortality |
| PSA screening detects prostate cancer most of the time and at an early stage | PSA screening decreases mortality | PSA screening improves quality of life |
| Corticosteroid use decreases neutrophil chemotaxis in patients with asthma | Corticosteroid use decreases admissions, length of hospital stay, and symptoms of acute asthma | Corticosteroid use decreases asthma-related mortality |
| Tight control of type 1 diabetes mellitus can keep fasting blood glucose <140mg/dl | Tight control of type 1 diabetes can decrease microvascular complications | Tight control of type 1 diabetes can decrease mortality and improve quality of life |

# Problems

- Should a 30-year-old woman with recurrent uncomplicated lower UTIs be advised to drink cranberry juice to prevent reinfection?
- For a 63 year old woman with Type 2 diabetes, is gabapentin superior to amitriptyline as first-line therapy for painful peripheral neuropathy?




# Presentation will cover:

- Relavance
- PICO
- search strategy
- search results
- the validity of this evidence
- the importance of this valid evidence
- can this valid, important evidence be applied to your patient

# Type of Question

- Two additional elements of the well-built clinical question are *the type of question* and *the type of study*.
- This information can be helpful in focusing the question and determining the most appropriate type of evidence or study.

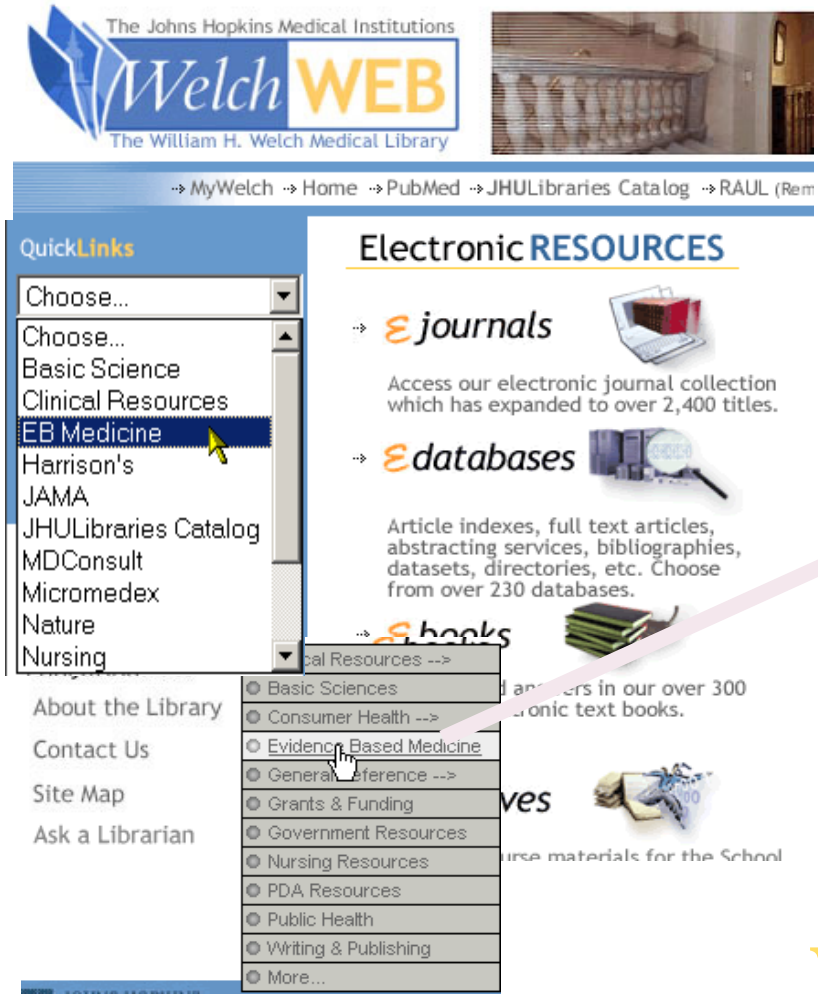
# The type of question is important and can help lead you to the best study design

| Most common type of questions: | Type of study: |
|---|---|
| **Diagnosis**<br>how to select and interpret diagnostic tests | prospective, blind comparison to a gold standard or cross-sectional |
| **Therapy**<br>how to select treatments that do more good than harm and that are worth the efforts and costs of using them | randomized controlled trial > cohort study |
| **Prognosis**<br>how to estimate the patient's likely clinical course over time (based on factors other than the intervention) and anticipate likely complications of disease | cohort study > case control > case series |
| **Harm/Etiology**<br>how to identify causes for disease (including iatrogenic forms) | cohort > case control > case series |

# Search for the Best Evidence

- ~~Review articles~~
- Community/professional standards
- Systematic reviews
- Original results

# What are the Sources of Good Evidence?






## Evidence Based Medicine

- Systematic Reviews, Journal Articles and other Databases
- Clinical Trials and Pre-publication Resources
- Research Tools: Filters, Hedges and Strategies
- Statistical Tools and Calculators
- Journal Clubs, List Servers, and Meta-lists
- Education and Tutorials
- Organizations and other resources

Ranking * = Good; **Very Good; ***Excellent

**Systematic Reviews, Journal Articles and other Databases**

- National Guideline Clearinghouse*** - EBM practice guidelines
- Cochrane*** - Systematic reviews of literature on specific subjects
- TRIP -CeRes*** - British meta-search engine; covers 58 resources
- Clinical Queries - PubMed*** - Evidence Based filters for Medline
- UpToDate*** - Topic reviews on specific clinical issues
- MD Consult - Practice guidelines, clinical topics
- Clinical Evidence Online** - Provides a searchable list of reviewed topics, BMJ
- Best Evidence - Provides a searchable list of reviewed topics, ACP
- CAT Bank* - 63 Critically Appraised Topics
- SUM Search - Univ. of Texas - Meta-search for Merck, NGC, and PubMed
- Bandolier - Reviewed literature, offers subjects by medical speciality

www.welch.jhu.edu

# Resources

- Asking Focused Questions
  http://www.cebm.net/asking-focused-questions/

- Educational Prescription
  http://www.cebm.net/wp-content/uploads/2014/04/educational-prescription_1.pdf


Thank You!