EVIDENCE-BASED MEDICINE
MSIII SURGERY CLERKSHIP

LOCATING EBM RESOURCES FOR CLINICAL PRACTICE

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Welcome to the MSIII Surgery Clerkship. . . If you haven’t already, open Google Chrome your computer to https://ttuhsc.libguides.com/homepage

(Google Chrome is recommended as the most well-supported browser for database searching)
Pathway to Course Module

Click the MSIII Surgery Clerkship Module

Click Library Courses
Session Objectives

1) Define and characterize what Evidence Based Medicine is and does.

2) Successfully navigate the following database tools:
   • PubMed Clinical Queries & Comparative Effectiveness
   • Cochrane Library
   • Cochrane Central Register of Controlled Trials
   • Cochrane Database of Systematic Reviews
   • ACP Journal Club

3) Determine the depth and scope of information in retrieved articles.

4) Identify and appraise the level of evidence involved.

5) Understand requirements for assignment submission.
What is Evidence-Based Medicine? Definition and Scope

- Evidence-Based Medicine (EBM) (under the umbrella of Evidence-Based Practice (EBP))
  - “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients”*
  - The most effective method of using available biomedical knowledge with the everyday practice of medicine

- EBM takes into consideration . . .
  - the best available research evidence
  - the clinical expertise of medical professionals
  - the patient’s characteristics to better serve the population

- Developed by Dr. David Sackett, Dr. Archie Cochrane and others

Dr. Archie Cochrane and EBM’s Emergence


1982 – Clinical epidemiology determinants and consequences of healthcare practice; conference chaired and coordinated by Gordon Guyatt & David Sackett

1990 – Ann McKibbon & Brian Haynes begin exploring EBM searching strategies

1992/93 – The Cochrane Collaboration

2000 – How To Practice and Teach Evidence Based Medicine by Dr. David Sackett; Oxford’s Center for Evidence-Based Medicine (CEBM) develops levels of evidence criteria; GRADE system of evidence appraisal developed

Past 15 years – Development of specialized EBM Resources (PubMed, ACP Journal Club, Cochrane Library, Cochrane Database of Systematic Reviews, etc.)
What is Evidence-Based Medicine? Steps in the Process

The practice of EBM comprises five basic steps (often known as the 5 A’s). These enable a more systematic approach to clinical performance.

<table>
<thead>
<tr>
<th>ASSESS the patient</th>
<th>1. Start with the patient -- a clinical problem or question arises from the care of the patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASK the question</td>
<td>2. Construct a well built clinical question derived from the case</td>
</tr>
<tr>
<td>ACQUIRE the evidence</td>
<td>3. Select the appropriate resource(s) and conduct a search</td>
</tr>
<tr>
<td>APPRAISE the evidence</td>
<td>4. Appraise that evidence for its validity (closeness to the truth) and applicability (usefulness in clinical practice)</td>
</tr>
<tr>
<td>APPLY: talk with the patient</td>
<td>5. Return to the patient -- integrate that evidence with clinical expertise, patient preferences and apply it to practice</td>
</tr>
</tbody>
</table>

*http://guides.mclibrary.duke.edu/c.php?g=158201&p=1036021*
Step 1: Assessing the Patient

Asking and resolving a relevant clinical question means . . .
- accurately assessing the patient before a formal question is posed.

Accurately assessed information influences the type of EBM resources needed for clinical application.

Such an assessment explores the patient’s problem with regard to several things:
1. Diagnosis
2. Etiology
3. Treatment
4. Prognosis
What if too many questions arise?

Patients may have several active problems:
- your questions may be too numerous to even ask, let alone answer.

What is the most important issue for this patient now?

Which question, when answered, will help me most?

Select from the many questions

the few questions that are most important to answer right away.
Step 1: Assessing the Patient

- Assessment questions
  - Typically four research categories
  - Facilitated into actual study questions
  - Corresponds to your PICO

### 4 Types of Clinical Questions

- Therapy / Prevention
- Diagnosis
- Harm, Etiology or Causation
- Prognosis
<table>
<thead>
<tr>
<th>Type of Question</th>
<th>Best Type of Study to Search For</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapy</td>
<td>RCT &gt; cohort &gt; case control &gt; case series</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Prospective, blind comparison to a gold standard</td>
</tr>
<tr>
<td>Etiology/Harm</td>
<td>RCT &gt; cohort &gt; case control &gt; case series</td>
</tr>
<tr>
<td>Prognosis</td>
<td>Cohort study &gt; case control &gt; case series</td>
</tr>
<tr>
<td>Prevention</td>
<td>RCT &gt; cohort study &gt; case control &gt; case series</td>
</tr>
<tr>
<td>Clinical Exam</td>
<td>Prospective, blind comparison to gold standard</td>
</tr>
<tr>
<td>Cost</td>
<td>Economic analysis</td>
</tr>
</tbody>
</table>
PICO: mnemonic to describe the four elements of a good clinical resource

**P = Population/Problem**
How would I describe the problem or a group of patients similar to mine?

**I = Intervention**
What main intervention, prognostic factor or exposure am I considering?

**C = Comparison**
Is there an alternative to compare with the intervention?

**O = Outcome**
What do I hope to accomplish, measure, improve or affect?
Does influenza vaccination reduce cardiovascular events in adults?

P = adults
I = influenza vaccination
C = non-vaccination
O = reduction of cardiovascular events
## Step 2: PICO Examples

<table>
<thead>
<tr>
<th>Element of the clinical question</th>
<th>Patient</th>
<th>Intervention (or cause, prognosis)</th>
<th>Comparison (optional)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe as accurately as possible the patient or group of patients of interest.</td>
<td></td>
<td>What is the main intervention or therapy you wish to consider? Including an exposure to disease, a diagnostic test, a prognostic factor, a treatment, a patient perception, a risk factor, etc.</td>
<td>Is there an alternative treatment to compare? Including no disease, placebo, a different prognostic factor, absence of risk factor, etc.</td>
<td>What is the clinical outcome, including a time horizon if relevant?</td>
</tr>
<tr>
<td><em>Example</em></td>
<td>In patients with acute bronchitis,</td>
<td>do antibiotics</td>
<td>none</td>
<td>reduce sputum production, cough or days off?</td>
</tr>
<tr>
<td><em>Example</em></td>
<td>In children with cancer</td>
<td>what are the current treatments</td>
<td></td>
<td>in the management of fever and infection?</td>
</tr>
<tr>
<td><em>Example</em></td>
<td>Among family-members of patients undergoing diagnostic procedures</td>
<td>does standard care, listening to tranquil music, or audiotaped comedy routines</td>
<td></td>
<td>make a difference in the reduction of reported anxiety.</td>
</tr>
</tbody>
</table>
Step 2: Categorical Questions

Many PICO question will pertain to the five categories listed here:

- Cost Analysis
- Clinical Exam

Others often needed:

See Course Handout for information on:

- Categories
- Levels of evidence

Templates for EBP Questions

- **For a therapy:** In ______(P), what is the effect of ______(I) on ______(O) compared with ______(C)?
- **For etiology:** Are ______(P) who have ______(I) at ___ (Increased/decreased) risk for/of ______(O) compared with ______(P) with/without ______(C)?
- **Diagnosis or diagnostic test:** Are (is) ______(I) more accurate in diagnosing ______(P) compared with ______(C) for ______(O)?
- **Prevention:** For ______(P) does the use of ______(I) reduce the future risk of ______(O) compared with ______(C)?
- **Prognosis:** Does ______(I) influence ______(O) in patients who have ______(P)?

Step 3: Acquire the Evidence

To acquire the best, most relevant, and most time-efficient evidence means performing a literature search with the resources available to you.

Evidence-Based Medicine pertains to certain databases and search strategies that help guide you to the right information.

This may involve both primary and secondary research (RCT vs. Systematic Review). Yet it will almost always involve information on navigable databases.

An EBM search derives its criteria from the PICO question. It uses searchable terminology and Boolean operators to retrieve the right information.
Step 3: Levels of Evidence

Figure 1: the EBM pyramid from https://libguides.cmich.edu/cmed/ebm/pyramid
### Step 3: Translating the PICO

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Descriptor</th>
<th>Description</th>
<th>Keywords and related words</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Population</td>
<td>Patients with tubercular pericardial effusion</td>
<td>“Tubercul*,” “effusion,” “mycobact,” and “pericarditis.”</td>
</tr>
<tr>
<td>I</td>
<td>Intervention</td>
<td>Steroid</td>
<td>“Prednisolone,” “hydrocortisone,” “dexamethasone,” and “steroid.”</td>
</tr>
<tr>
<td>C</td>
<td>Control</td>
<td>Placebo</td>
<td>“Placebo,” and “no treatment.”</td>
</tr>
<tr>
<td>O</td>
<td>Outcome</td>
<td>Time to clinical response</td>
<td>“Response,” “efficacy,” “utility,” and “usefulness.”</td>
</tr>
</tbody>
</table>

**PICO:** Population, intervention, control and/or outcome

Truncation (*) of a term can allow the database to search the root word and its antecedents.
Step 3: Truncation

Truncation locates suffix variations in one step!

Enter an asterisk * after the prefix.

vaccine retrieves 89 articles
vaccines retrieves 64 articles
vaccinate retrieves 9 articles
vaccinated retrieves 28 articles
vaccination retrieves 89 articles
vaccin* retrieves 122 articles

vaccin* retrieves all the variants!
**Step 3: Boolean Searching**

**AND**
Using AND, this search would only retrieve results with Peanut Butter and Jelly.

**OR**
Using OR, this search would retrieve results with peanut butter, with jelly, and with both.

**NOT**
Using NOT, this search would retrieve results with peanut butter, and exclude those with jelly or PB with jelly.
Popular Resources and PubMed

Click the PubMed link from beneath the Popular Resources Heading.

Homepage to PubMed

PubMed is ... the US government’s online resource providing access to MEDLINE, the country’s largest bibliographic database of life sciences and biomedical information.
Some PubMed Quick Facts

PubMed is...

... sponsored by the National Center for Biotechnology Information (NCBI) through the National Library of Medicine (NLM) and the National Institute of Health (NIH).

... a very large repository of information, mostly packaged as records or citations representing articles in the biomedical literature.
Step 3: PubMed Clinical Queries

Clinical Queries within PubMed offers specific results exclusively confined to clinical trials and systematic reviews.

From the PubMed homepage, click on Clinical Queries.
Step 3: PubMed Clinical Queries

Clinical Study Categories allows you to navigate the various EBM-related categories within your results.

PubMed automatically combines search terms.

Type “influenza vaccin* cardiovascular” into search box and click Search.

Choose “see all” to observe better formatted results.
Step 3: PubMed Clinical Queries

Search query includes “Broad” application of therapeutic treatments

Clinical Study Categories allows you to navigate the various EBM-related categories within your results

Click “See more” to observe search stream

Query translation with applied terms mapped to MeSH headings and combined searches

Return to PubMed homepage
Step 3: PubMed Comparative Effectiveness Research

Comparative Effectiveness Research allows you to evaluate comparative outcomes with various studies. Click on it.

From the PubMed homepage, click on Topic-Specific Queries.
Step 3: PubMed Comparative Effectiveness Research

Research Categories allow you to limit your search articles from the different levels of evidence-based medicine.

Type “influenza vaccin* cardiovascular” into the search box.

Selected Topics can compare consumer health issues foreground Comparative Effectiveness as the subject of the research.

Click Go.
Step 3: PubMed Comparative Effectiveness Research

Search stream details and delineation of associated MeSH terms

Comparative Effectiveness critically limits your results

Select the result beginning with “Influenza Vaccination in Patients with Chronic . . . .”
Step 3: PubMed Comparative Effectiveness Research

Bibliographic information and abstract

Click “TTUHSC ONLINE” for access to full text.
While a **Systematic Review** asks a clearly formulated question and uses systematic and explicit methods to select and critically appraise relevant research, a **Meta-Analysis** is a systematic review which uses quantitative methods to integrated and summarize the research’s results.

**Randomized Controlled Trials** correspond to Cochrane’s primary research evidence.
Step 3: RCT’s and Other EBM Studies

When searching for EBM literature, information that has not been critically appraised or scrutinized is considered primary, or "unfiltered" research.

Sometimes unfiltered information may be the only research available. If so, limit (filter) your search:
- Randomized Controlled Trials
- Case Controlled Studies
- Cohort Studies

**Randomized Controlled Trials** - Include a randomized group of patients in an experimental group and a control group. These groups are followed up for the variables/outcomes of interest.

**Case Reports or Case Series** - a case report is a detailed report of the symptoms, signs, diagnosis, treatment, and follow-up of an individual patient (patients if a Case Series)

**Cohort Study** – this type of study identifies two groups (cohorts) of patients, one which did receive the exposure of interest, and one which did not, and follows these cohorts forward for the outcome of interest.
Step 3: Cochrane Evidence via the Web

Open a web browser and go to www.cochranelibrary.com

Partial databases are freely available via the web.

Some full-text Cochrane Systematic Reviews are available in Open Access format.

Click on Search CDSR.
Step 3: Cochrane Evidence via the Web

Cochrane Database of Systematic Reviews

- Searching options:
  - use Medical Subject Headings
  - build a search with previous searches

Enter “influenza vaccin*” and “cardiovascular” into the search boxes. Make sure both search fields are “Title, Abstract, Keywords.” Then click Go.
Step 3: Cochrane Evidence via the Web

Search results pull up Cochrane Systematic Reviews. Click on the result displayed.

Options for browsing clinical trials and other studies.

Full-text resource available via website’s open access.

Note: NOT ALL Cochrane Reviews will be available.
Click on the Cochrane Library logo at the top of the page to return to the homepage.

This is a structured abstract with the full-text available through the web-based Cochrane library.

Other full-text options for Cochrane are available through Ovid.

Cochrane Collaboration Group as editorial review board.
Step 3: Cochrane Evidence via the Web

Select “Search trials” to search for Randomized Controlled Trials

More Resources allows you to search for other EBM tools including Economic Evaluations if your PICO involves cost analysis variables.

Scroll to Browse by Topic
Step 3: Cochrane Evidence via the Web

Browse by Topic

Or, you can browse by the Cochrane Review Group. Click Here.
Step 3: Cochrane Evidence via the Web

Browse a Cochrane topic that interests you. Click Heart Group for recent titles.

Cochrane Systematic Reviews are prepared by experts who register with a specific Cochrane Review group composed of an editorial team and an information specialist.
Step 3: Cochrane Evidence via the Web

Browse Cochrane topics and limit your options by subdivided topics.

Cochrane’s Database of Systematic Reviews identifies its reviews by specialized study categories as well as the phase of testing and type of evaluation.

NOTE that all systematic reviews with a full-text article are fully and completely available through OVID or with a Loansome Doc account.

Return to library homepage.
You can access the Cochrane Collaboration through this link normally. For today . . .
But for today’s class, please go to the training site at http://ovidsp.ovid.com
Step 3: Cochrane Evidence via OVID

Web Address:  http://ovidsp.ovid.com

ID: thsclibtrain
Password: learn99
Step 3: Cochrane Evidence via OVID

NOTE: In addition to Cochrane Collaboration databases, Ovid hosts multiple resource platforms.

From the Ovid start page, select:
- EBM Reviews - Cochrane Central Register of Controlled Trials
- EBM Reviews - Cochrane Database of Systematic Reviews
Then click OK.
Step 3: Cochrane Evidence via OVID

Click the arrow ▼ to view and adjust Search History if hidden.

Ovid’s search manager ("Search History") will display individual and combined searches here.

Advanced search within Ovid will search the results from within the databases selected.

Type the word “influenza” into the search box and click Search.
Step 3: Cochrane Evidence via OVID

Results retrieved from Cochrane’s Trials and Systematic Reviews databases

Ovid’s search manager will display individual and combined searches here.
Step 3: Cochrane Evidence via OVID

EBM Full Text allows users access to review articles.

Search History builds searches by stacking them together numerically.

Ovid recognizes truncated terms; more results accumulated through keyword searching.

Type the truncated term “vaccin*” into the search box and click Search.
Step 3: Cochrane Evidence via OVID

Select boxes within the Search History to allow for combined searching.

Click the AND button to combine the search terms and create a new set of results.

Combined searching creates a new list of results and limits those results to articles particular to those results.
Step 3: Cochrane Evidence via OVID

Search “cardiovascular” as a keyword to further combine to the search and limit the results.

Click on the boxes of the previous combined search and the most recent search. AND them together by clicking the AND button.

Combined search limits results to topical query criteria.
Step 3: Cochrane Evidence via OVID

Accurate results for targeted question and outcome.

Abstract & Full-text availability options

Use additional filtering options for better accuracy. Click “Adult” and “Randomized Controlled Trial” for more precise results.

Locate the article that begins “Influenza vaccine pilot study in acute coronary syndromes . . .” Click on it.

Accurate results for targeted question and outcome.
Step 3: Cochrane Evidence via OVID

Title and abstract with section headings

Full-Text access through official journal

Link to in-window PDF of article

Full-Text access as HTML

Options for printing, emailing, saving and exporting

Note that complete Systematic Reviews can be very long (often hundreds of pages).

Return to the results page.
- The ACP Journal Club is coordinated by the American College of Physicians and involves collaboration with over 110 of the top clinical journals.
- Its original studies and systematic reviews are all methodologically sound and clinically relevant.
- Furthermore, its results are broken down categorically and display both evidence-based conclusions along with contextual commentaries by clinical experts.

Set up a free account with the online system (http://annals.org/aim/journal-club) to receive the best new EBM studies with clinical evaluations.
Step 3: ACP Journal Club

Click the “Change” link to re-run the existing search using the ACP Journal Club database.

Tick the box next to the ACP Journal Club to apply this database.

Click “Run Search” to apply the existing search criteria to the ACP Journal Club database.
Step 3: ACP Journal Club

The Search History is maintained even though the number of results changes.

ACP Journal Club specified

Result identifies both publication date and categorical grouping

Select the following result: “Review: influenza vaccine reduces cardiovascular events in adults”
Influenza immunization directly affects the incidence and severity of influenza infection, with substantial variability depending on the age, comorbid conditions, and immune function of persons being vaccinated (1). Udell and colleagues did a systematic review and meta-analysis of RCTs to assess the effect of influenza vaccine on CV events. Results of the review showed a reduction in composite CV events, with an absolute risk reduction (ARR) of 1.7% (5 published RCTs, NNT 58, CI 38 to 124). The effect of influenza vaccine was particularly notable for those with recent ACS, with an ARR of 13% (NNT 8, CI 6 to 13).

With the aging of the US population, incidence of CV disease is increasing. This raises questions in the context of the population of this meta-analysis: mean age 67 years, 51% women, and 36% with cardiac history. How might the increasing use of statins, with pleiotropic effects, including antiinflammatory activity, alter the effects of immunization? With universal recommendations for influenza vaccination for persons > 6 months of age, how will herd or community immunity affect population levels of influenza activity? Finally, how will pneumococcal vaccination affect the reduction in CV morbidity and mortality resulting from influenza immunization? (2) The meta-analysis by Udell and colleagues presents compelling evidence for the benefits of influenza immunization, particularly in patients with recently diagnosed CV disease.

Bruno, Granwehr, MD
University of Texas MD Anderson Cancer Center, Houston, Texas, USA
Step 4: Appraise the Evidence

After identifying the best, current information which can answer our clinical question, the next step is to read the article and evaluate the study.

The validity and reliability of the information involves examining its quality and clinical importance.

Assessing the information’s applicability leads into how it may be implemented to the current clinical circumstances.

There are three basic questions that need to be answered for every type of study:

1. Are the results valid (validity)?
2. Can I apply the results in practice (applicability)?
3. What are the results (reliability)?
Step 4: What Is Critical Appraisal?

“Randomized controlled trials and systematic reviews are the highest levels of evidence but they are not automatically of good quality and should always be appraised critically.”

Step 4: Appraise the Evidence

Open a separate browser and go to the following website: https://www.dartmouth.edu/~library/biomed/guides/research/ebm-resources-materials.html

Or Google “Dartmouth EBM Worksheets”
Step 4: Appraise the Evidence

Evidence-Based Medicine Worksheets

- The Clinical Question Worksheet (PDF or WORD)
- The Clinical Question Worksheet Example (PDF)

Appraising the Evidence (Critical Appraisal Worksheets):
- Therapy (Randomized Control Trials (RCT)) [PDF or WORD]
- Therapy (RCT) expanded version with key learning points (PDF)
- Therapy (RCT) with Continuous Outcomes [PDF or WORD]
- Systematic Review/Meta-analysis [PDF or WORD]
- Practice Guideline [PDF or WORD]
- Diagnostic Test Study [PDF or WORD]
- Prognosis Study [PDF or WORD]
- Harm/Etiology [PDF or WORD]
- Qualitative Study [PDF or WORD]

Applying the Evidence to the Patient:
- Applying the Evidence Worksheet [PDF or WORD]

Putting it all together - Creating and Using CATs:
- CAT Worksheet [PDF or WORD]
Step 5: Apply the Evidence

Putting knowledge into practice comes with applying the evidence.

The “evidence” within evidence-based medicine is not meant to replace clinical practice.

Its purpose is to enhance the ability to make better care decisions based on the needs and preferences of the patient.

Building on experience from clinically applied can help the improve the overall workflow and practice of medicine.
Step 5: Apply the Evidence (Optional Worksheet)

Remember this for future reference.
Group Discussion “EBM Journal Club” with Dr. Griswold

Turn in your EBM Report!
Instructors:

Peggy Edwards

Dan Stuart

Margaret Vugrin

Micah Walsleben