RESOURCES GUIDE: Evidence Based Health Care (EBHC) (http://hslibraryguides.ucdenver.edu/ebhc)

CLASS OBJECTIVES

✓ Recognize options for limiting literature search retrieval to valid and reliable research studies appropriate for clinical decision making;
✓ Search The Cochrane Library, Dynamed, FIRSTConsult, ACP Journal Club, and other clinical information support resources;
✓ Limit an Ovid or EMBASE search to evidence based limits;
✓ Search PubMed MEDLINE using “Clinical Queries” and learn to set up NCBI filters for EBHC.

What is evidence-based practice?
“…the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.” --Sackett DL, et al.


“Evidence-based medicine (EBM) is the integration of best research evidence with clinical expertise and patient values.” --Guyatt G, et al.


Why is retrieving “current best evidence” difficult?
- Glut of published literature
- Quality of literature
- Poor searching skills
### Formulating a Clinical Question

**The well-built clinical question: a key to evidence-based decisions.**

**Example Clinical Scenarios:**

- **Diagnosis:** How to select a diagnostic test or how to interpret the results of a particular test.
  - In patients with suspected depression what is the accuracy of a two-question case-finding instrument for depression compared with six previously validated instruments?
  - In patients with no symptoms, which screening test is most accurate for diagnosing breast cancer?

- **Therapy:** Which treatment is the most effective, or what is an effective treatment given a particular condition.
  - In children with colds, are zinc lozenges safe and effective for relief of cold symptoms?
  - In patients with acute bronchitis, do antibiotics reduce sputum production, cough or days off work?

- **Harm or Etiology:** Are there harmful effects of a particular treatment, or how can these harmful effects be avoided.
  - What are the risks of treating asthma patients with beta-adrenergic agonists?
  - In women taking oral contraceptives, is there an association between their use and cardiovascular disease?

- **Prognosis:** What is the patient's likely course of disease, or how to screen for or reduce risk.
  - In a healthy woman who has suffered a miscarriage, what is the normal grief process and are any factors associated with longer than normal grieving?
  - What are the risk factors for developing diabetes mellitus type II in adolescent males?

### Define the clinical problem using the PICO components described at right:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td><strong>Patient or Problem</strong></td>
<td><strong>Intervention</strong> (a cause, prognostic factor, treatment, etc.)</td>
<td><strong>Comparison Intervention</strong> (if necessary)</td>
<td><strong>Outcomes</strong></td>
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<tr>
<td>Starting with your patient, ask &quot;How would I describe a group of patients similar to mine?&quot; Balance precision with brevity.</td>
<td>Ask &quot;Which main intervention am I considering?&quot; Be specific.</td>
<td>Ask &quot;What is the main alternative to compare with the intervention?&quot; Again, be specific.</td>
<td>Ask &quot;What can I hope to accomplish?!&quot; or &quot;What could this exposure really affect?&quot; Again, be specific.</td>
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</table>

**Tips for Building**

Create a PICO for the scenario –

**P –**

**I –**

**C –**

**O –**

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From Oxford’s CEBM – [http://www.cebm.net](http://www.cebm.net)

<table>
<thead>
<tr>
<th><strong>Type of Question you are asking</strong></th>
<th><strong>Type of Study you would want to find</strong></th>
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<tbody>
<tr>
<td>How would I categorize this question?</td>
<td>What would be the best study design in order to answer this question?</td>
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</table>
Finding the best evidence in the literature

Online tools and databases where you find evidence-based resources can be divided into three categories:

1. Those that do most of the work for you
2. Those that do some of the work for you
3. Those where you do most of the work

But even when most of the work is done for you – you will still need to use your critical judgment!

Category 1

- **The Cochrane Library** ([http://hslibrary.ucdenver.edu/](http://hslibrary.ucdenver.edu/)) includes the following files:
  - **Cochrane Database of Systematic Reviews (Cochrane Reviews)** – rigorous, full-text reviews done by Cochrane Review Groups with explicitly stated objectives and eligibility criteria, a comprehensive literature search, comparison of studies to criteria, justification of exclusions plus occasional updates
    - Every Cochrane Systematic Review must have a standardized title including:
      - Intervention / for a specific Problem / in a Patient Population (when appropriate)
    - Every review goes through the following stages:
  - **Database of Abstracts of Reviews of Effectiveness (DARE or Other Reviews)** - systematic reviews published in journals and other, non-Cochrane sources, with quality assessed structured abstracts, produced by the Centre for Reviews and Dissemination (CRD) at the University of York, UK.
  - **Cochrane Central Register of Controlled Trials (Clinical Trials)** – journal citations of randomized trials, just under half are from MEDLINE, the remainder are from the European medical index EMBASE, as well as other published and unpublished sources, including Cochrane Groups Specialized Registers.
  - **Cochrane Database of Methodology Reviews (Methods Reviews)** – full-text systematic reviews on research methodological studies
  - **Cochrane Methodology Register (Methods Studies)** - citations on publications on how to conduct controlled trials and systematic reviews
  - **Health Technology Assessment Database (Technology Assessments)** – structured abstracts of studies on the medical, social, ethical and economic implications of health care interventions. Produced by the CRD.
  - **NHS Economic Evaluation Database (Economic Evaluations)** – structured abstracts of critically appraised economic evaluations of health care interventions, produced by the CRD.
  - **About the Cochrane Collaboration (Cochrane Groups)** – description of Cochrane Review Groups, Centres, etc.
    - Updated quarterly.
    - For individual subscription information, see [http://www3.interscience.wiley.com/user/register/form](http://www3.interscience.wiley.com/user/register/form)

Category 2

- **ACP Journal Club** Provides evidence based critical appraisals of research studies of clinical importance published in major medical journals. It is now a section of Annals of Internal Medicine, not a separate journal. Search PubMed for "ACP journal club"[Title] and add a topic, as in "ACP journal club"[Title] AND CABG. For individual subscription information, see [http://www.acponline.org/catalog/journals/subs.html?hp](http://www.acponline.org/catalog/journals/subs.html?hp)
- **Dynamed** ([http://hslibrary.ucdenver.edu/databases/clinical](http://hslibrary.ucdenver.edu/databases/clinical)) DynaMed is a clinical reference tool including more than 3,000 topics created by physicians for health care professionals for use primarily at the 'point-of-care'. DynaMed is updated daily and monitors the content of over 500 medical journals and systematic evidence review databases. Levels of recommendation are graded A-C; levels of evidence are rated 1-3.
- **FIRSTConsult** ([http://hslibrary.ucdenver.edu/databases/clinical](http://hslibrary.ucdenver.edu/databases/clinical)) is an evidence-based clinical information resource. Recommendations for practice are graded A (high quality systematic reviews or RCTs), B (non-randomized trials and other types of experimental designs), or C (consensus or expert opinion) by trained editors. Free “PocketConsult” smartphone version available from the library: [http://hslibraryguides.ucdenver.edu/mobiletechguide](http://hslibraryguides.ucdenver.edu/mobiletechguide)
- **Natural Medicines Comprehensive Database** ([http://hslibrary.ucdenver.edu/databases/clinical](http://hslibrary.ucdenver.edu/databases/clinical)) is an evidence- based source of information on the ingredients, interactions, effectiveness, and use of brand name natural products and substances. Products are graded effective to ineffective using evidence based reviews of the literature. Purchase a smartphone version, [http://www.naturaldatabase.com/(S(epq0rw45k3ip4snjicc3a45))/pda.aspx?cs=475965&s=ND](http://www.naturaldatabase.com/(S(epq0rw45k3ip4snjicc3a45))/pda.aspx?cs=475965&s=ND)
- **Nursing Consult** ([http://hslibrary.ucdenver.edu/databases/clinical](http://hslibrary.ucdenver.edu/databases/clinical)) is an evidence based resource designed especially for clinical nurses. A seven level grading scheme is used in the Evidence Based Nursing section of the resource.
- **UpToDate** ([http://hslibrary.ucdenver.edu/databases/clinical](http://hslibrary.ucdenver.edu/databases/clinical)) now offers evidence grading. 1 or 2 indicates the strength of the recommendation, A/B/C indicates the grade for the quality of the evidence used.

*Please evaluate this class at [http://hslibrary.ucdenver.edu/classes/evaluate.php](http://hslibrary.ucdenver.edu/classes/evaluate.php)*
Note on Grading the Evidence

Most of the above resources use some system of grading the quality of articles referenced. Generally, the systems combine a rating for the type of resource (systematic review, meta-analysis, blinded RCT, etc.) and criteria such as the study design, follow up of subjects, and the clinical importance of the finding. For example:

**A1** might mean - a systematic review where all included studies are RCTs with good follow up studying outcomes of clinical importance.

**B2** might mean - a good quality non-random study that meets only one additional criteria – for example, the outcome is of clinical importance.

**C3** might mean - consensus or other expert based information – which meets no criteria for study design.

Category 3

- **Ovid MEDLINE and CINAHL** “Clinical Queries” limit feature (Attachment 1)
- **PubMed MEDLINE** “Clinical Queries” feature (Attachment 2) - Click on the Clinical Queries link under the PubMed Tools heading on the welcome screen
  

  Use My NCBI filters for evidence based medicine (Attachment 4)
- **EMBASE** “Evidence Based” limits (Attachment 2)

Tips for retrieving EBM literature in Ovid MEDLINE, PubMed, and EMBASE:

- Use **Clinical Trial** publication types (pt) to limit your MEDLINE search to articles about actual clinical trials and to automatically explode all 7 clinical trial terms (below).


  *Clinical Trials, the medical subject heading, retrieves articles on how to conduct clinical trials."

- Don't limit your search to **Review** (pt). Reserve the Review limit for “quick ‘n dirty” searching.


- Core Clinical Journals, also known as AIM (Abridged Index Medicus), limits your search to 120 clinical journals commonly found in hospital libraries. Use this limit for “quick ‘n dirty” searching only, and not EBHC searches.

Filtering Tool: Trip Database

TRIP (http://www.tripdatabase.com/) is a one stop resource for filtering high quality evidence based research, including:

- powerful search filtering tools (including a PICO search interface)
- results from a variety of high quality producers of evidence based information (such as the Cochrane Collaboration),
- rollover preview of individual results,
- login through Facebook or Twitter,
- tracking and favorites options for logged in users
- sharing results through Facebook or Twitter.

When used on-campus, many journal articles are just a click away from your Trip results. When off campus, use the Library’s Ask Us link (http://hslibrary.ucdenver.edu/AskUs) for help accessing materials found through Trip searching. OR use the Library’s Journal search to find the article you need (http://hslibrary.ucdenver.edu/Journals)
<table>
<thead>
<tr>
<th>Level</th>
<th>Therapy/Prevention, Aetiology/Harm</th>
<th>Prognosis</th>
<th>Diagnosis</th>
<th>Differential diagnosis/symptom prevalence study</th>
<th>Economic and decision analyses</th>
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<tbody>
<tr>
<td>1a</td>
<td>SR (with homogeneity*) of RCTs</td>
<td>SR (with homogeneity*) of inception cohort studies; CDR† validated in different populations</td>
<td>SR (with homogeneity*) of Level 1 diagnostic studies; CDR† with 1b studies from different clinical centres</td>
<td>SR (with homogeneity*) of prospective cohort studies</td>
<td>SR (with homogeneity*) of Level 1 economic studies</td>
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<tr>
<td>1b</td>
<td>Individual RCT (with narrow Confidence Interval†)</td>
<td>Individual inception cohort study with ≥ 80% follow-up; CDR† validated in a single population</td>
<td>Validating** cohort study with good†† reference standards; or CDR† tested within one clinical centre</td>
<td>Prospective cohort study with good follow-up****</td>
<td>Analysis based on clinically sensible costs or alternatives; systematic review(s) of the evidence; and including multi-way sensitivity analyses</td>
</tr>
<tr>
<td>1c</td>
<td>All or none§</td>
<td>All or none case-series</td>
<td>Absolute SpPins and SnNouts‡</td>
<td>All or none case-series</td>
<td>Absolute better-value or worse-value analyses ††††</td>
</tr>
<tr>
<td>2a</td>
<td>SR (with homogeneity*) of cohort studies</td>
<td>SR (with homogeneity*) of either retrospective cohort studies or untreated control groups in RCTs</td>
<td>SR (with homogeneity*) of Level &gt;2 diagnostic studies</td>
<td>SR (with homogeneity*) of 2b and better studies</td>
<td>SR (with homogeneity*) of Level &gt;2 economic studies</td>
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<tr>
<td>2b</td>
<td>Individual cohort study (including low quality RCT; e.g., &lt;80% follow-up)</td>
<td>Retrospective cohort study or follow-up of untreated control patients in an RCT; Derivation of CDR† or validated on split-sample§§§ only</td>
<td>Exploratory** cohort study with good††† reference standards; CDR† after derivation, or validated only on split-sample§§§ or databases</td>
<td>Retrospective cohort study, or poor follow-up</td>
<td>Analysis based on clinically sensible costs or alternatives; limited review(s) of the evidence, or single studies; and including multi-way sensitivity analyses</td>
</tr>
<tr>
<td>2c</td>
<td>&quot;Outcomes&quot; Research; Ecological studies</td>
<td>&quot;Outcomes&quot; Research</td>
<td>Ecological studies</td>
<td>Audit or outcomes research</td>
<td></td>
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<tr>
<td>3a</td>
<td>SR (with homogeneity*) of case-control studies</td>
<td>SR (with homogeneity*) of 3b and better studies</td>
<td>SR (with homogeneity*) of 3b and better studies</td>
<td>SR (with homogeneity*) of 3b and better studies</td>
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<tr>
<td>3b</td>
<td>Individual Case-Control Study</td>
<td>Non-consecutive study; or without consistently applied reference standards</td>
<td>Non-consecutive cohort study, or very limited population</td>
<td>Analysis based on limited alternatives or costs, poor quality estimates of data, but including sensitivity analyses incorporating clinically sensible variations.</td>
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<tr>
<td>4</td>
<td>Case-series (and poor quality cohort) and case-control studies§§</td>
<td>Case-series (and poor quality prognostic cohort studies***</td>
<td>Case-control study, poor or non-independent reference standard</td>
<td>Case-series or superseded reference standards</td>
<td>Analysis with no sensitivity analysis</td>
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<td>5</td>
<td>Expert opinion without explicit critical appraisal, or based on physiology, bench research or “first principles”</td>
<td>Expert opinion without explicit critical</td>
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**Grades of Recommendation**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>consistent level 1 studies</td>
</tr>
<tr>
<td>B</td>
<td>consistent level 2 or 3 studies or extrapolations from level 1 studies</td>
</tr>
<tr>
<td>C</td>
<td>level 4 studies or extrapolations from level 2 or 3 studies</td>
</tr>
<tr>
<td>D</td>
<td>level 5 evidence or troublingly inconsistent or inconclusive studies of any level</td>
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*Please evaluate this class at [http://hslibrary.ucdenver.edu/classes/evaluate](http://hslibrary.ucdenver.edu/classes/evaluate)*
**Notes**

Users can add a minus-sign "-" to denote the level of evidence that fails to provide a conclusive answer because of:

- EITHER a single result with a wide Confidence Interval (such that, for example, an ARR in an RCT is not statistically significant but whose confidence intervals fail to exclude clinically important benefit or harm)
- OR a Systematic Review with troublesome (and statistically significant) heterogeneity.
- Such evidence is inconclusive, and therefore can only generate Grade D recommendations.

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<tr>
<th>*</th>
<th>By homogeneity we mean a systematic review that is free of worrisome variations (heterogeneity) in the directions and degrees of results between individual studies. Not all systematic reviews with statistically significant heterogeneity need be worrisome, and not all worrisome heterogeneity need be statistically significant. As noted above, studies displaying worrisome heterogeneity should be tagged with a &quot;-&quot; at the end of their designated level.</th>
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<tbody>
<tr>
<td>†</td>
<td>Clinical Decision Rule. (These are algorithms or scoring systems which lead to a prognostic estimation or a diagnostic category.)</td>
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<tr>
<td>‡</td>
<td>See note #2 for advice on how to understand, rate and use trials or other studies with wide confidence intervals.</td>
</tr>
<tr>
<td>§</td>
<td>Met when all patients died before the Rx became available, but some now survive on it; or when some patients died before the Rx became available, but none now die on it.</td>
</tr>
<tr>
<td>§§</td>
<td>By poor quality cohort study we mean one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), objective way in both exposed and non-exposed individuals and/or failed to identify or appropriately control known confounders and/or failed to carry out a sufficiently long and complete follow-up of patients. By poor quality case-control study we mean one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), objective way in both cases and controls and/or failed to identify or appropriately control known confounders.</td>
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<tr>
<td>§§§</td>
<td>Split-sample validation is achieved by collecting all the information in a single tranche, then artificially dividing this into &quot;derivation&quot; and &quot;validation&quot; samples.</td>
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<tr>
<td>††</td>
<td>An &quot;Absolute SpPin&quot; is a diagnostic finding whose Specificity is so high that a Positive result rules-in the diagnosis. An &quot;Absolute SnNout&quot; is a diagnostic finding whose Sensitivity is so high that a Negative result rules-out the diagnosis.</td>
</tr>
<tr>
<td>‡‡</td>
<td>Good, better, bad and worse refer to the comparisons between treatments in terms of their clinical risks and benefits.</td>
</tr>
<tr>
<td>†††</td>
<td>Good reference standards are independent of the test, and applied blindly or objectively to applied to all patients. Poor reference standards are haphazardly applied, but still independent of the test. Use of a non-independent reference standard (where the 'test' is included in the 'reference', or where the 'testing' affects the 'reference') implies a level 4 study.</td>
</tr>
<tr>
<td>††††</td>
<td>Better-value treatments are clearly as good but cheaper, or better at the same or reduced cost. Worse-value treatments are as good and more expensive, or worse and the equally or more expensive.</td>
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<tr>
<td>**</td>
<td>Validating studies test the quality of a specific diagnostic test, based on prior evidence. An exploratory study collects information and trawls the data (e.g. using a regression analysis) to find which factors are 'significant'.</td>
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<tr>
<td>***</td>
<td>By poor quality prognostic cohort study we mean one in which sampling was biased in favour of patients who already had the target outcome, or the measurement of outcomes was accomplished in &lt;80% of study patients, or outcomes were determined in an unblinded, non-objective way, or there was no correction for confounding factors.</td>
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<tr>
<td>****</td>
<td>Good follow-up in a differential diagnosis study is &gt;80%, with adequate time for alternative diagnoses to emerge (eg 1-6 months acute, 1 - 5 years chronic)</td>
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</table>

"Extrapolations" are where data is used in a situation which has potentially clinically important differences than the original study situation.

**References**

Levels of Evidence / Sources of Evidence


Integrated into the EMR

- AHRQ, Dynamed, FirstConsult, Micromedex, FPIN Clinical Queries, National Guidelines Clearinghouse, Natural Medicines Comprehensive Database, Nursing Consult
- Cochrane Other Reviews (DARE), ACP Journal Club, OTSeeker, and PEDro
- Cochrane Systematic Reviews, PubMed or Ovid MEDLINE Systematic Review search filters
- ACP Journal Club, Evidence Alerts via Stat!Ref, Evidence Based Nursing, Evidence Updates from BMJ, Journal Watch
- PubMed or Ovid MEDLINE Clinical Queries, CINAHL Clinical Queries, EMBASE Evidence Searching, or Cochrane Clinical Trials

Filtering tool: Trip Database (tripdatabase.com)