# Searching for the evidence

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# Evidence-Based Medicine

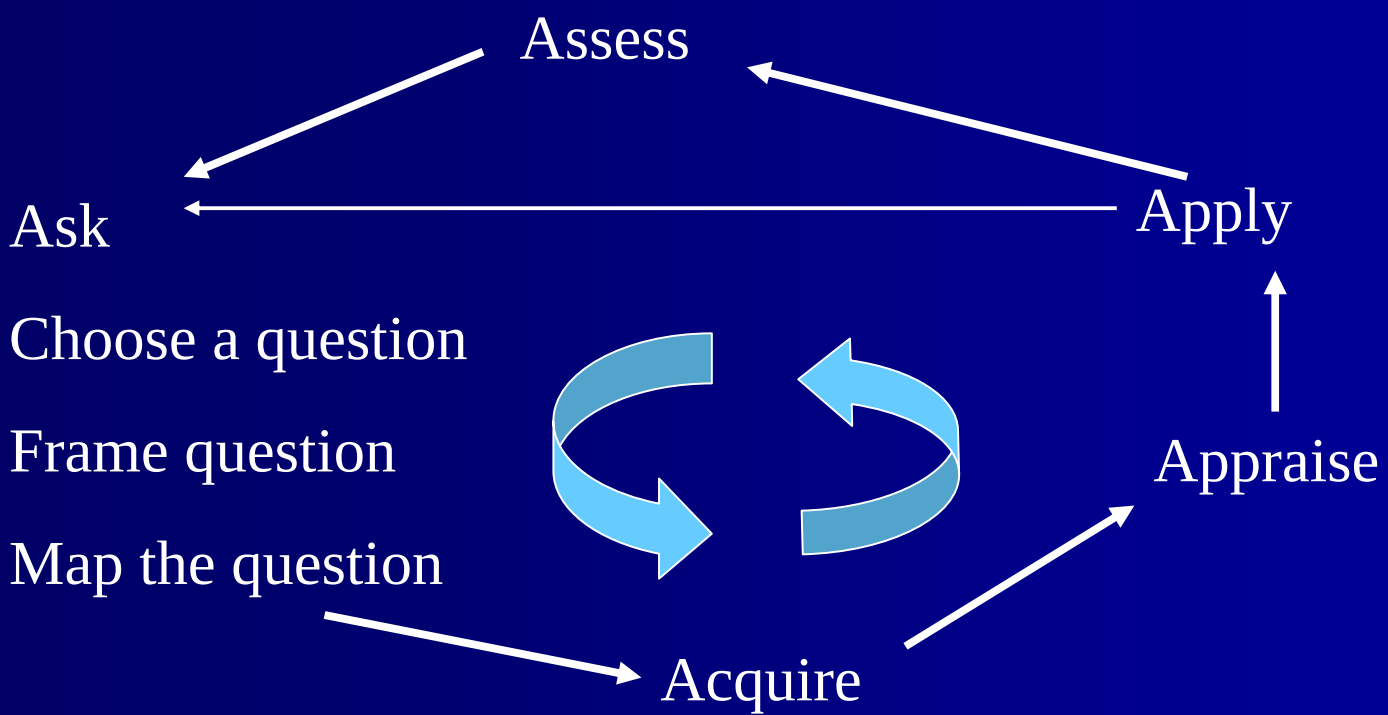
- Also called evidence-based individual decision-making
- Conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients
- Replaces the “art of medicine” (magical synthesis of information about the patient, research, and clinical experience)

# Evidence-Based Medicine

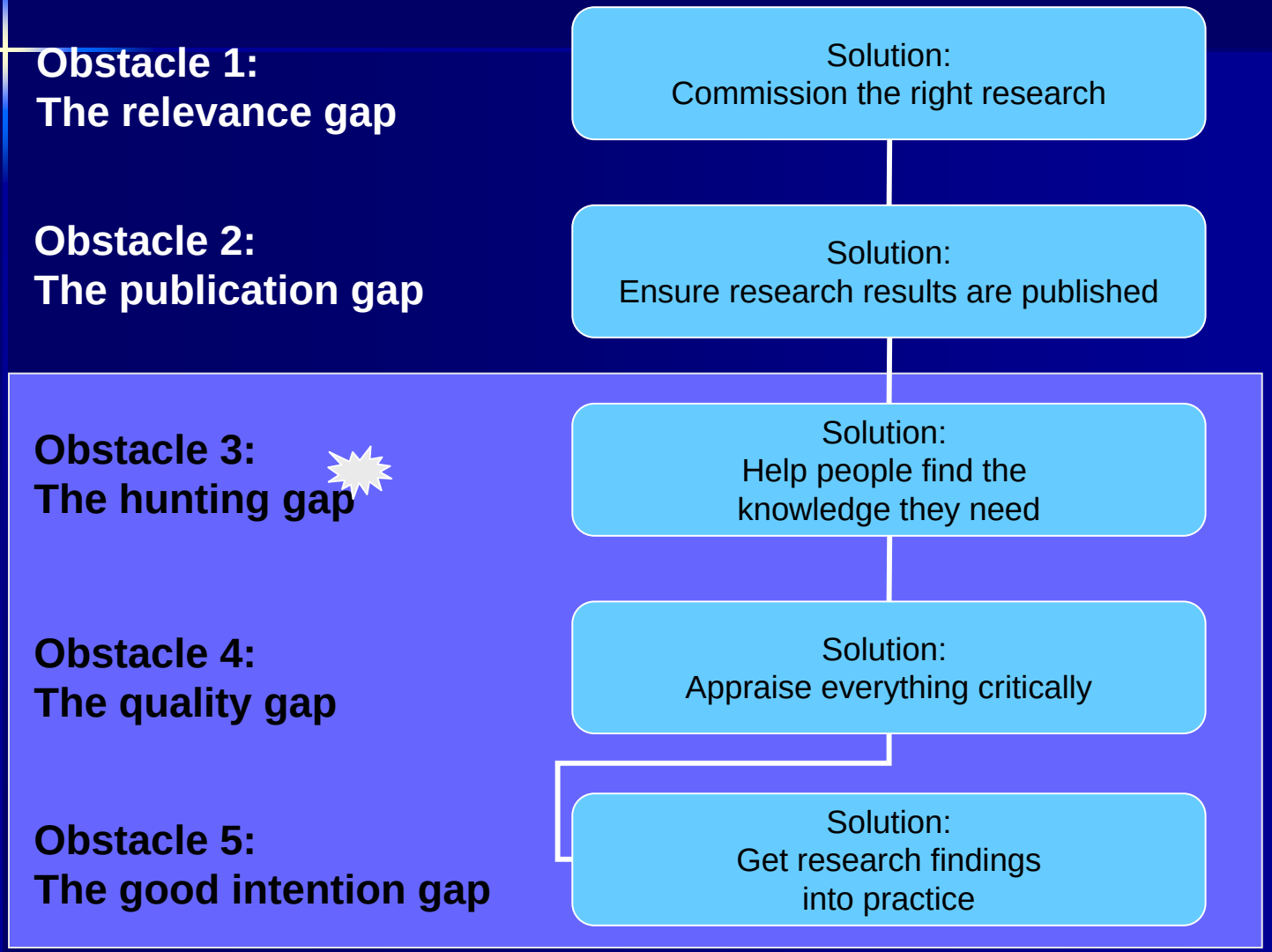
- Emphasizes the individual clinician seeking and appraising evidence about management of an individual patient
- Emphasizes expedience so as to be feasibly incorporated into clinical practice
- Individual patient decisions often must be made in the absence of good evidence, so often depend more on personal experience (patient and physician), attitude regarding risk

# Problem Solving Cycle

**(Adapted from R. Hayward, Alberta, CA)**



# Evidence-based Decisions Require Evidence



# Web Resources

- http://www.med.ualberta.ca/ebm/ebm.htm
  ("tool kit", will help when doing CATs)
- http://www.jr2.ox.ac.uk/bandolier/
  (fabulous and often amusing source of evidence, information, commentary on medicine)
- http://www.nlm.nih.gov/bsd/pubmed_tutorial/m1001.html
  (searching tutorial)

# Finding the Information

- Where to search for evidence
  - Databases and other sources
- How to search more efficiently
  - Boolean logic, MeSH terms
- How far to go in your search
- (How low to go)

# Where to Look for Primary Evidence - Hierarchy

- First line health databases
- Specialist databases
- Science databases
- Databases specific to the problem
- Search of relevant websites
- Reference lists
- Experts' recommendations
- Unstructured web browsing

# First Line Health Databases

- Medline: NLM database covering medicine, nursing, dentistry, veterinary medicine, the health care system, and preclinical sciences; containing citations and abstracts from > 4,800 biomedical journals; contains > 14 million citations dating back to the mid-1950s; most have English abstracts.

- EMBase: Excerpta Medica database; >10 million records from 1974 to present; focus on drug-related publications (can be accessed through Scopus).

# First Line Health Databases

- CINAHL: Cumulative Index to Nursing & Allied Health Literature, 1982-2005.
- The Cochrane Library: CDSR (Cochrane Reviews), Database of Abstracts of Reviews of Effects (DARE); Cochrane Central Register of Controlled Trials; Health Technology Assessment Database (HTA); NHS Economic Evaluation Database (NHS EED).
- HSTAT database: Health Services Technology/Assessment Text: a free, Web-based resource of full-text documents that provide health information and support health care decision making.

# Other Databases

- Scopus a fairly new scientific database that contains 28 million records and covers the content of over 4,000 international scientific, technical, medical and social science publishers. Scopus covers the citations, abstracts and references from articles from **14,000 publications**, including approximately 530 e-journals and Open Access journals, 750 conference proceedings, **all** journals in Medline, EmBase, and 400 trade publications. Includes large volumes of journals from the life sciences, physical sciences, and social sciences.

- Scirus —is "the most comprehensive science-specific search engine on the Internet. Driven by the latest search engine technology, Scirus searches over 450 million science-specific Web pages." Search is divided into, 'journal results', 'preferred web results', and 'other web results' and can be sorted by relevance or dates. This award-winning site includes all relevant documents from several databases: Medline, Digital Archives, LexisNexis, PsyDok, Research Papers in Economics, and others.

# Other Databases

- Web of Science – includes Science Citation Index, find articles that cite key articles, and the Social Science Citation Index (SSCI)
- FirstSearch: an interactive system to search multiple databases, including conference abstracts and proceedings, ERIC (education database) and others
- CRISP: searchable database of federally funded biomedical research projects
- Digital Dissertations: ~1.7 million dissertations, about 200,000 are biomedical
- AND MANY MANY MORE!!

# Medical Meta-Search Engines

- SUMSearch (http://sumsearch.uthscsa.edu)
  Combines meta-searching and contingency searching. Using internet with the meta-search and if too many hits, restricts using an automatic contingency algorithm.
- Trip Database Plus (http://tripdatabase.com)
- Rapid access to the largest collection of evidence-based and high quality medical information. Includes other materials such as textbooks, images, guidelines.

# Search of Relevant Websites

- OMNI: free catalogue of hand-selected and evaluated Internet resources in Health and Medicine.
- Health Index: the MANTIS Database - osteopathic, chiropractic and manual medical literature
- Many others

# Other Sources

- The references in articles you have already found
- Contact with authors already identified or experts in the field to look for unpublished papers or otherwise unidentified papers
- Handsearching primary journals
- These methods have varying rates of return, may or may not be worth the effort, depending on subject, ease of finding other information, importance of finding “everything”

# Unstructured Web Browsing

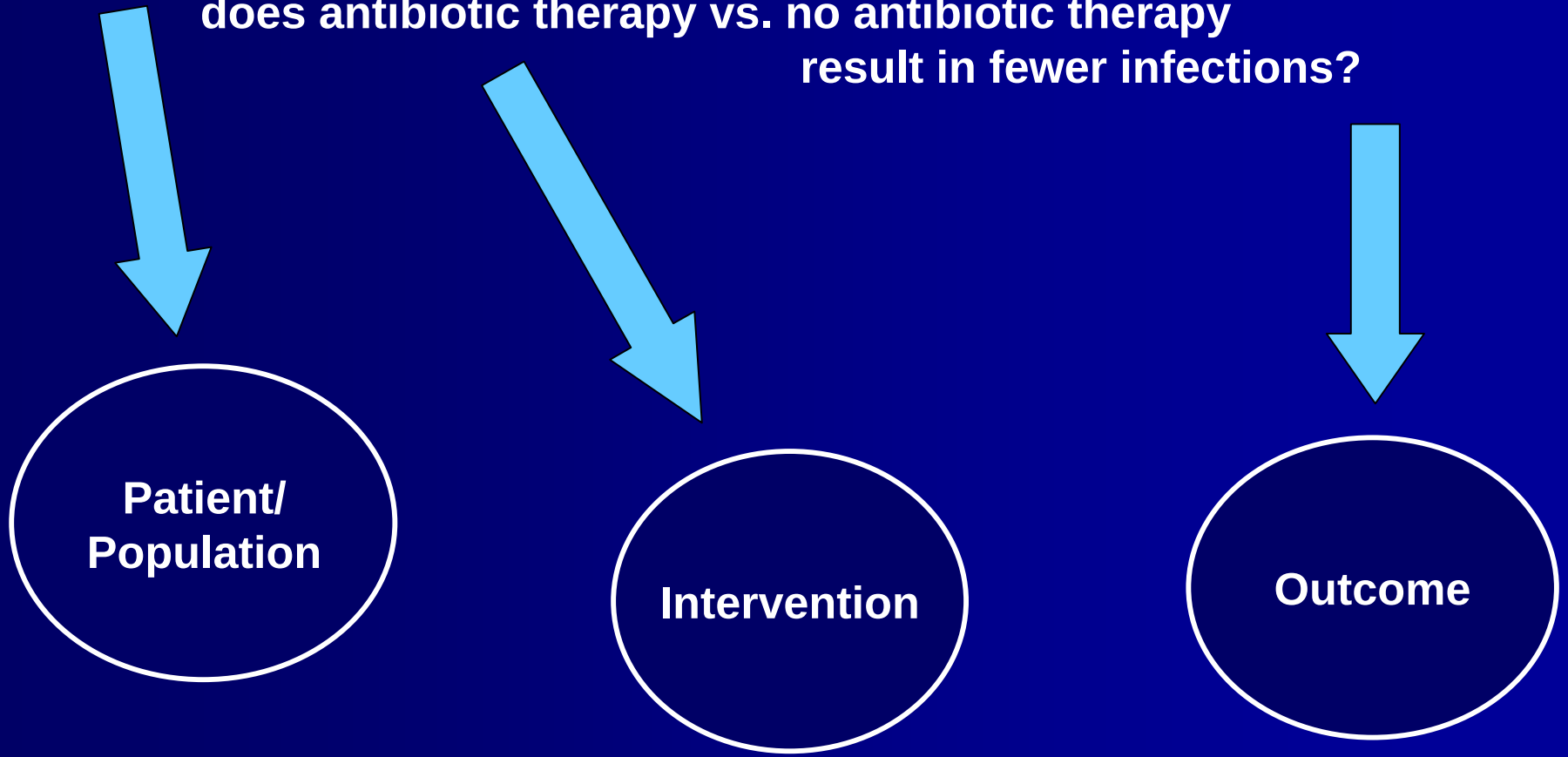
- Most often find narrative reviews, conference proceedings, abstracts
- Consider the source
- May be useful for new or diffuse subjects

# A Surgical Strike on the Evidence

- Searching Medline alone is likely to be inadequate.
- How and where else to search has major effect on cost and duration of process.
- Huge amount of time could be spent to find “one last paper”.
- Balance increased effort against:
  - Missing something really important
  - Being confident that you haven’t missed anything really important
  - Importance of the insights/perspective gained by the searching process

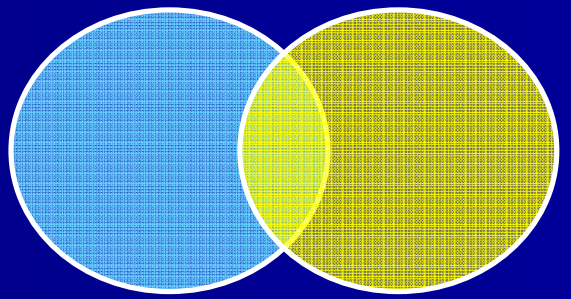
# How Searching Works

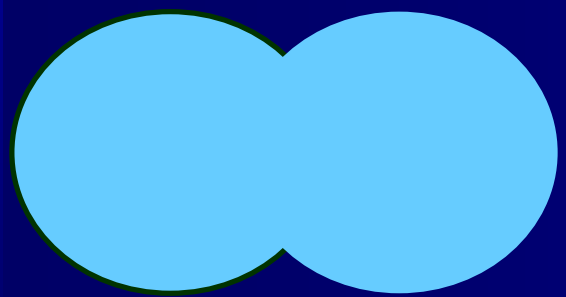
In children with eczema,
does antibiotic therapy vs. no antibiotic therapy
result in fewer infections?



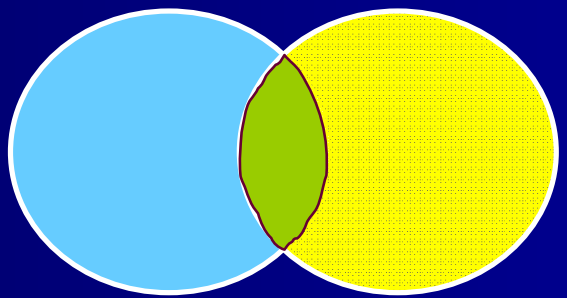
# Algebra Review (yikes!)

- Boolean operators: OR, AND, and NOT
- Remember Venn diagrams?





OR



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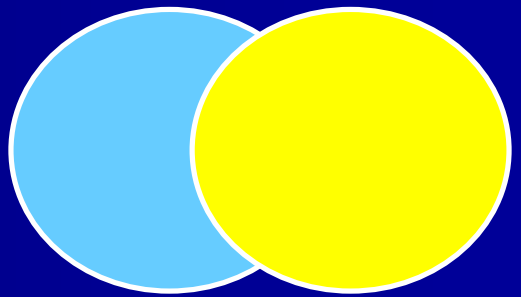


NOT

# Algebra Review (yikes!)

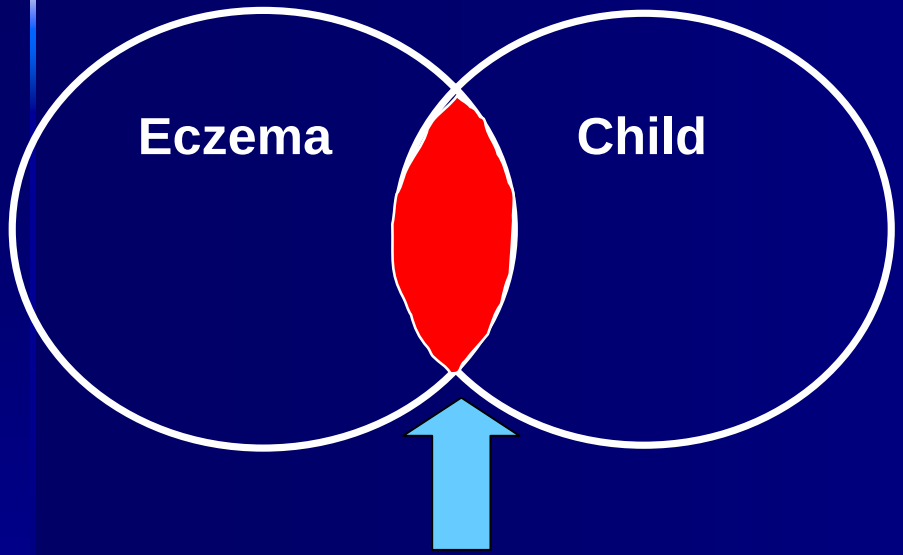
Use parentheses: $(a+b)/(c+d) \neq a+(b/c)+d$

(antibiotic OR infection) AND eczema

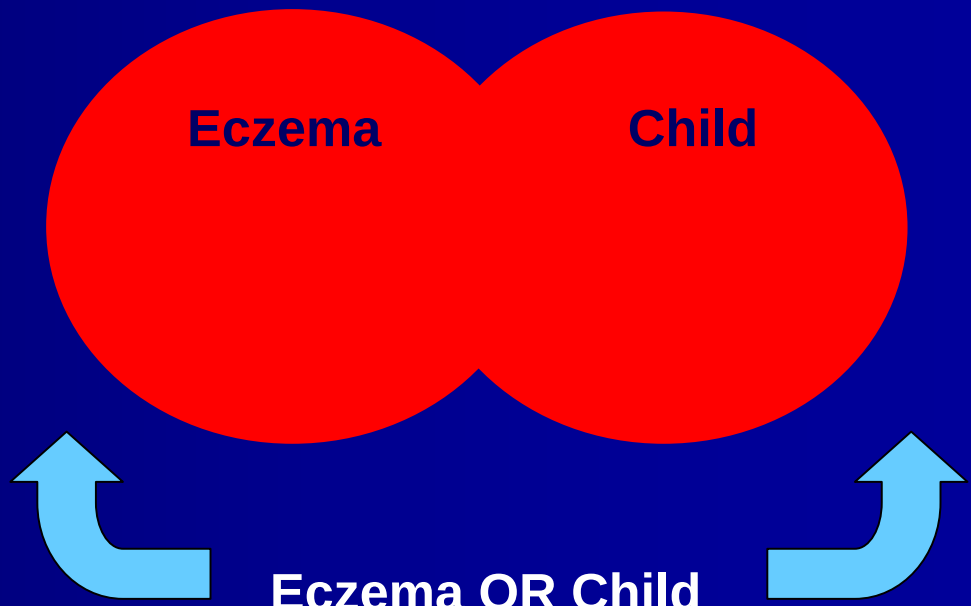
≠

antibiotic OR (infection AND eczema)

# Boolean Operators: AND, OR

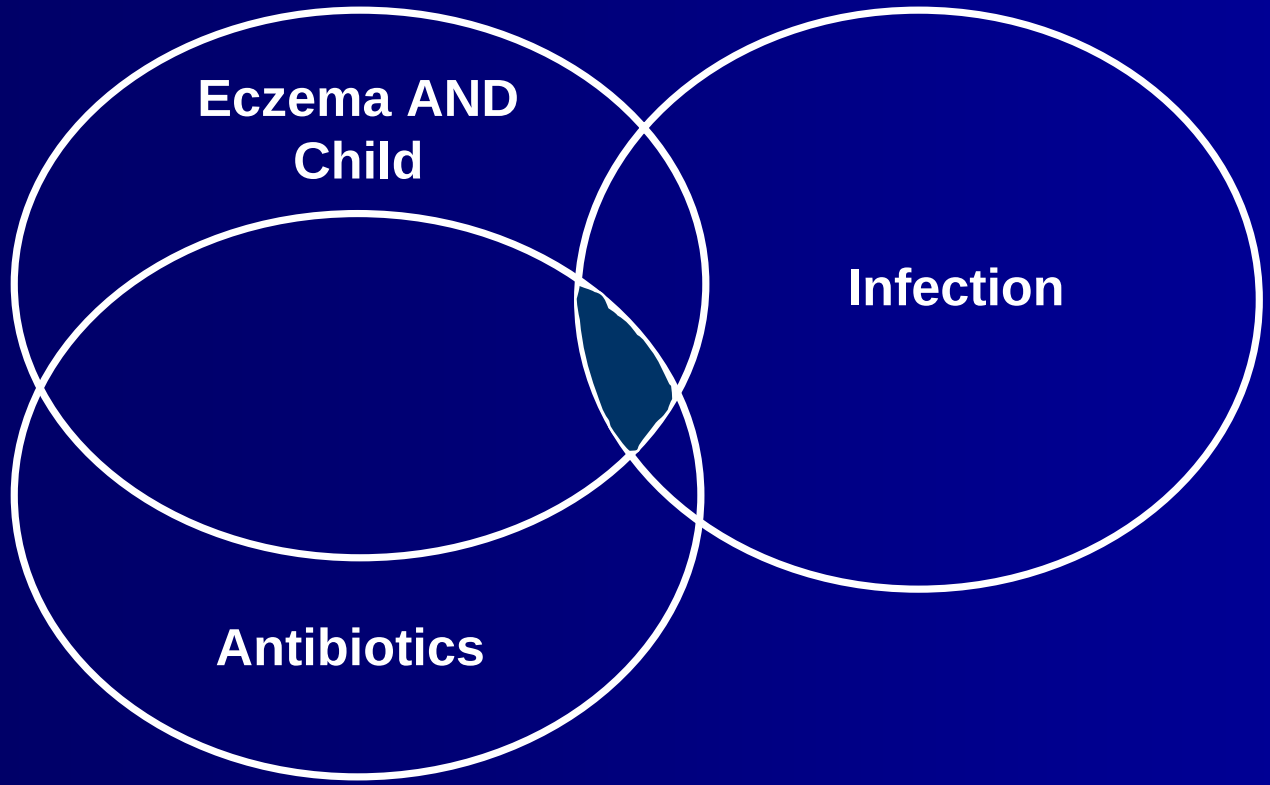



**Eczema AND Child**
**Only studies relevant**
**to BOTH eczema *and* child**




**Eczema OR Child**
**ALL studies relevant**
**to EITHER eczema *or* child**

# General Structure of a Search




eczema AND child AND antibiotics AND infection

# Quality Filters to Further Narrow Search: ("quick and dirty" criteria)

- The best evidence depends on the type of question.
- (DIAGNOSIS) Who has the problem?
  - Random (or consecutive) sample with blind comparison to criterion (gold) standard
- (ETIOLOGY/ HARM) Why did they get the problem?
  - Cohort or case-control study of comparable groups
- (PROGNOSIS) Will the problem resolve?
  - Inception cohort with high (>80%) follow-up
- (THERAPY) How can we alleviate the problem?
  - Randomized controlled trial or systematic review of randomized trials

# Speeding up MEDLINE: PubMed "Clinical Queries"

- Uses the "optimal search strategies" designed by Haynes, et al
- Incorporates methodological terms to increase likelihood of getting valid studies
- Enter the subject of inquiry (from the well-built (PICO) clinical question)
- Choose category:  therapy, diagnosis, etiology or prognosis
- Choose sensitivity or specificity of search
- Good starting place, but not useful for comprehensive searching
- New feature allows a search for systematic reviews

# Optimal searching strategies in Medline

**Clinical Queries**

- Incorporates methodological terms to increase likelihood of getting valid studies
- You enter the subject of inquiry (from the well-built (PICO) clinical question)
- Choose category: therapy, diagnosis, etiology or prognosis
- Choose sensitive (broad) or specific (narrow) search

# MeSH Terms

- MeSH = Medical Subject Headings, NLM's controlled vocabulary used for indexing articles
- All of Medline is arranged in hierarchical "trees" of subjects, which have headings
- General PubMed searches include the words you enter (or whatever term PubMed "maps" your words to) *and* all of the terms below it in the tree ("exploding" the term)
- Every article is indexed by MeSH terms, including "major" terms

# MeSH Terms

- To maximize return, include both the MeSH terms and common names for your topic in your search
- Example: ear infection
  - "otitis[MeSH]" → 20700 citations
  - "ear infection" → 21378 citations (includes MeSH term)
  - "otitis media[MeSH]" → 18105 citations (excludes otitis externa)

# Searching Tricks

- To find the best MeSH terms:
  - Search MeSH database in PubMed
  - Search PubMed using ordinary term
    - Click on “details” to see term mapping
    - Scan for an article you want and click on it
    - Click on “Citation” to see how this article was indexed
    - MeSH major terms are marked with asterisk

# Searching Tricks

- Use “Related Articles”
- Use “Limits”
  - Fields, publication type, age, date, language
- Use algebraic logic to perform multiple searches and then combine them
- Click on “History” to view past searches
  - #1 AND #2
  - (#1 AND #4) OR #5
  - #1 AND steroid

# Not all databases are like PubMed

- PubMed is particularly powerful and adapted to biomedical research.
- Each database has its own syntax and logic.
- Most use Boolean operators.
- The more databases you search, the greater the (time) investment in the searching process.

# Where to find synthesized evidence

- Synthesized information is found in:
  - Published systematic reviews/meta-analyses
  - Decision analyses
  - Practice guidelines (www.guidelines.gov)
- The Cochrane Library
  - Cochrane Database of Systematic Reviews
  - Database of Reviews of Effectiveness (DARE)
- *Clinical Evidence*

# Cochrane Library

- A library of systematic reviews and RCTs of health care interventions
  - source of best evidence for for intervention questions
- Not useful for diagnosis (or prognosis) questions
- Widely available (CD-ROM, medical libraries, internet)
  - Get it at through our library by clicking on “Databases” on the library’s homepage, then on “Cochrane Library”
- Updated regularly
- Relatively small and easily searched

# Archie Cochrane:

- “All effective treatment must be free!”
- “It is surely a great criticism of our profession that we have not organized a critical summary, by specialty or subspecialty, adapted periodically, of all relevant randomized controlled trials.”

# *The Cochrane Library*

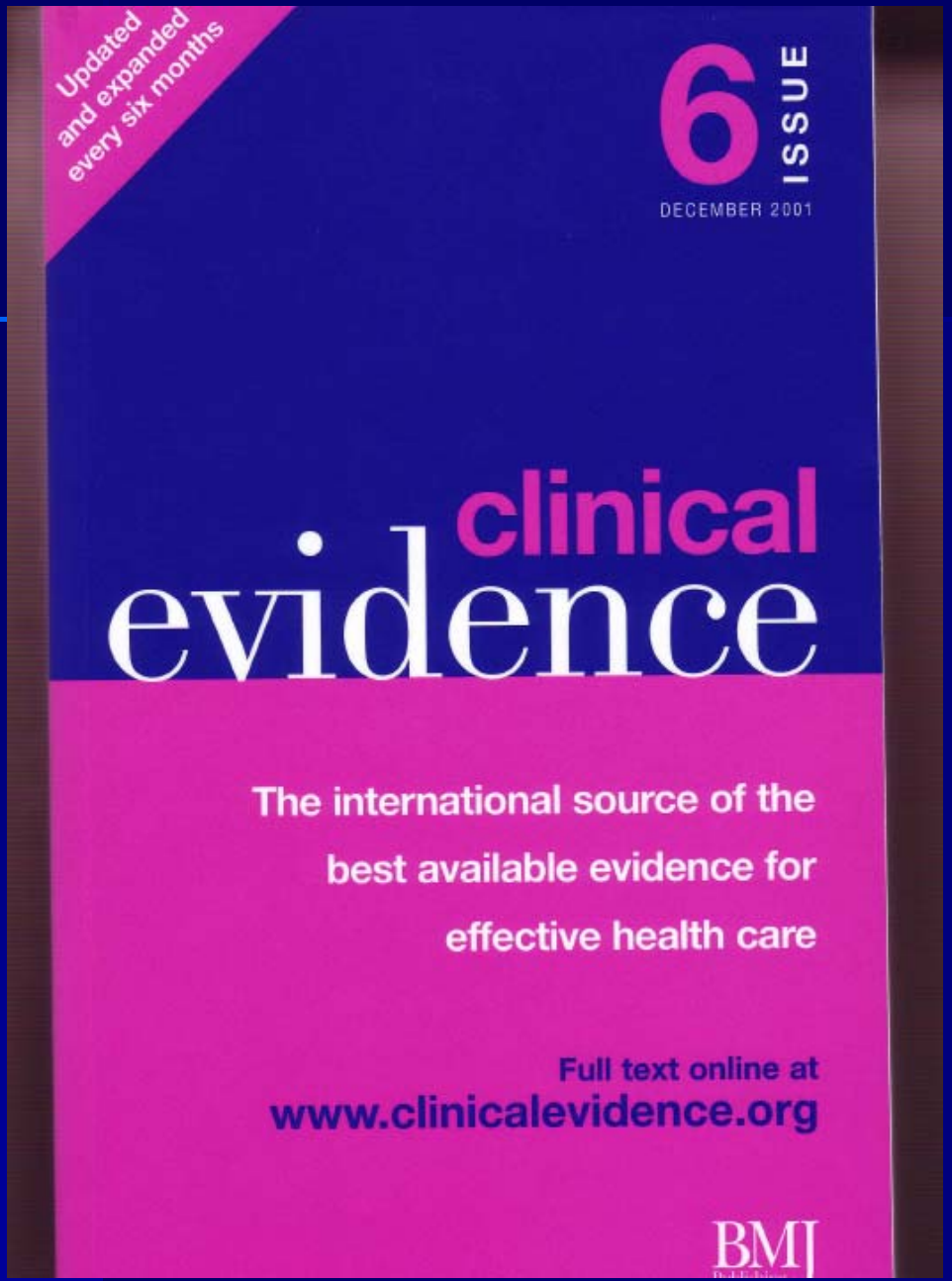
- Cochrane Database of Systematic Reviews (2435 reviews + 1606 protocols)
- DARE: Database of reviews of effects (5340 reviews)
- Cochrane Controlled Trials Register (454,449 controlled clinical trials)
- Health Technology Database (4620 reviews)
- NHS Economic Evaluation Database (15,884 reviews)

# *Clinical Evidence*

- Compendium of evidence on the effects of clinical interventions, updated every 6 months
- Based on thorough searches and appraisal of the literature, peer reviewed
- Contains only evidence (no treatment recommendations); explicitly states when there is no good evidence
- Question-driven
- Free to US primary care physicians: www.unitedhealthfoundation.org

# *Clinical Evidence*

- Published by BMJ, the publishing arm of the British Medical Association
- Available in paper (q.6 mo), on the web, and for hand-helds (e.g. Palm Pilot)
- Access is free for developing countries
- Currently available in English, Japanese and Italian
- “Concise” version first published in 2002
- Several specialist versions published or in press




# *Clinical Evidence*

http://www.clinicalevidence.com/

# Practice Guidelines

- Properly done practice guidelines should be based on a combination of the best available evidence and on consensus where evidence is limited
- Sources: Specialty societies (ACOG, NASPGHAN), CDC
- National Guideline Clearinghouse:
  - www.guidelines.gov

# Summary:

- Develop familiarity with the nuances of searching more than one database.
- Use synthesized information whenever possible. Best when the question is narrow or specific
- For broad searchs, the meta-search engines might be useful but buyer beware; you may find some “thorns amongst the roses.”
- Critically appraise the new information before applying it to patient care.