



Evidence Based Medicine Tutorial

Evidence-Based Medicine is the process of systematically finding, appraising and using contemporaneous research findings as the basis for clinical decisions. Evidence-Based Medicine asks questions, finds and harnesses that information for everyday clinical practice.

Evidence-based medicine follows four steps:

1. Formulate a clear clinical question from a patient's problem.
2. Search the literature for relevant clinical articles.
3. Evaluate (critically appraise) the evidence for its validity and usefulness.
4. Implement useful findings in clinical practice.

Scope Note. Medical Subject Headings (MeSH), U.S. National Library of Medicine, 1997.

For the location of Kaleida Library's EBM textbooks, please see page 20.

KALEIDA HEALTH LIBRARIES

Aaron HSL (BGH)

Tel: 859-2878 | Fax: 859-1527

DeGraff

Call any Kaleida Library for assistance.

Emily Foster HSL (WCHOB)

Tel: 878-7304 | Fax: 878-7547

Kideney HSL

Tel: 887-4848 | Fax: 887-4347

Suburban HSL

Tel: 568-6540 | Fax: 568-3030

Web Site

<http://library.kaleidahealth.org>

Step 1: Formulate a clear clinical question from a patient's problem

Formulating the question/ Asking answerable questions/focused questions

Use **PICO**

Patient or problem being addressed

Intervention or exposure being considered

Comparison intervention or exposure

Outcome of interest

Resources for more information:

Articles:

Ebell M. Information at the point of care: answering clinical questions
J AM Board Fam Pract. 1999; 12:225-235

Websites:

1. Centre for Evidence-Based Medicine/ Oxford Centre for Evidence-Based Medicine
http://www.cebm.net/learning_ebm.asp. This is an excellent website for EBM. It also contains a chart for focusing clinical questions.
2. Emory University Emergency Medicine-Ambulatory Care (EMAC) Clinical Solutions Web Site
<http://www.emory.edu/WHSC/MED/>. They have an EBM Curriculum based on the Users Guides To the Medical Literature series published in JAMA. Although case examples focus on ambulatory and emergency settings, the curriculum is clear.

Step 2: Search the literature for relevant clinical articles: Finding the best evidence in journals

Search:

Primary sources in bibliographic databases (example, Medline)

Use search filters/hedges (*see end of guide, p 18*)

Secondary (filtered /summarized sources, such as the EBM databases Cochrane, DARE)

- Cochrane Database of Systematic Reviews-full text reviews or protocols- for reviews in preparation.
- DARE- The Database of Abstracts of Reviews of Effectiveness- “assessments and structured abstracts of systematic research reviews...”
- POEMS- Patient-Oriented Evidence that Matters. Information that asks questions relevant to Primary Care practice. Information that uses patient-oriented outcomes such as symptoms... If valid, the results have the potential to change practice.¹

Evidence from other sources

- Practice Guidelines/protocols, position papers from societies and associations. Some are evidence-based, some are consensus.

Resources for more information:

Grandage, Karen K. When less is more: a practical approach to searching for evidence-based answers. J Med Libr Assoc. 90(3):298-304, 2002 Jul.

Step 3: Evaluate (critically appraise) the evidence for its validity and usefulness.

Resources for more information:

Berg, Alfred O. Dimensions of evidence. *J Am Board Fam Pract.* 11(3):216-23, 1998 May-Jun. *Includes a chart from U.S. Preventive Services Task Force that grades evidence.*

Geyman, John P. Evidence-based medicine in primary care: an overview. *J Am Board Fam Pract.* 11(1):46-56, 1998 Jan-Feb.

Hunt, Dereck L. Locating and appraising systematic reviews. *Ann Intern Med.* 126(7):532-8, 1997 Apr 1.
Lists questions to ask to help assess the quality of a systematic review.

Miser, William F. Critical appraisal of the literature: how to assess an article and still enjoy life. *J Am Board Fam Pract.* 12(4):315-33, 1999 Jul-Aug.

Also see page 6-8 of this guide.

Step 4: Apply the conclusions to the situations/ Are they applicable to my patient or problem?

- Is your patient typical of a study patient?
- Can you expect similar results given the setting?

Resources for more information:

Articles:

Wolf, Fredric M. (2000). Summarizing evidence for clinical use. In Geyman, JP, & Deyo, Richard A. (Eds.), Evidence-based clinical practice (pp.133-144). Boston: Butterworth Heinemann.

Websites:

Emory

<http://www.emory.edu/WHSC/MED/EMAC/curriculum/diagnosis/diagnostictesting.html>

Formulating the question starts with the clinical encounter:

- Situation** - the population (important defining characteristics, whether it describes a patient, or a profession, or the way a service is delivered)

When evaluating a study for your situation, the question concerns whether the study situation is similar enough to allow you to generalize to your situation.

- Intervention** - action or proposed action (diagnostic tool, therapy or management, prognosis, or harm), or an exposure or disease.

- Comparison of interventions** - of a new treatment to the standards. Alternative. Do you want studies to include control groups or placebo effects?

- Outcomes** - Negative (side effects, adverse effects, expense, cost) and positive (cure, remission, cost, compliance)

Medline or other databases

Understand filters (subheadings, limits, pub. types), types of studies.

Learn to create hedges

Look for clues in abstracts (Consensus statements, likely producers of position statements, guidelines)

•**EBM databases:** Cochrane, DARE

FINDING QUALITY INFORMATION

Government

- CDC** (recommendations/reports) <http://www.cdc.gov/>
- NGC** (guideline clearinghouse) <http://www.ngc.gov/index.asp>
- NIH** (consensus statements) <http://www.nih.gov/>
Question: Are these consensus statements/guidelines based on studies?

Professional /National Associations- NLM-Dirline <http://dirline.nlm.nih.gov> to find associations that may produce position statements. Question: Are these position statements evidence based?

ACOG publications

Major study types found in the medical literature

Miser, WF. Critical appraisal of the literature. J Am Board Fam Pract. 12(4):315-33, 1999 Jul-Aug.

Medical Literature

Primary (analytic) studies

those that report original research

Secondary (Integrative) studies

those that draw conclusions from original research

Experimental

an intervention is made or variables are manipulated

- experiment
- randomized controlled trial
- nonrandomized controlled trial

Observational

no intervention is made and no variables are manipulated

- Cohort
- case-control
- cross sectional
- descriptive, surveys
- case reports

- meta-analysis
- systematic review
- nonsystematic review
- editorial, commentary
- practice guideline
- decision analysis
- economic analysis

Information about the **Hierarchy of Research Design** and criteria for grading the internal validity of individual studies can be found at the website of the U.S. Preventive Services Task Force (USPSTF): current methods. An article by Harris, RP appears there. <http://www.ahcpr.gov/clinic/uspstmeth.htm>

There is a way to determine the highest level of evidence?



Hierarchy of Research Design

- I:** Evidence obtained from at least one properly randomized controlled trial.
- II-1:** Evidence obtained from well-designed controlled trials without randomization.
- II-2:** Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
- II-3:** Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
- III:** Opinions of respected authorities, based on clinical experience, descriptive studies and case reports, or reports of expert committees.

Criteria for grading the internal validity of individual studies located in <http://www.ahcpr.gov/clinic/ajpmsuppl/harris2.htm#literature>

For searching basics and beyond, please see our HUBNET guide.
<http://library.kaleidahealth.org/hubnetmanual2003.pdf>

It is always best to start searches in one of the primary databases, for example Medline, as the EBM databases do not contain all EBM materials.

Cochrane Database of Systemic Reviews

EBM Reviews - Cochrane Database of Systematic Reviews
<4th Quarter 2003>

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Author Title Search Fields Browse Topics Combine Limit Basic Change Database Logoff

#	Search History	Results	Display
-	-	-	-

[Saved Searches](#)

Enter **Keyword** or phrase:
 [Perform Search](#)

Limit to:
 Systematic Reviews Protocols New Reviews
 Recently Updated Reviews

Copyright (c) 2000-2004 [Ovid Technologies, Inc.](#)
Version: rel9.0.0, SourceID 1.8300.1.453

Start with the toolbar.

Note: The explanations that follow are taken from OVID.



<click> on **Search Fields**  to see the whole list.


Search Fields

Search Fields allows you to search a particular element in a record, for example author or a word in an abstract.

Search Fields/Indexes Help

[Perform Search](#) [Display Index\(es\)](#) [Tools Display](#) [Main Search Page](#)

Enter word or phrase:

- Click the "Perform Search" button to search the text in the selected fields
- Click the "Display Index(es)" button to browse the selected indexes, starting with the text entered
- Items marked with  can only be searched. No index is available

All Fields (af)
- or choose from among the following fields -

<input type="checkbox"/> <i>ab</i> : Abstract	<input type="checkbox"/> <i>hw</i> : Keyword and Heading Words
<input type="checkbox"/> <i>an</i> : Accession Number	<input type="checkbox"/> <i>kw</i> : Keywords
<input type="checkbox"/> <i>au</i> : Author	<input type="checkbox"/> <i>sh</i> : Mesh Headings
<input type="checkbox"/> <i>ap</i> : Author's Response	<input type="checkbox"/> <i>oh</i> : Outline Headings
<input type="checkbox"/> <i>ct</i> : Caption Text	<input type="checkbox"/> <i>pg</i> : Pages
<input type="checkbox"/> <i>ca</i> : Cited Author	<input type="checkbox"/> <i>cp</i> : Place of Publication
<input type="checkbox"/> <i>cm</i> : Commentary	<input type="checkbox"/> <i>pd</i> : Publication Date
<input type="checkbox"/> <i>am</i> : Comments Author	<input type="checkbox"/> <i>pt</i> : Publication Type


Search fields: Terms may be restricted to any field. Fields may also be combined.

1. Type a word or phrase and check the desired field.

Search Fields/Indexes

Perform Search Display Index(es) Tools Display Main Search Page

Enter word or phrase:

- Click the "Perform Search" button to search the text in the selected fields
- Click the "Display Index(es)" button to browse the selected indexes, starting with the text entered
- Items marked with  can only be searched. No index is available

All Fields (af)
- or choose from among the following fields -

<input type="checkbox"/> <i>ab</i> : Abstract	<input type="checkbox"/> <i>hw</i> : Keyword and Heading Words
<input type="checkbox"/> <i>an</i> : Accession Number	<input type="checkbox"/> <i>kw</i> : Keywords
<input type="checkbox"/> <i>au</i> : Author	<input type="checkbox"/> <i>sh</i> : Mesh Headings
<input type="checkbox"/> <i>ap</i> : Author's Response	<input type="checkbox"/> <i>oh</i> : Outline Headings
<input type="checkbox"/> <i>ct</i> : Caption Text	<input type="checkbox"/> <i>pg</i> : Pages
<input type="checkbox"/> <i>ca</i> : Cited Author	<input type="checkbox"/> <i>cp</i> : Place of Publication
<input type="checkbox"/> <i>cm</i> : Commentary	<input type="checkbox"/> <i>pd</i> : Publication Date
<input type="checkbox"/> <i>am</i> : Comments Author	<input type="checkbox"/> <i>pt</i> : Publication Type

OR

On the main search page you may type the word or phrase followed by the field. i.e. intusseception.ti.

Note: .ti. will search only documents with intusseception in the title.

Also Note: the field is surrounded by dots < . >

Search fields can help refine or narrow a search by restricting the term to a specific field. Otherwise, all of the fields are included in the search, which can return many false citations.

The Tool Bar: Browse Topics



Click on **Browse Topics** icon to see the whole list of of topics in the database. See screen print on p. 13.

Browse Topics links to information about each of the Collaborative Review Groups who prepare and maintain the Cochrane Reviews.

Each Review Group has an "Article List" of all the articles by the group in this database.

This enables browsing the collection by topic.

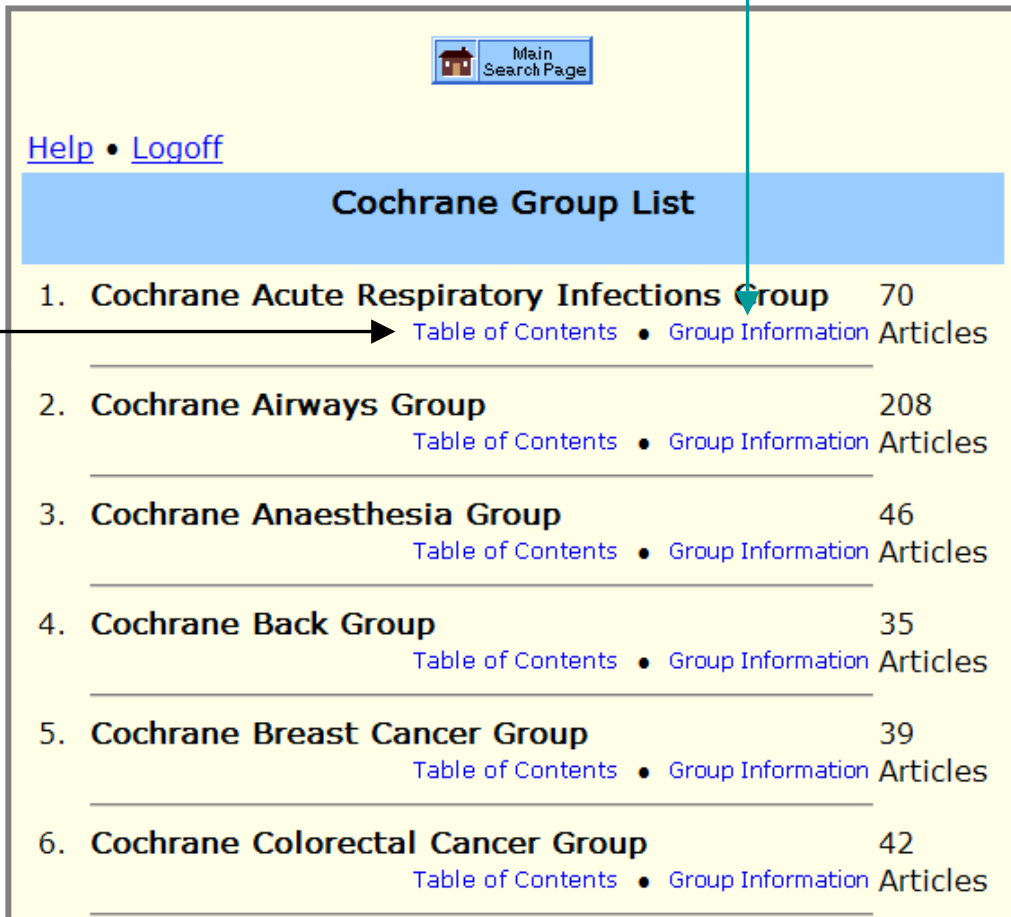
Continuing...

Browse Topics



Table of contents will give a list of articles by the group.

Group Information will give a range of information, from details about the group, to a very detailed account of the search strategies, and topics.

A screenshot of a web page titled 'Cochrane Group List'. At the top, there is a 'Main Search Page' button with a house icon. Below it are links for 'Help' and 'Logoff'. The main content is a list of six Cochrane groups, each with a number, name, and article count. For each group, there are links for 'Table of Contents', 'Group Information', and 'Articles'. A blue arrow points from the 'Table of Contents' link for the first group to the text in the top box. A green arrow points from the 'Group Information' link for the first group to the text in the top box.

Cochrane Group List		
1.	Cochrane Acute Respiratory Infections Group	70
	Table of Contents • Group Information	Articles
2.	Cochrane Airways Group	208
	Table of Contents • Group Information	Articles
3.	Cochrane Anaesthesia Group	46
	Table of Contents • Group Information	Articles
4.	Cochrane Back Group	35
	Table of Contents • Group Information	Articles
5.	Cochrane Breast Cancer Group	39
	Table of Contents • Group Information	Articles
6.	Cochrane Colorectal Cancer Group	42
	Table of Contents • Group Information	Articles


Group Information <continued>






Contact Information / Editorial Information / Sources of Support / Conflicts of Interest / Search Strategy Information

This list continues with Publications, References, Topic List (a good source for finding additional search terms)

Acute Respiratory Infections Group

The Cochrane Database of Systematic Reviews

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 [Main SearchPage](#)  [Browse Cochrane Group List](#)   [Cochrane Groups](#)  [Group Table of Contents](#)

Outline

- [Contact Information](#)
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- [Methods Used in Reviews: Reporting of Reviews](#)
- [Editorial Process: Titles](#)
- [Editorial Process: Protocols](#)
- [Editorial Process: Reviews](#)
- [Editorial Process: EUpdating](#)
- [Editorial Information: Editorial Team](#)
- [Editorial Information: EIReviewers](#)
- [Editorial Information: Additional Contributors](#)
- [Editorial Information: Support Cochrane Centre](#)
- [Editorial Information: Acknowledgements](#)
- [Consumer Involvement](#)
- [Involvement of Others](#)
- [Potential Conflict of Interest](#)

Output...

[Print Preview](#)

[Email Article Text](#)

[Save Article Text](#)

Links...

[Topic Review](#)

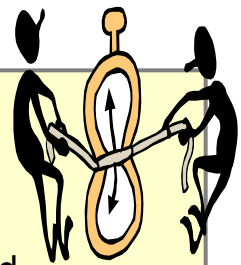
[External Resolver](#)

[Help](#)

[Logoff](#)

History...

The Cochrane Database of ... [Go](#)



Limits: To fine tune or narrow a search

Systematic Reviews

A limit to Systematic Reviews restricts your search retrieval to complete review articles, which are updated and maintained by the Collaborative Review Groups.

Protocols

A limit to Protocols limits your search to a review that is currently being prepared. Protocols are the background, objectives, and methods of reviews in preparation.

New Reviews

A limit to New Reviews restricts your search to reviews that have been added since the last update.

Recently Updated Reviews

A limit to Recently Updated Reviews restricts your search retrieval to reviews that have been significantly changed since the last update.

To use **Limit to:**

Type any of the above terms directly in the search box combined with the subject or the set number of the subject. In the example **limit 1 to protocols**, 1=the set created when the subject was searched.

Enter **Keyword** or phrase:

Limit to:

Systematic Reviews Protocols New Reviews Recently Updated Reviews

OR

Click on the appropriate box under **Limit to:** after you have typed the subject in the search box.



Useful information from OVID about searching this database:

Searching Cochrane on OVID uses slightly different terminology than searching Medline, especially when it comes to the **text word** and **keyword** terms.

Remember that using “OR” is a GOOD thing in this database, (or in any, if you want to make sure you capture any occurrence of a term).

The Keywords (KW) field contains MeSH headings that have been assigned by members of the Cochrane Collaboration. These headings are used to describe the content of reviews. *Protocols do not have keywords assigned to them.*

This field is word indexed. Though the headings look like MeSH terms, they should not be searched as such. For example, *if the keyword displays as myocardial infarction it should be searched as myocardial infarction.kw.*

The Text Word (TW) field is ideal for broad retrieval of author's specialized terminology. Searches in this field are conducted simultaneously in the Title (TI), Abstract (AB), Caption Text (CT), and Full Text (TX) fields.

If you believe that your search phrase has been used very frequently in the literature (e.g. "blood pressure,") you may wish to focus the results more closely by using the Title (TI), Abstract (AB) and Caption Text (CT) fields, or by using one of the Limits to restrict the results of your search.

So...

Using fields to capture articles about breast cancer

EBM Reviews - Cochrane Database of Systematic Reviews
<1st Quarter 2004>

Author Title Search Fields Browse Topics Combine Limit Basic Change Database Logoff

#	Search History	Results	Display
1	breast cancer.af.	159	Display
2	breast neoplasms.mp.	20	Display
3	breast neoplasms.tw.	20	Display
4	breast neoplasms.kw.	15	Display
5	breast neoplasms.af.	20	Display
6	1 or 2 or 3 or 4 or 5	160	Display

Saved Searches Save Search History Delete Searches

Enter **Keyword** or phrase:
 Perform Search

Limit to:
 Systematic Reviews Protocols New Reviews Recently Updated Reviews

What you are seeing...

#1= .af. Requesting All Fields

#2= .mp. All fields (equiv. to .af.)

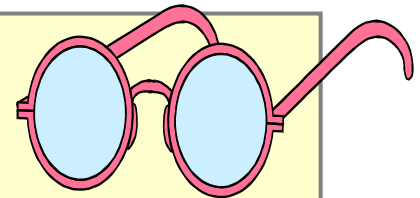
#3= .tw. Culls from 4 fields in author's terminology (see previous page)

#4= .kw. Medical subject heading (MeSH)

#5= .af. All Fields

#6= Creating a hedge using OR allows you to capture all 160 citations, which may or may not be a good thing.

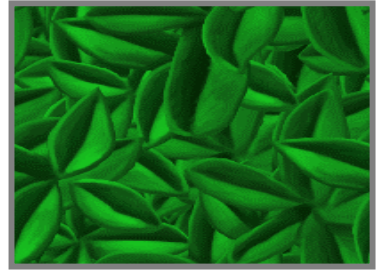
<clicking> the search field icon will list all of the searchable fields in this database.



Hedges

Creating combinations of terms with “OR” to capture all variants of a term.

physician OR doctor* or MD**

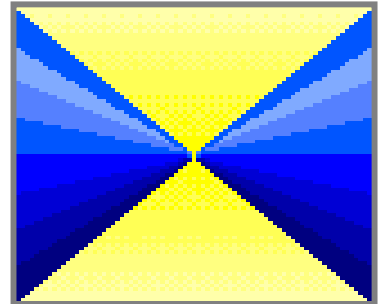


* = truncation. When when <*>is used it allows for different forms of a term. **Physician*** allows physician or physicians to be included in a search.

Filters

Focuses the term to a certain aspect, like diagnosis or therapy. The search results become limited to this aspect. Searches may be further limited by the type of study or method.

Sensitivity and specificity are important in developing filters.



Article:

Haynes RB. Developing **optimal** search strategies for detecting clinically sound studies in MEDLINE. J Am Med Inform Assoc. 1(6):447-58, 1994 Nov-Dec. Available full text on PubMed. <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>

NOTE: There are numerous sites with sets of filters already developed. Please see following page.

Sensitivity/Specificity/Filters

*EBM Filters/Strategies

The following filters were developed by Dr. Brian Haynes and Ann McKibbin from McMaster University. They are designed to retrieve high quality evidence from published studies appropriate to decision-making (e.g. clinical trials for diagnosis, cohort studies for prognosis, etc.) from the Medline databases.

It is important to realize that these are strategies are to be used in combination with a subject search strategy which should be done first to retrieve as much information as possible relevant to the subject.

•SENSITIVITY or COMPREHENSIVE RETRIEVAL retrieves as many documents as possible on a topic. This is also referred to as "recall" and usually retrieves a larger number of hits.

•SPECIFICITY or RELEVANCE retrieves as many relevant documents as possible. This is often referred to as "precision" and usually retrieves a smaller number of hits, although a larger proportion of them will be highly relevant. Some may be omitted.

*Duke University Medical Center Library-
<http://www.mclibrary.duke.edu/respub/guides/ebm/searching.html>. This website also has a list of filters to increase sensitivity or specificity in diagnosis, therapy, etc.

Other sites with filters already created:


•Edward G.Miner Library at the University of Rochester Medical Center-
http://www.urmc.rochester.edu/hslt/miner/digital_library/evidence_based_resources.cfr
See tools and search filters

•Emory-<http://www.emory.edu>

•NLM PubMed- <http://www.ncbi.nlm.nih.gov/entrez/query/static/clinical.html>

Filter Table showing Clinical Queries using Research Methodology Filters from NLM is on the following page

Filters from NLM

			
<small>Entrez PubMed Nucleotide Protein Genome Structure OMIM PMC Journals Books</small>			
Clinical Queries using Research Methodology Filters			
Category	Optimized For	Broad/ Narrow	PubMed Equivalent
therapy	sensitive/broad	99%/70%	(clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials [MeSH Terms] OR clinical trial[Publication Type] OR random* [Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]
	specific/narrow	93%/97%	randomized controlled trial[Publication Type] OR (randomized [Title/Abstract] AND controlled[Title/Abstract] AND trial [Title/Abstract])
diagnosis	sensitive/broad	98%/74%	sensitiv*[Title/Abstract] OR sensitivity and specificity[MeSH Terms] OR diagnos*[Title/Abstract] OR diagnosis[MeSH:noexp] OR diagnostic * [MeSH:noexp] OR diagnosis,differential [MeSH:noexp] OR diagnosis[Subheading:noexp]
	specific/narrow	64%/98%	specificity[Title/Abstract]
etiology	sensitive/broad	93%/63%	risk*[Title/Abstract] OR risk*[MeSH:noexp] OR risk * [MeSH:noexp] OR cohort studies[MeSH Terms] OR group*[Text Word]
	specific/narrow	51%/95%	(relative[Title/Abstract] AND risk*[Title/Abstract]) OR (relative risk [Text Word]) OR risks[Text Word] OR cohort studies[MeSH:noexp] OR (cohort[Title/Abstract] AND stud*[Title/Abstract])
prognosis	sensitive/broad	90%/80%	incidence[MeSH:noexp] OR mortality[MeSH Terms] OR follow up studies[MeSH:noexp] OR prognos*[Text Word] OR predict*[Text Word] OR course*[Text Word]
	specific/narrow	52%/94%	prognos*[Title/Abstract] OR (first[Title/Abstract] AND episode [Title/Abstract]) OR cohort[Title/Abstract]

Sensitive (broad) and specific (narrow) searches and approximate equivalent in the PubMed query language as recommended in [Haynes RB et al.](#)

- A list of EBM texts is available at <http://library.kaleidahealth.org/ebmbooks.html>
- Our online catalog is located at <http://library.kaleidahealth.org/uhtbin/webcat>
Type *evidence based* at the keyword option in the catalog. This will pull up a list of books and journals on the topic.