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# Systematic Reviews: Context & Methodology

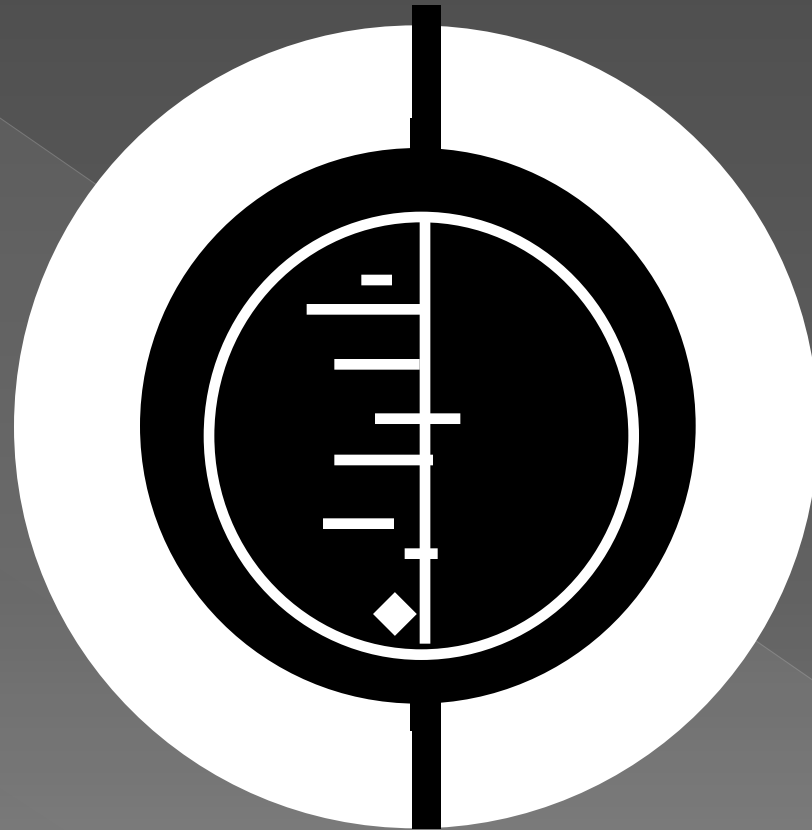
PF Anderson  
University of Michigan  
March 2011

# Overview

- Background
- About Systematic reviews
  - > Purpose
  - > Uses
  - > Role of the Librarian
- Process & Methodology

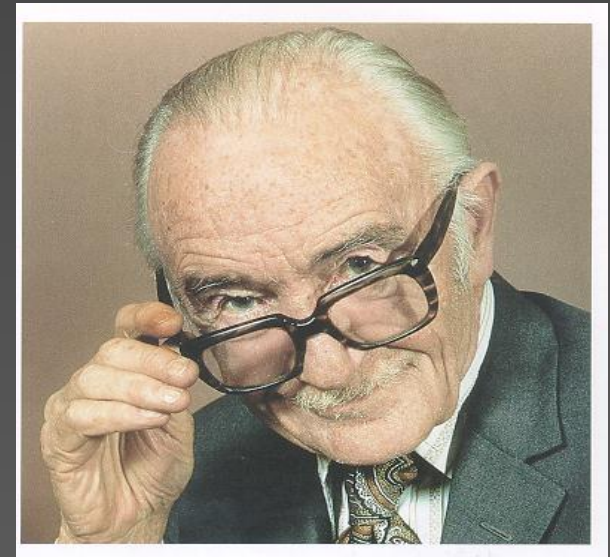
Background

# The Cochrane Collaboration



Preparing, maintaining and disseminating  
systematic reviews of the effects of health care

# Archie Cochrane



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Cochrane Archive at the Cardiff University Library of the University Hospital Llandough, "Professor Archibald Leman Cochrane, CBE FRCP FFCM, (1909 - 1988)", <http://www.cochrane.org/about-us/history/archie-cochrane>, reproducible without permission when citing source.

- Soviet POW was dying in great pain. He was screaming; Archie had no drugs to help.
- Instinctively, Archie sat on the bed and took the Russian in his arms.
- The effect was almost magical, the Russian quietened at once and died peacefully a little later.



Rosefirerising, "Fragile Handle with Care", Flickr, <http://www.flickr.com/photos/rosefirerising/3326633071>,  
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- **“I believe that cure is rare while the need for care is widespread, and that the pursuit of cure at all costs may restrict the supply of care...”**
  - Archie L. Cochrane, “Effectiveness and Efficiency: Random Reflections on Health Services” 1972, p7



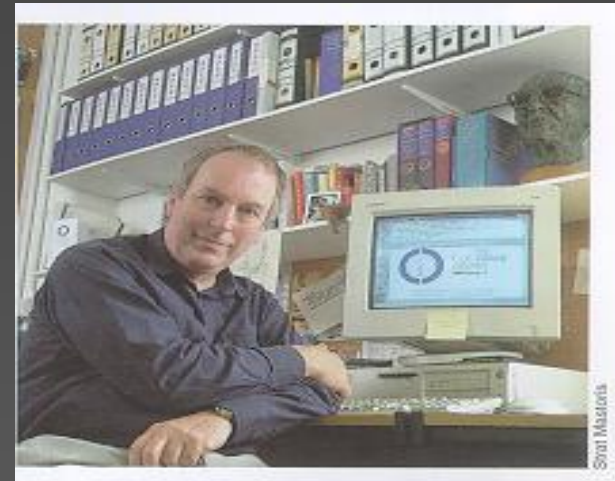
Observe, Compare, Reflect, Record.



Rosefirerising, "Dental Cosmos: Slogan: Observe, Compare, Reflect, Record", Flickr,  
<http://www.flickr.com/photos/rosefirerising/372705283>, CC BY-NC-ND 2.0, <http://creativecommons.org/licenses/by-nc-nd/2.0/deed.en>.

- “It is surely a great criticism of our profession that we have not organised a critical summary, by speciality and subspeciality, adapted periodically, of all relevant randomised controlled trials”
  - Archie L. Cochrane. “Medicines for the year 2000” London. Office for Health Economics. 1979, p1-11

# The Story of the Cochrane Library



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Cochrane Consumer Network, "Iain Chalmers," <http://consumers.cochrane.org/sites/consumers.cochrane.org/files/01Cochrane5min.ppt>

- **1972** ‘*Effectiveness and efficiency: Random Reflections on Health Sciences*’ by Archie Cochrane
  - > Archie awarded the wooden spoon to obstetricians
- **1973** Iain Chalmers, an obstetrician, read Archie’s book and took up the challenge

# *The Cochrane Library*

- Cochrane Database of Systematic Reviews (CDSR)
- Database of Abstracts of Reviews of Effectiveness (DARE)
- Cochrane Central Controlled Trials Register (CENTRAL)
- Cochrane Database of Methodology Reviews
- Cochrane Methodology Register (CMR)
- About the Cochrane Collaboration
- Health Technology Assessment Database (HTA)
- NHS Economic Evaluation Database (NHS EED)

# The Cochrane Collaboration

- About 6000 contributors
- 49 Collaborative Review Groups (CRGs)
- 12 Centres throughout the world
- 9 Fields
- 11 Methods Groups
- 1 Consumer Network
- Campbell Collaboration

# About Systematic Reviews

# Evidence-Based or Systematic Review, What's the Difference?

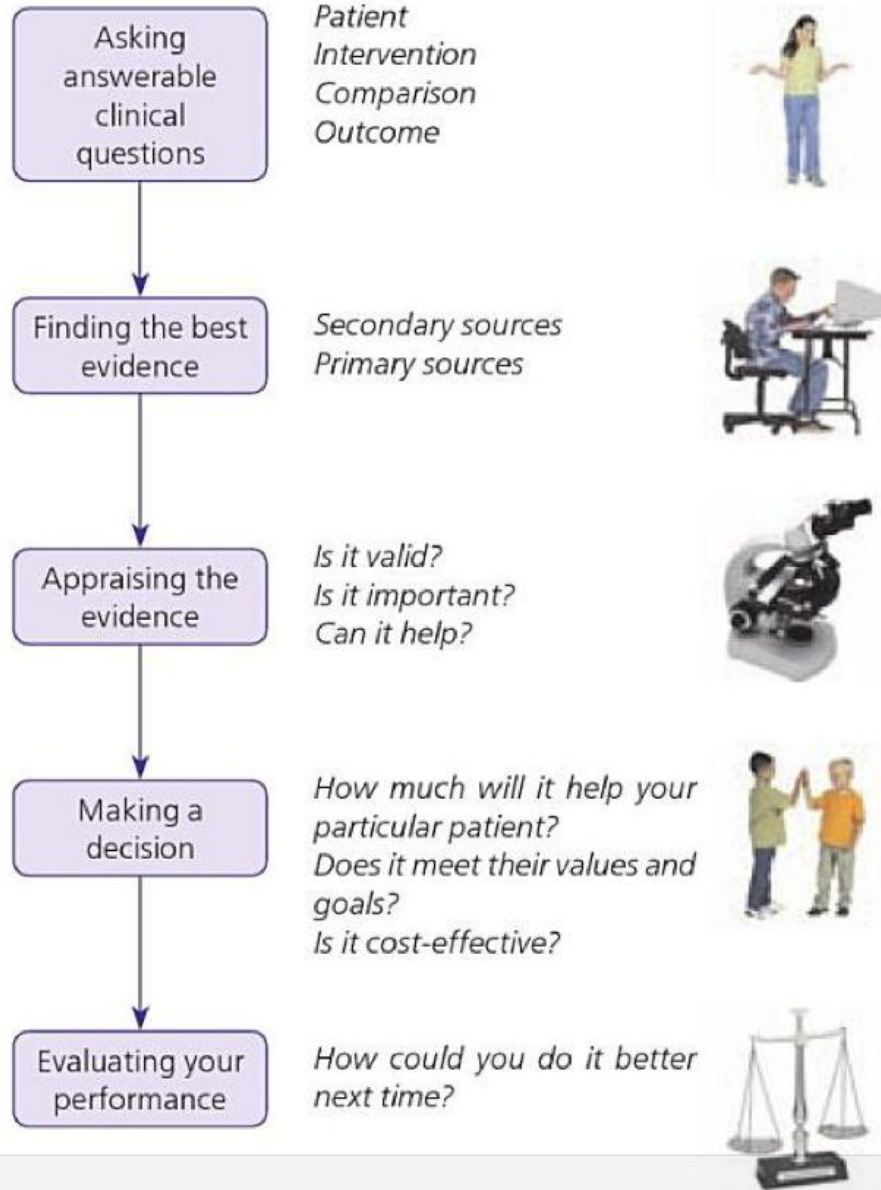
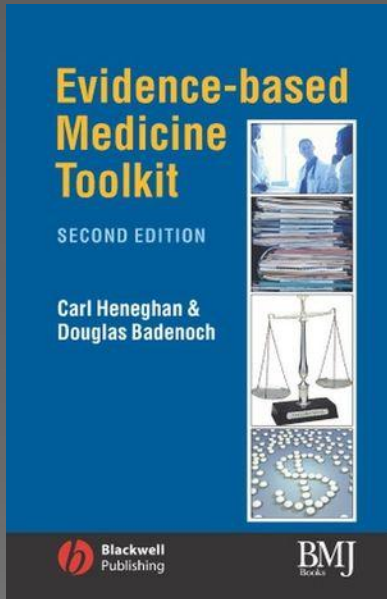


- Evidence-based -> clinically integrated
- Systematic review -> research methodology



Rosefirerising, "Doctor Reading Articles", Flickr,  
<http://www.flickr.com/photos/rosefirerising/1175879764/in/set-72157604660150389>, CC BY-NC-ND 2.0,  
<http://creativecommons.org/licenses/by-nc-nd/2.0/deed.en>.

# Clinical



# What is a Systematic Review?

- Scientific & Unbiased:
  - > “A systematic review involves the application of scientific strategies, in ways that limit bias, to the assembly, critical appraisal, and synthesis of all relevant studies that address a specific clinical question.”
- Summary:
  - > “A meta-analysis is a type of systematic review that uses statistical methods to combine and summarize the results of several primary studies.”
- Clearly Reported:
  - > “Because the review process itself (like any other type of research) is subject to bias, a useful review requires clear reporting of information obtained using rigorous methods.”
  - > Cook, D.J., Mulrow, C.D., Haynes, R.B. (2007). Systematic reviews: Synthesis of best evidence for clinical decisions. *Annals of Internal Medicine* , 126(5): 376-380.



# The Cochrane Collaboration



Preparing, maintaining and disseminating  
systematic reviews of the effects of health care

# Cochrane Reviews: Team

- Clinical expert
  - > Initiates, defines, selects topic.
- Clinical expert
  - > Partners in above process, and collaborates in review to prevent bias.
- Statistician
  - > Provides methodological oversight, ensures process quality for entire project.
- Librarian
  - > Provides methodological oversight, ensures process quality for information search process.
- Healthcare Consumer
  - > Provides insight into the priorities for research, information conduit for relating priorities and findings between consumers and clinicians.

# What is Evidence-Based Health Care?

- According to the ADA policy statement on EBD, the term "best evidence" "refers to information obtained from randomized controlled clinical trials, nonrandomized controlled clinical trials, cohort studies, case-control studies, crossover studies, cross-sectional studies, case studies or, in the absence of scientific evidence, the consensus opinion of experts in the appropriate fields of research or clinical practice. The strength of the evidence follows the order of the studies or opinions listed above."
  - Ismail AI, Bader JD. (2004). Evidence-based dentistry in clinical practice. *JADA*, 135(1):78-83

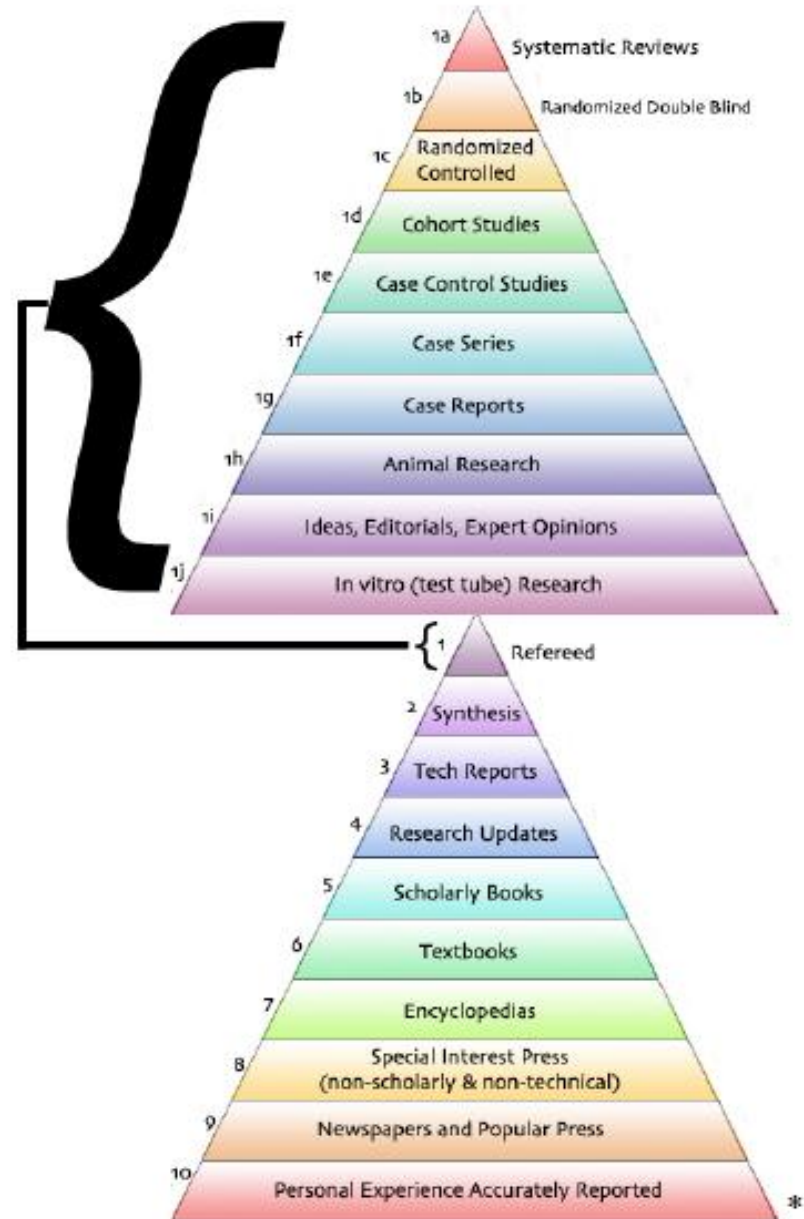


# What is Evidence-Based Health Care?

- ◉ *Short version:*
- ◉ ‘Make your [clinical] decisions based on the best evidence available, integrated with your clinical judgment. That’s all it means. The best evidence, whatever that is.’
  - > Paraphrased from Dr. Ismail in conversation, circa 2003.



# Levels of Evidence, in Context



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Anderson, P.F. (2006).  
Chain of Trust / Level of Evidence – Vertical.  
Available at: <http://www-personal.umich.edu/~pfa/pro/courses/ChainOfTrustLoEVert2.pdf>.

Top pyramid is from:  
Medical Research Library of Brooklyn.  
Guide to Research Methods, The Evidence Pyramid.  
Available at: <http://library.downstate.edu/ebm/2100.htm>

# Process & Methodology

# Process & Methodology Overview

- Team meets
  - > Define topic, overview literature base, suggest inclusion/exclusion criteria, discuss methodology & timeline.
- Librarian
  - > Generates data for the team
  - > FRIAR/MEMORABLE/SECT
  - > Topic experts collaborate
- Topic experts
  - > Review data at 3-4 levels (title, abstract, article, [request additional information]), achieve consensus
  - > Handsearching (librarian generates list, experts implement)
  - > Determine level of evidence for remaining research
  - > Generate review tables
- Share findings (Publication)
  - > Strength of evidence available (strong, weak, inadequate); suggest directions for future research to fill gaps in research base

# FRIAR/SECT

- F – Frame
- R - Rank by Relevance
- I - Irrelevant Search Concepts
- A - Alternates/Aliases (Term Generation)
- R - Review, Revise, Repeat
- S – Search
- E – Evaluate
- C – Cite
- T - Test/Try Again



# F = Frame = PICO Question

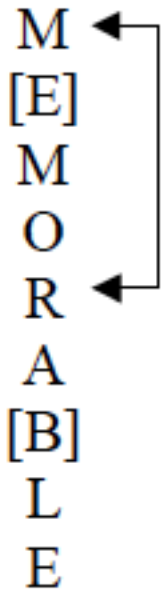
- P = Patient
- I = Intervention
- C = Control group or comparison
  - > NOTE: In very small research domains, this portion may not be included. A systematic review would not reach clinical significance, but would focus on levels of evidence available and directions for future research.
- O = Outcome desired

# A = Alternates/Aliases

- Term generation process might include:
  - > Alternate terms, spellings (UK), archaic terms
  - > Acronyms & what they stand for
  - > Anatomical area, symptoms, diagnostic criteria
  - > Products, chemicals, microorganisms, registry numbers, etc.
- NOTE: After asking the question, this is most important part of the process.
- TIP: Have team brainstorm terms, then search for more, have team review added terms.

# MEMORABLE, A Medline Search Strategy Development Tool

M  
[E]  
M  
O  
R  
A  
[B]  
L  
E



<i>M</i>	<i>MeSH Terms</i>
<i>E</i>	<i>Enhance (With Floating or Expanded Subheadings)</i>
<i>M</i>	<i>Mumbo-Jumbo (Jargon and Freetext Terms)</i>
<i>O</i>	<i>OR (Combine This Group)</i>
<i>R</i>	<i>Repeat (With Next Concept Group)</i>
<i>A</i>	<i>AND (Combine All Groups)</i>
<i>B</i>	<i>Best Filter (EDTP)</i>
<i>L</i>	<i>Limits</i>
<i>E</i>	<i>Evaluate</i>

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# Sentinel Articles

- Number of sentinels desired - 3-5. Can have more or less, but this tends to work best. Verify appropriateness of selected sentinels.
- Neither very recent (current year) or old (before 1985)
  - > Articles old enough to have MeSH assigned, new enough to have complete indexing
  - > On topic, not broader or narrower
  - > Well-indexed with appropriate terms
- Representative of citations that would be retrieved by a well-done search
- Remember – purpose is for validating search, not proving you know the best articles on the topic
- Each sentinel article must represent ALL desired concepts in the search
  - > Articles selected must meet all inclusion and exclusion criteria.

# Sources of Search Strategies

EBHC Search Strategies Home - ...

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## evidence based medicine

is

- not
  - being old hat to it being a dangerous innovation, perpetrated by the arrogant to serve cost cutters and it continues to evolve and adapt, now is a useful time to refine the discussion of what it is and what it is
  - the conscientious, explicit, and judicious use of current best evidence in must helps clarify what evidence based medicine is not.
  - neither old hat nor impossible to practice.
  - and is not.
  - means integrating individual clinical expertise with the best available external clinical evidence from research and can be conducted only from ivory towers and armchairs is rebuffed by audits from the front lines of clinics joining them at the barricades.
  - will
    - be hijacked by purchasers and managers to cut the costs of health care.
    - identify and apply the most efficacious interventions to maximise the quality of care.
    - but suggests a fundamental misunderstanding of its financial consequences.
    - remains a relatively young discipline whose positive impacts are just beginning to be validated. [ 12 ]

practice have been established or planned in adult medicine, child health, surgery, pathology, pharmacotherapy, nursing, general practice, and de

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### EBHC Search Strategies Home

Evidence-based health care is fundamental to current high-quality medical research and clinical practice. Fundamental to evidence-based health care research and practice is both high quality literature searching (information gathering) and evaluation/assessment/synthesis of the information found.

This wiki will focus on the process, techniques and tools of high quality searching in the context of evidence-based health care. Information collected in the wiki is primarily intended for medical librarians, but may be of interest to others. Please keep in mind that search strategies and tools here are intended for use by trained professionals in the course of their professional duties, and are not intended for use by the general public. If they are helpful or useful to others that is a plus, but not the primary purpose of the site.

For more enriched training information, please also see the EBM Librarian:<http://ebmlibrarian.wetpaint.com/>



# Sources of Search Strategies

- Search the Methods of existing systematic reviews.
- *Warning:*
  - > Many articles published as systematic reviews may have modified the process.
  - > Many articles published as systematic reviews may not include a replicable search methodology.
  - > Some articles published as systematic reviews may not actually be systematic reviews.

# Assessing the Results: Tools

- ◉ CONSORT (Consolidated Standards of Reporting Trials)
- ◉ ASSERT (A Standard for the Scientific & Ethical Review of Trials)
- ◉ EQUATOR (Enhancing the QUALity & Transparency of health Research)
- ◉ SPIRIT (Standard Protocol Items for Randomized Trials)
- ◉ QUORUM (Quality of Reporting of Meta-analyses)
- ◉ MOOSE (Meta-analysis of Observational Studies in Epidemiology)
- ◉ STROBE (Strengthening the Reporting of Observational Studies in Epidemiology)
- ◉ ... and many more ...

# Assessing the Results: Evidence Tables

- ◉ Levels of evidence
- ◉ Participant characteristics
- ◉ Study characteristics
- ◉ Intervention and outcome measurements
- ◉ Results
- ◉ Study limitations
- ◉ Inclusion/Exclusion criteria



# Evidence Table Example

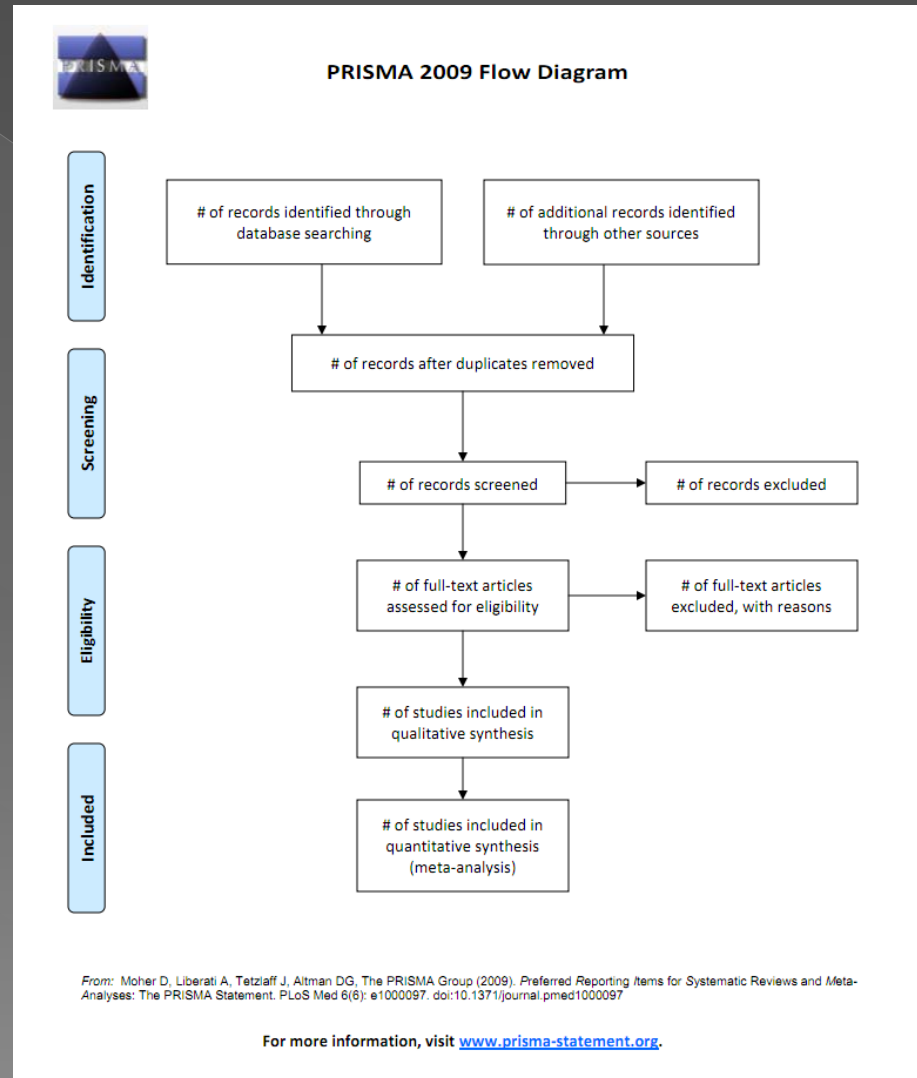
EVIDENCE TABLE TOPIC \_\_\_\_\_

Author/ Year	Study Objectives	Level/Design/Subjects	Intervention and Outcome Measures	Results	Study Limitations

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# Clearly Stating the Evidence



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Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group, "PRISMA 2009 Flow Diagram", Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement, <http://www.prisma-statement.org/2.1.4%20-%20PRISMA%20Flow%202009%20Diagram.pdf>.

- ◉ Slides at:

- > <http://slideshare.net/umhealthscienceslibraries/>

- ◉ Contact:

- > [pfa@umich.edu](mailto:pfa@umich.edu)