Author(s): Mark MacEachern, MLIS, 2011

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Overview

- Introductory items
- Search construction
  - Concept building
  - Boolean logic
  - Vocabulary
  - Techniques
- Sources
  - PubMed
  - Ovid MEDLINE
  - EMBASE
  - Grey literature
- Search completion
  - Documentation
  - Reporting
  - Citation management
- If time permits: Demonstration (from sentinel to evaluation)
Why search?

- A high-quality lit search is essential for a successful meta-analysis
- It is from the search results that data is gathered for analysis
- Failure to locate important studies can significantly affect results
- Remember the goal is to capture every relevant study
- Important to report search so your methodology can be reproduced
What to expect?

- Expect 1000s of results
- Expect to search multiple databases
  - Ovid, EMBASE, Cochrane, PubMed, etc.
- Expect the search process to take weeks or months
- Expect to publish search strategy and search methodology
- Expect to consult a professional with search expertise (e.g., health sciences librarian)
Search construction

- Concept building
- Boolean logic
- Vocabulary
- Techniques
- Evaluating searches
Search construction: Concept building

- Identify major concepts of topic
- PICO helps for clinical questions

- Example: Is the incidence of breast cancer greater in people who are obese?

- What are the major concepts?
  - Breast cancer
  - Obesity
  - Incidence
  - People
Search construction: Concept building

- Alternate words / Synonyms
  - Obesity, obese, overweight, BMI, etc.
  - Breast cancer, breast neoplasms, breast tumors, etc.
  - Incidence, epidemiology
Search construction: Boolean Logic

- **AND**
- **OR**
- **NOT**
Search construction: Boolean Logic

Concept 1
Breast cancer
  OR
Breast neoplasms
  OR
Breast tumors

AND

Concept 2
Obesity
  OR
Obese
  OR
Overweight
  OR
BMI

AND

Concept 3
Incidence
  OR
Epidemiology
Search construction: Vocabulary

Keywords

Controlled vocabularies
Search construction: Vocabulary

Keywords

What are they?

- Literal search
- Looks for occurrences of words

When to use?

- Current topics
- Not easy to describe concepts
- No vocabulary exists in database

Examples

- Drug names (Lipitor, Prozac)
- Slang
- Concepts (Swine flu, oil spill)
Search construction: Vocabulary

Keywords

Pros
- Very current projects/topics
- No knowledge of controlled vocabulary necessary
- Slang
- Broad, difficult to describe concepts

Cons
- Not consistent
- Burden on enduser to discover synonyms (might miss some)
- Too many (irrelevant) results
- Difficult to limit results
Search construction: Vocabulary

Keywords

- **Controlled vocabularies**

What are they?

- Set of words or phrases used to describe concepts
- Dictionary of accepted terms for a database

When to use?

- Searching a database that uses one

Examples

- MeSH (Medical Subject Headings)
- EMTREE (Embase)
Pros

- Burden on database to discover variations in terms
- Consistency & reproducible searches
- Specific & targeted (increased relevancy)

Cons

- Restrictive
- Burden on enduser to learn vocabulary
- Vocabularies differ (no consistency)
Search construction: Vocabulary

Controlled vocabularies

Keywords

All MeSH Categories
Chemicals and Drugs Category
Complex Mixtures
Biological Products
Vaccines

Alzheimer Vaccines
Bacterial Vaccines
Anthrax Vaccines
Autovaccines
Brucella Vaccine
Cholera Vaccines
Diphtheria-Tetanus-acellular Pertussis Vaccines
Diphtheria-Tetanus-Pertussis Vaccine
Diphtheria-Tetanus Vaccine
Escherichia coli Vaccines
Haemophilus Vaccines
Lyme Disease Vaccines
Meningococcal Vaccines
Pertussis Vaccine +
Plague Vaccine
Pseudomonas Vaccines
Rickettsial Vaccines
Salmonella Vaccines +
Shigella Vaccines
Staphylococcal Vaccines
Streptococcal Vaccines +
Tuberculosis Vaccines +
Cancer Vaccines
Fungal Vaccines
### Search construction: Techniques

- **Truncation**
  - `obes*`

- **Wild cards**
  - `an?esthesiology`

- **Adjacency**
  - `screen* adj10 cancer*`

- **Phrases**
  - “breast cancer”

- **Boolean**
  - “vitamin d” AND cancer

- **Parentheses**
  - (“breast cancer” OR “breast neoplasms”) AND obes*

---

**Note:** Techniques vary from database to database
Search construction: Techniques

- Limits – use sparingly (language, species, pt)
Search construction: Techniques

- Exploding subject headings
  - Use differs across databases

[Image of a tree diagram with nodes and numbers]
Search construction: Techniques

Subheadings

Vaccines
Suspensions of killed or attenuated microorganisms (bacteria, viruses, fungi, protozoa, or rickettsiae), antigenic proteins derived from them, or synthetic constructs, administered for the prevention, amelioration, or treatment of infectious and other diseases.

PubMed search builder options

Subheadings:
- administration and dosage
- adverse effects
- analysis
- biosynthesis
- blood
- chemical synthesis
- chemistry
- classification
- complications
- contraindications
- diagnostic use
- economics
- genetics
- history
- immunology
- isolation and purification
- legislation and jurisprudence
- metabolism
- microbiology
- pharmacokinetics
- pharmacology
- poisoning
- radiation effects
- standards
- supply and distribution
- therapeutic use
- toxicity
- virology

"Vaccines/economics"[majr] AND "public health"[majr]
### Search construction: Techniques

**Floating subheadings**

- Ovid MEDLINE (part of a search)
  1. exp Arthritis, Rheumatoid/
  2. exp Inflammatory Bowel Diseases/
  3. cuc.tw.
  4. chronic ulcerative colitis.tw.
  5. crohn*.tw.
  6. ibd.tw.
  7. rheumatoid arthritis.tw.
  8. or/1-7
  9. exp Postoperative Complications/
  10. exp Perioperative Care/
  11. su.fs.
  12. or/9-11
  13. 8 and 12

- PubMed (part of a search)
  
Search construction: Filters

- A predefined search designed to target specific study methodologies (RCTs, Cohort, Systematic Reviews)
- Use a validated filter (whenever possible)

Example: PubMed Clinical Queries – Specific, Therapy

- (randomized controlled trial[Publication Type] OR (randomized[Title/Abstract] AND controlled[Title/Abstract] AND trial[Title/Abstract]))
- 93% Sensitive
- 97% Specific
Search construction: Evaluation

- Important to validate your search in each database
- Make sure search captures all sentinel articles
- How:
  - Cross search set of sentinel papers with your final search
  - (Set of Papers) NOT (Final Search)
- Save searches for reporting
Sources

- PubMed
- Ovid MEDLINE
- EMBASE
- Scopus
- Web of Science
- PsycINFO
- CINAHL
- Cochrane Database of Systematic Reviews
- Conference Papers Index
- ClinicalTrials.gov
- Proquest Theses & Dissertations
- CABI
- Google Scholar
- Sociological Abstracts
- And others…
Sources: PubMed (pubmed.gov)

- Primary biomedical database
- 20+ million citations
- Native interface for MEDLINE dataset
- Citations indexed with MeSH
A randomised controlled trial of extended brief intervention for alcohol dependent patients in an acute hospital setting

PMID: 21726445 [PubMed - as supplied by publisher] 
Related citations

Exploration of the prevalence and correlates of depression among South Korean workers with injuries.

PMID: 21709370 [PubMed - in process]
Related citations

Alcohol-induced memory blackouts as an indicator of injury risk among college drinkers.

PMID: 21706613 [PubMed - as supplied by publisher] 
Related citations

Alcohol screening in the emergency department.

PMID: 21689583 [PubMed - in process]
Related citations

Health risk screening in adolescents: a pilot study.

PMID: 21661162 [PubMed - in process]
Related citations

Risk factors for cervical in trauma patients: the impact of ethanol use and lack of insurance.

PMID: 21665688 [PubMed - in process]
Screening and brief interventions for alcohol use in college health centers: a review.

Seigars DK, Carey KB.
Center for Health and Behavior, Syracuse University, Syracuse, New York 13244-2340, USA. dkseiger@syr.edu

Abstract
OBJECTIVES: To provide a critical review of the efficacy of brief interventions for alcohol use in college health centers.

METHODS: studies were included if (a) they examined brief intervention trials that were conducted in college- or university-based student health centers or emergency departments, and (b) they provided pre-post data to estimate change.

RESULTS: Twelve studies suggested that screening and brief interventions in these settings are acceptable, feasible, and promote risk reduction.

CONCLUSIONS: findings support continued use of time-limited, single-session interventions with motivational interviewing and feedback components.
Results: 2

1. Alcoholism
   A primary, chronic disease with genetic, psychosocial, and environmental factors influencing its development and manifestations. The disease is often progressive and fatal. It is characterized by impaired control over drinking, preoccupation with the drug alcohol, use of alcohol despite adverse consequences, and distortions in thinking, most notably denial. Each of these symptoms may be continuous or periodic. (Morse & Flavin for the Joint Commission of the National Council on Alcoholism and Drug Dependence and the American Society of Addiction Medicine to Study the Definition and Criteria for the Diagnosis of Alcoholism. in JAMA 1992;268:1012-4)

2. National Institute on Alcohol Abuse and Alcoholism (U.S.)
   Component of the NATIONAL INSTITUTES OF HEALTH. It conducts research focused on improving the treatment and prevention of alcoholism and alcohol-related problems to reduce the health, social, and economic consequences of this disease. NIAAA, NIMH, and NIDA were created as coequal institutes within the Alcohol, Drug Abuse and Mental Health Administration in 1974. It was established within the NATIONAL INSTITUTES OF HEALTH in 1992. Year introduced: 2008
Sources: Ovid MEDLINE

- Different interface to search MEDLINE dataset
- Heavily used for systematic reviews
- Provides additional search functionality (adjacency)
- Uses MeSH (like PubMed)

http://www.ovid.com
<table>
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</tr>
<tr>
<td>2</td>
<td>exp Diabetes Insipidus/</td>
<td>6581</td>
<td>Advanced</td>
<td>Display</td>
</tr>
</tbody>
</table>
| 3 | diabet*.
| 4 | (dm 1 or dm i or dm 2 or dm iii).
| 5 | 1 or 2 or 3 or 4                             | 368249  | Advanced    | Display |
| 6 | Hemoglobin A, Glycosylated/                   | 17712   | Advanced    | Display |
| 7 | ((glycosylated or glycated) adj hemoglobin).
| 8 | (a1c or hb a1c or hba1c).
| 9 | exp Blood Glucose/                            | 113260  | Advanced    | Display |
| 10| blood glucose.
| 11| blood sugar.
| 12| ((Suger or glucose) adj blood).
| 13| ((glucose or sugar) adj (control or level)).
| 14| exp hyperglycemia/                           | 21324   | Advanced    | Display |
| 15| exp hypoglycemia/                            | 19279   | Advanced    | Display |
| 16| (glycem* or glycosm*).
|    |                                               | 24890   | Advanced    | Display |
Your term mapped to the following Subject Headings:
Click on a subject heading to view more general and more specific terms within the tree.

Any term you select will automatically be exploded to include all narrower terms. To select a term without exploding, clear the Explode checkbox for that term.

Term mapped through permuted index

Include All Subheadings
Combine selections with: OR
Continue

Select Subject Heading Auto Explode Focus Scope

- Alcoholism
- "National Institute on Alcohol Abuse and Alcoholism (U.S.)"
- alcoholism mp. search as Keyword

Hints:
- Click on a Subject Heading to view its tree-related terms that are more general and more specific.
- Select the Explode box if you wish to retrieve results using the selected term and all of its more specific terms.
- Select the Focus box if you wish to limit your search to those documents in which your subject heading is considered the major point of the article.
- If your search did not map to a desirable subject heading, select the box Search as Keyword.
- If you select more than one term, you can combine them using a boolean operator (AND or OR).
- If you wish to see the scope note for any term or heading, click on the information icon, when available.
Sources: EMBASE

- Similar to PubMed, Ovid
- Indexes many more international journals than MEDLINE
- Uses EMTREE
- Includes MEDLINE, unless you NOT out

http://www.embase.com/home
Query Builder
Build a multi-term search query

Find Term  Browse by Facet

vaccine
Type word or phrase (without quotes)

For term: 'vaccine'
Extend your search:  ☑ Explosion  ☐ As major focus

Take this query to Drug Search  or  Add to Query Builder

Entree
- chemicals and drugs
- biologic factors and agents acting on the immune system
- biological product
- vaccine  227,062 Records
  - acellular vaccine
  - Alzheimer disease vaccine
  - amebiasis vaccine
  - autovaccine
  - bacterial vaccine
  - cancer vaccine
  - canxavik
  - chorionic gonadotropin vaccine
  - contraceptive vaccine
  - dendritic cell vaccine
  - diploid cell vaccine
  - DNA vaccine
  - edible vaccine
  - encephalitis vaccine

http://www.embase.com/home
Sources: Grey literature

- “Information produced on all levels of government, academic, business and industry in electronic and print formats not controlled by commercial publishing, i.e., where publishing is not the primary activity of the producing body”

- Types
  - Conference abstracts (Conference Papers Index)
  - Clinical trials (ClinicalTrials.gov)
  - Government reports, documents (.gov, CABI)
  - Dissertations (ProQuest Dissertations and Theses)
  - Unpublished manuscripts
Sources: Other options

- Examine the references of articles of relevance
  - Included studies and relevant reviews
- Use cited by features
- Contact authors
- Snowballing (esp for complex questions or interventions)
- Contact companies, organizations, societies, etc
- Hand search important journals (by Impact Factor, perhaps)
- Search for ongoing studies (prelim data)
  - Clinicaltrials.gov; controlled-trials.com (ISRCTN)
- Citation tracking
Search Completion

- Documentation
- Reporting
- Citation Management
Search Completion: Documentation

- Important to document exact search terms
- MeSH Terms?
- Keywords?
- Limits?
- Filters?
- Databases?
- Dates?
- Save strategy

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</table>
See PRISMA statement

“The aim of the PRISMA Statement is to help authors report a wide array of systematic reviews to assess the benefits and harms of a health care intervention. PRISMA focuses on ways in which authors can ensure the transparent and complete reporting of systematic reviews and meta-analyses.”

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<tr>
<td>Search</td>
<td>8</td>
<td>Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.</td>
</tr>
</tbody>
</table>

http://www.prisma-statement.org/statement.htm
Search completion: Reporting

- See Cochrane Handbook
    - Section 6.6

- “It should be borne in mind at the outset that the full search strategies for each database will need to be included in an Appendix of the review.”
Search completion: Reporting

- See Cochrane Handbook
    - Section 6.6

- In study flow diagram:
  - number of unique records identified by the searches;
  - number of records excluded after preliminary screening (e.g. of titles and abstracts); and
  - number of records retrieved in full text
Search completion: Reporting

- See Cochrane Handbook
  - http://www.cochrane-handbook.org/
    - Section 6.6

- In abstract:
  - List all databases searched.
  - Note the dates of the last search for each database or the period searched.
  - Note any language or publication status restrictions (but refer to Section 6.4.9).
  - List individuals or organizations contacted.”
Search completion: Reporting

- See Cochrane Handbook
    - Section 6.6

- In methods:
  - List all databases searched.
  - Note the dates of the last search for each database AND the period searched.
  - Note any language or publication status restrictions
  - List grey literature sources.
  - List individuals or organizations contacted.
  - List any journals and conference proceedings specifically handsearched for the review.
  - List any other sources searched (e.g. reference lists, the internet).
## Search completion: Citation mgmt

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[License: CC BY](http://guides.lib.umich.edu/citationmanagement)
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Search completion: Citation mgmt

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Recap

- Spend time developing your search
- Search multiple databases
- Test your searches
- Take notes during process to facilitate reporting
- Consult an expert searcher
Thanks!

Mark MacEachern
A. Alfred Taubman Health Sciences Library