



JOHNS HOPKINS  
BLOOMBERG  
SCHOOL *of* PUBLIC HEALTH

## Section B

---

Identifying Key Sources and Techniques  
for Searching

# Agenda

- Key electronic databases
- Controlled vocabulary (indexing)
- Indexing of randomized controlled trials (RCTs) and observational studies
- Other sources:
  - Trials registers
  - Gray literature searching
  - Personal contacts

# Major Bibliographic Databases

- Major bibliographic databases for RCTs and observational studies:
  - MEDLINE/PubMED ([www.ncbi.nlm.nih.gov/sites/entrez?](http://www.ncbi.nlm.nih.gov/sites/entrez?))
  - EMBASE ([www.embase.com](http://www.embase.com))
  - Cochrane Central Register of Controlled Trials (CENTRAL) ([www.thecochranelibrary.com](http://www.thecochranelibrary.com))
  - National and regional databases (often local language)
    - ▶ LILACS (<http://lilacs.bvsalud.org>)
  - Subject-specific databases
    - ▶ CINAHL  
(<http://www.ebscohost.com/academic/cinahl-plus-with-full-text/>)
    - ▶ PsychINFO  
(<http://www.apa.org/pubs/databases/psycinfo/index.aspx>)
    - ▶ OTSeeker ([www.otseeker.com](http://www.otseeker.com))

# Other Bibliographic Databases to Consider

- Citation databases
  - Web of Science ([www.thomsonreuters.com](http://www.thomsonreuters.com))
  - Scopus ([www.scopus.com](http://www.scopus.com))
    - ▶ Dissertations, thesis databases
      - ProQuest ([www.Proquest.com](http://www.Proquest.com))
- Gray literature databases
  - Opengrey ([www.opengrey.eu](http://www.opengrey.eu)) (formerly System for Information on Grey Literature in Europe, or SIGLE)

# Using More Than One Database

- Use of all databases may be necessary to identify all reports

Topic	Database	Articles available	% of total	Unique articles
Bicycle-related brain injuries: 51 (7 (13.7%))*	EMBASE	31	60.8	8
	MEDLINE	33	64.7	3
	PsycINFO	16	34.4	2
	WoS	27	52.9	5
Ethanol-impaired driving: 234 (39 (16.7%))*	EMBASE	96	41.0	27
	MEDLINE	167	71.4	34
	PsycINFO	80	34.2	9
	WoS	141	60.3	28
House fires: 54 (3 (5.6%))*	EMBASE	17	31.5	2
	MEDLINE	26	48.1	3
	PsycINFO	9	16.7	3
	WoS	44	81.5	24
Road rage: 40 (3 (7.5%))*	EMBASE	10	25.0	4
	MEDLINE	16	40.5	7
	PsycINFO	17	42.5	2
	WoS	24	60.0	10
Suicide among adolescents: 966 (66 (6.8%))*	EMBASE	346	35.8	77
	MEDLINE	667	69.1	217
	PsycINFO	277	28.7	38
	WoS	427	44.2	111

\*Total number of articles (number common to all databases (%)).  
WoS, World of Science.

Source: Lawrence, D. W. (2008). What is lost when searching only one literature database for articles relevant to injury prevention and safety promotion? *Inj Prev*, 14(6), 401-404. doi:10.1136/ip.2008.019430

# Controlled Vocabulary

- Consistency
  - Alternative spellings
  - Synonyms
  - Plurals
  - Related terms
- For systematic review searches, use controlled vocabulary *and* keywords
  - If you use only keywords, you could miss articles that don't use your precise terms
  - If you use only controlled vocabulary, you could miss articles that have not been indexed yet or that have older indexing

# Finding the Evidence: MEDLINE/PubMed

- PubMed (pre-MEDLINE) versus MEDLINE
  - Includes more than 22 million citations from more than 5,600 journals in 60 languages (39 for current MEDLINE)
  - MEDLINE: articles published from 1966 forward (19 million records)
  - Old MEDLINE (1949-1965) (~500,000 records)
  - Numerous vendors
  - Software differences

# Searching for Studies in PubMed

- Medical Subject Headings (MeSH)
  - Descriptors (with thesaurus)
  - Most specific term used
- Publication type
- Keyword searching
  - Titles since 1966
  - Abstracts since 1975
  - Truncation useful



# Beginning of MeSH Term Entry Page

NCBI Resources How To ctwise2 My NCBI Sign Out

MeSH MeSH Search Limits Advanced Help

Display Settings: ☒ Full Send to: ☐

**Macular Degeneration** ←

Degenerative changes in the RETINA usually of older adults which results in a loss of vision in the center of the visual field (the MACULA LUTEA) because of damage to the retina. It occurs in dry and wet forms.  
Year introduced: 1979(1975)

PubMed search builder options

Subheadings:

<input type="checkbox"/> blood	<input type="checkbox"/> ethnology	<input type="checkbox"/> prevention and control
<input type="checkbox"/> cerebrospinal fluid	<input type="checkbox"/> etiology	<input type="checkbox"/> psychology
<input type="checkbox"/> chemically induced	<input type="checkbox"/> genetics	<input type="checkbox"/> radiography
<input type="checkbox"/> classification	<input type="checkbox"/> history	<input type="checkbox"/> radionuclide imaging
<input type="checkbox"/> complications	<input type="checkbox"/> immunology	<input type="checkbox"/> radiotherapy
<input type="checkbox"/> congenital	<input type="checkbox"/> metabolism	<input type="checkbox"/> rehabilitation
<input type="checkbox"/> diagnosis	<input type="checkbox"/> microbiology	<input type="checkbox"/> surgery
<input type="checkbox"/> diet therapy	<input type="checkbox"/> mortality	<input type="checkbox"/> therapy
<input type="checkbox"/> drug therapy	<input type="checkbox"/> nursing	<input type="checkbox"/> ultrasonography
<input type="checkbox"/> economics	<input type="checkbox"/> parasitology	<input type="checkbox"/> urine
<input type="checkbox"/> enzymology	<input type="checkbox"/> pathology	<input type="checkbox"/> veterinary
<input type="checkbox"/> epidemiology	<input type="checkbox"/> physiopathology	<input type="checkbox"/> virology

☐ Restrict to MeSH Major Topic  
☐ Do not include MeSH terms found below this term in the MeSH hierarchy. ←

PubMed search builder

Add to search builder AND Search PubMed

Related information

PubMed  
PubMed - Major Topic  
Clinical Queries  
NLM MeSH Browser

Recent activity

macula\* AND degenerat\* (19) MeSH  
macula\* AND general\* (0) MeSH

# End of MeSH Term Entry Page

## Entry Terms:

- Degeneration, Macular
- Degenerations, Macular
- Macular Degenerations
- Age-Related Maculopathies
- Age Related Maculopathies
- Maculopathy, Age-Related
- Maculopathy, Age Related
- Macular Dystrophy
- Dystrophies, Macular
- Dystrophy, Macular
- Macular Dystrophies
- Maculopathies, Age-Related
- Maculopathies, Age Related
- Age-Related **Macular Degeneration**
- Age Related **Macular Degeneration**
- Age-Related Macular Degenerations
- Degeneration, Age-Related Macular
- Degenerations, Age-Related Macular
- **Macular Degeneration**, Age-Related
- Macular Degenerations, Age-Related
- Age-Related Maculopathy
- Age Related Maculopathy

## Previous Indexing:

- Retinal Degeneration (1970-1978)

## See Also:

- Vitelliform Macular Dystrophy

All MeSH Categories

Diseases Category

Eye Diseases

Retinal Diseases

Retinal Degeneration

**Macular Degeneration**


Geographic Atrophy

 Macular Degeneration

MeSH

 macular degeneration (9)

MeSH

 (randomized controlled trial[pt] OR controlled clinical trial[pt]... (2499959 PubMed

See more...

# Availability of RCT Indexing Terms

- 1966-1977
  - No specific term available
- 1978
  - RANDOMIZED-ALLOCATION (MeSH)
- 1990
  - RANDOMIZED-CONTROLLED-TRIALS (MeSH)
- 1992
  - RANDOMIZED-CONTROLLED-TRIAL (publication type)

# Methodological Terms Related to Observational Studies

- Epidemiology (1967-1998)
  - Molecular epidemiology
  - Pharmacoepidemiology
- Epidemiologic studies (1998-)
  - Case-control studies
    - ▶ Retrospective studies
  - Cohort studies
    - ▶ Follow-up studies
    - ▶ Longitudinal studies
    - ▶ Prospective studies
  - Cross-sectional studies
  - Seroepidemiologic studies
    - ▶ HIV seroprevalence studies

# Methodological Terms Related to Observational Studies

- Epidemiologic methods (1966-1989)
  - Meta-analysis as a topic (2008)
- Research design (1972-1989)
- Risk (1966-1989)
- Go to PubMed, search MeSH on observational studies
  - <http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=search&db=mesh>

# Searching MEDLINE for Observational Studies

- Very little research
- From a small pilot study by Susan Wieland:
  - Methods terms appear well indexed
  - Outcomes (diseases) appear well indexed
  - Exposures do not seem well indexed

# Searching MEDLINE for Observational Studies

	Text search	MeSH search	MeSH search without exposure
Outcome terms	breast cancer	breast neoplasms [majr:noexp]	breast neoplasms [majr:noexp]
AND			
Exposure terms	oral contraceptive* OR “estrogen” OR “hormones” OR “hormonal”	contraceptives, oral [mh:noexp] OR contraceptives, oral/ pharmacology [mh] OR contraceptives, oral/ therapeutic use [mh] OR estrogens/ therapeutic use [mh] OR contraceptives,oral/ adverse effects [mh]	
AND			
Design terms	“risk” OR epidemiologic	odds ratio [mh:noexp] OR follow-up studies [mh:noexp] OR risk [mh:noexp] OR risk factors [mh:noexp]	odds ratio [mh:noexp] OR follow-up studies [mh:noexp] OR risk [mh:noexp] OR risk factors [mh:noexp]
Total records	1456	424	6120
Gold standard records	49	48	58
Precision	49/1456 = 3%	48/454 = 11%	58/6120 = 1%
Sensitivity	49/58 = 84%	48/58 = 83%	58/58 = 100%

# EMBASE

- Elsevier's "European MEDLINE"
  - Included journals overlap with MEDLINE, but there also are more non-US journals
  - Nineteen million records
  - More than 7,000 periodicals
- Use Advanced Search to map to and explode preferred terms along with synonyms (free text)
- Defaults to citation retrieval from Medline and Embase
  - Change in Advanced Search



# CENTRAL

- The Cochrane Central Register of Controlled Clinical Trials (CENTRAL)
  - Soon to be relaunched as CRS-Cochrane Register of Studies
  - Includes each Cochrane Review Group trials register
    - ▶ Example: Cochrane Eyes and Vision Trials Register
  - Includes all hand-search results
  - Includes RCTs and controlled clinical trials from MEDLINE and Embase
  - Easy, reliable access to the maximum possible number of trials
  - Searchable with MeSH terms

# ISI Web of Science

- Multidisciplinary research databases, including citations from sciences (1900), social sciences (1956), and arts and humanities (1975)
- Strength in citation mapping
- No controlled vocabulary
- Boolean operators include “Same” for apostrophes
- Wildcard symbols
  - Asterisk (\*) (same as PubMed), with the addition of question mark (?) for one letter in a word
    - ▶ Example: *wom?n* will search woman, women, or womyn

# Systematic Snowballing

- Use **included articles** as a source to identify missing studies:
  - Reference lists
    - ▶ Check **cited** articles = backward searching
  - Web of Science, SCOPUS
    - ▶ Check **citing** articles = forward searching
  - “Related articles”/ “Find Similar” in MEDLINE and Embase
    - ▶ Also could use to find new terms to expand your search strategy

# Finding the Evidence: Searching the Web

- Registers of ongoing trials
  - [www.clinicaltrials.gov](http://www.clinicaltrials.gov)
  - [www.centerwatch.com](http://www.centerwatch.com)
  - [www.controlled-trials.com](http://www.controlled-trials.com)
  - WHO portal: [www.who.int/ictrp/en](http://www.who.int/ictrp/en)
- Government sites, such as US Food and Drug Administration
- Organizations and foundations
- Web search: [www.scirus.com](http://www.scirus.com)

# Finding the Evidence: FDA Drug Approval Reports

- Drugs@FDA:
  - [www.accessdata.fda.gov/scripts/cder/drugsatfda/](http://www.accessdata.fda.gov/scripts/cder/drugsatfda/)

# Impact of Not Including Unpublished Results

- How often does not including unpublished results make a difference?
  - Study comparing meta-analytic results in 42 systematic reviews of nine “new” medications with unpublished Food and Drug Administration data included with data omitted
  - Included 41 efficacy outcomes and one harm outcome
    - ▶ 46% (19/41) showed lower estimates of drug efficacy
    - ▶ 46% (19/41) showed higher estimates of drug efficacy
    - ▶ 7% ( 3/41) showed identical efficacy
    - ▶ The summary estimate of harm was greater when unpublished data were included in the meta-analysis

# Hand-Searching

- Journals in topic area
- Conference proceedings: Biosis
- Bibliographies of related systematic reviews or individual studies
- Gray literature
  - Dissertations: Proquest
  - Industry files or internal reports: OpenGrey

# How Many RCTs Are Missed by Not Hand-Searching?

- Systematic review of empirical studies comparing hand-searching to electronic searching
  - Hand-searching found 92% to 100% of all RCTs
  - MEDLINE found 55%
  - Embase found 49%
  - PyscINFO found 67%
  - The Cochrane Highly Sensitive Search Strategy (HSSS) identified 80% of RCTs (combined databases)
  - Complex strategies (multiple terms) found 65%
  - Simple searches (one term) found 42%



# Finding the Evidence: Personal Communication

- Experts in the field
- Industry

# Summary: Sources and Techniques

- Key electronic databases: PubMed, Embase, ISI Web of Science, Scopus
- Controlled vocabulary (e.g., MeSH)
- Other sources:
  - Trials registers
  - Gray literature searching
  - Personal contacts
- Techniques: hand-searching and “snowballing”
- Personal contacts

# Looking Ahead

- Next section:
  - Building a high-quality electronic search strategy