

Literature Searching Basics

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- Literature searches vary in their complexity from quick focused searches that aid in patient bedside care decisions through to extensive searches that support systematic reviews and health technology assessments
- Whatever its purpose, the principles of effective searching remain the same



Developing a Research Question

Pre-searching and Question Refinement

- If you are unfamiliar with the topic, a preliminary literature search, or pre-search may help establish the parameters of your research question
- Be prepared to revise your question based on the results of your pre-search

PICOS/PECOS

PICO/PECO is a model adopted by proponents of evidence-based medicine as an aid to question formulation

Why is it Important?

- To create a clear question
- To identify the information needed to answer that question
- To translate the question into searchable terms
- To develop and refine the search approach

“It looks easy. It can be tricky. It is absolutely invaluable.”

[Evidence-Based Answers to Clinical Questions for Busy Clinicians. (2006). The Centre for Clinical Effectiveness, Monash Institute of Health Services Research, Melbourne, Australia, p. 2]

The background of the slide is a blue gradient. The top half shows a lighter blue sky with wispy white clouds. A horizontal line, representing a horizon, separates the sky from the bottom half, which is a darker blue representing water with subtle ripples. The text "Identifying Concepts" is centered in the middle of the image.

Identifying Concepts

Developing a research question using PICOS

P = *Population*: the group under observation/study

I/E = *Intervention*: the intervention, exposure or action of interest

C = *Comparison*: an alternative action or intervention against which the intervention of interest will be compared

O = *Outcome*: a measure of the desired effect of the Intervention/Exposure

S = *Study design*: research designs appropriate for studying the question under consideration

Components of a research question (PICO format)

Q1: Is a pre-recorded telephone health information service (*Intervention*) for mothers with toddlers (*Population*) more effective than printed information (*Comparison*) in increasing knowledge of accident prevention techniques? (*Outcome*)

Q2: Is there a relationship between health care costs (*Intervention*) and patients' (*Population*) use of health services? (*Outcome*)



Selecting Searching Terminology

Keywords & Synonyms

- Developing lists of keywords and synonyms for each PICO component of your research question prior to searching the literature will aid in search planning
- Keywords are independent of any one electronic database and will help you to be consistent as you map your search to each database or resource you use

Is hypnotism an effective means of reducing smoking in adolescents?

Concept/ Facet	Teenagers P	Hypnotism I	Smoking O
Keywords/ Synonyms	teenager(s) teen(s) adolescent(s) youth(s) high school student(s)	hypnotism hypnosis hypnotherapy suggestion	smoke smoking cigarette(s) tobacco snuff



Combining Terms for Effective Searching

Boolean operators

Boolean Operators are combining terms,
available in some form or other in most
databases

Boolean operators: OR

- Used to connect synonyms or similar terms
- Broadens / expands a search
- Finds records with any of your search terms

medical savings accounts OR MSA

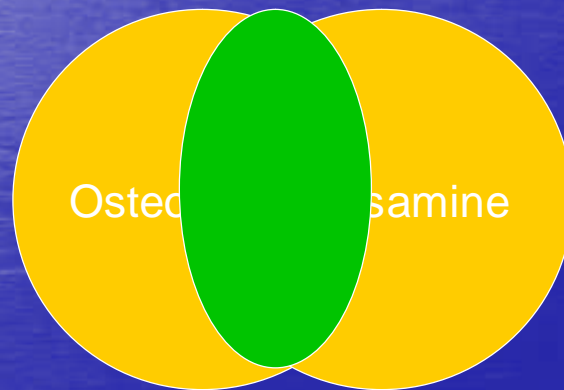
Medical savings
accounts

MSA

Boolean operators: AND

- Used to combine search concepts/components
- Narrows / focuses a search
- Finds records with all your search terms

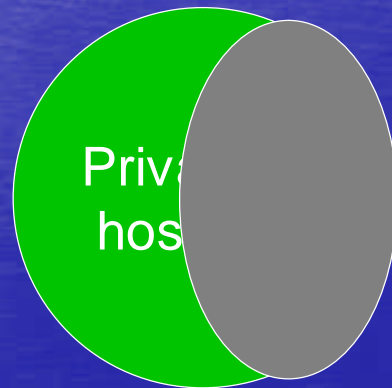
osteoarthritis AND glucosamine



Boolean operators: NOT

- Used to exclude terms
- Narrows / focuses a search
- Finds all records with search term A which do NOT include search term B
- Use the NOT operator with caution as you may unintentionally delete important studies from your search results

private hospitals NOT United States



Is hypnotism an effective means of reducing smoking in adolescents?

PICO Component	Teenagers P	Hypnotism I	Smoking O
Keywords/ Synonyms	teenager(s) <i>OR</i> teen(s) <i>OR</i> adolescent(s) <i>OR</i> high school student(s)	hypnotism <i>OR</i> hypnosis <i>OR</i> hypnotherapy <i>OR</i> suggestion	smoke <i>OR</i> smoking <i>OR</i> cigarette(s) <i>OR</i> tobacco <i>OR</i> snuff

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Choosing Search Limits

Decide what, if any, limits to apply to your search

Limits may include, but are not restricted to:

1. Populations - eg: seniors, children, Italians, age ranges etc...
2. Countries, cities, regions – eg: Singapore
3. Publication dates – eg: most recent 10 years
4. Languages – eg: English or Spanish
5. Study designs – eg: randomized controlled trials, review articles, etc...

Study design filters

“a predefined search strategy designed to retrieve levels of evidence (RCTs, systematic reviews etc) or types of clinical queries (diagnosis, prognosis, etiology, treatment) when combined with the subject search terms of your choice. They are also referred to as hedges, Clinical Queries (USA), or optimal search strategies.” (BestBETS Search Strategies

<http://www.bestbets.org/links/strategies.html>)

- Used to limit search results by study design
- Study design filters can increase the specificity of search results

RCT Search Terms for OVID MEDLINE searches (Cochrane Collaboration)

1. (controlled clinical trial or randomized controlled trial or meta analysis).pt.
2. clinical trials as topic/
3. (placebo\$ or random\$ or trial\$).ti,ab.
4. 1 or 2 or 3
5. limit 4 to animals
6. limit 4 to (animals and humans)
7. 5 not 6
8. 4 not 7

RCT Search Terms for OVID EMBASE searches (Cochrane Collaboration)

1. cross-over procedure/ or double-blind procedure/
or randomized controlled trial/ or single-blind
procedure/
2. (allocat\$ or assign\$ or cross over\$ or crossover\$
or (double ADJ blind\$) or factorial or placebo\$ or
random\$ or (single ADJ blind\$) or volunteer\$).ti,ab.
3. 1 or 2
4. limit 3 to animals
5. limit 3 to (animals and humans)
6. 4 not 5
7. 3 not 6

Select search terms to retrieve different study designs/types

Qualitative research

- (e.g. “findings”, “qualitative”, “interview\$”)

Diagnosis

- (e.g. “sensitivity”, “specificity”)

Prognosis

- (e.g. “follow-up studies”, “incidence”)

Intervention/Therapy

- (e.g. “randomised controlled trial.pt.”)

Causation

- (e.g. “risk”, “risk factor” and “cohort studies”)



Deciding where to Search

A literature search may include one or more of the following:

- Electronic bibliographic database searching
- Searching grey/unpublished literature
- Reviewing reference lists from relevant journal articles
- Hand searching key journals
- Consulting with experts in the field

Bibliographic database selection

- No one bibliographic database is comprehensive enough to index all published literature on a topic. MEDLINE indexes approx 5000 of the 20,000 biomedical journals published.
- Overlap between databases is common
- Extent of overlap between MEDLINE and EMBASE is estimated to be 34%; ranging between 10% and 75%, depending on topic
- Selection will vary with the subject. When choosing electronic databases, consider the multidisciplinary needs of your research question & select databases that reflect these needs

Bibliographic databases for clinical research topics

- PubMed/MEDLINE
- Cochrane Database of Systematic Reviews
- Cochrane CENTRAL Register of Controlled Trials
- EMBASE
- CINAHL
- PsycINFO
- International Pharmaceutical Abstracts

Bibliographic databases for non clinical health research topics

□ ABI Inform

- health policy, health services administration, economics of health care

□ ERIC

- health promotion, health education

□ Social Sciences Abstracts/Sociological Abstracts

- health policy, health promotion, patient access to and satisfaction with health care

□ Econlit

- economics of health care

□ Philosophers' Index

- Ethical aspects of health care procedures and delivery

The background is a vertical rectangle with a blue gradient. The top half shows a lighter blue sky with wispy white clouds. A thin white horizon line separates the sky from the bottom half, which is a darker blue representing the ocean with subtle ripples. The text "Vocabulary Mapping" is centered in the middle of the image.

Vocabulary Mapping

Electronic Database Subject Headings

- Most electronic databases assign thesauri or subject headings to reflect the content of each article indexed in these database
- MEDLINE for example assigns approximately 12 MeSH subject headings to each article indexed
- Subject headings may be broad or specific or of major or minor importance
- Incorporating subject headings into a search strategy enhances your ability to locate relevant studies

Mapping Keywords to Subject Headings

- Using previously identified keywords/synonyms map each keyword/synonym to established subject headings in the electronic databases chosen
- You will use the same list of keywords for each database searched, but because subject heading lists are generally unique to each database, your search strategy will look somewhat different in each database
- Although more time consuming than simple keyword searching, adapting your search to each database's list of subject headings will make for more effective searching

Identifying and Verifying the Validity of Search Terms

- Examining the indexing of relevant studies identified through pre-searching or during consultations with experts/researchers can help identify relevant subject headings and assist in the development of your search strategy
- PubMed's Related Articles feature may be used to locate relevant studies where an insufficient number exists for this purpose

Broad vs Narrow Subject Headings/Terms

- Include both broad and specific thesaurus/subject terms in your search as appropriate

MEDLINE examples:

- **Mental health[MeSH]** as well as MeSH terms for specific mental health conditions such as **schizophrenia[MeSH]**, **alcoholism[MeSH]** etc.....
- **Angiotensin-converting enzyme inhibitors[MeSH]** (*ACE inhibitors used to treat high blood pressure and heart failure*) as well as **captopril[MeSH]** (*a specific ACE inhibiting drug*)

Narrowing a search

- Use more specific search terms
- Decrease # of synonyms included in the search
- Eliminate or limit word truncation
- Add concepts to your search
- Apply limits

Broadening a search

- Use broader, more general search terms
- Include a variety of synonyms
- Apply truncation symbols to word stems to retrieve alternate spellings, singular/plural word forms & word variants
- Drop the least important concepts from your search – eg: outcomes
- Apply fewer / no limits to your search

Truncation

- Finds variations of a word stem
- Eg: *plan** retrieves plan, plans, planner, planners, and planning
- Truncation should only be used with keyword or title/abstract word searching - not with subject heading searching
- Truncation symbol may vary with database - but usually *



Searching Norms for HTAs & Systematic Reviews

- Search both thesaurus/subject terms *as well as* text (title/abstract) words
- Include both synonyms and truncated forms of text words in your search
- Include CAS Registry numbers and generic/brand names in drug searches
- Unless there is a compelling reason (eg: changes in policies, procedures, interventions etc...) do not limit searches by date or language



Pre-testing Your Search Strategy

- Select one electronic database on which to craft, test and finalize your search strategy
- Be prepared to run multiple tests of your search strategy with your research team before finalizing your strategy
- If you have pre-identified key studies, these studies can be used to verify the effectiveness of your search strategy



Searching Beyond Electronic Databases

- Not all literature searches go beyond electronic database searching
- Where necessary, searching may be expanded to include:
 - Scanning reference lists of key articles
 - Searching the grey literature: government reports, research organization reports, dissertations, conference proceedings, newsletters etc...

HTA on the NET (Institute of Health Economics)

http://www.ihe.ca/documents/HTA%20on%20the%20net%2010thedition_0.pdf

- Hand searching key journals
- Consultation with experts
- Citation searching with Web of Science

Bibliographic Management Software

- When running complex, broad searches, consider using a bibliographic management software program to store and organize search results

Eg: EndNote, RefWorks, Reference Manager

Recording your Literature Search

- Record information on all resources searched (and when), search terms used, when the search was completed and how many records/results were found
- Track studies retrieved, ordered and received
- Particularly important in the case of systematic reviews, health technology assessments, or scoping reviews

Questions? Comments?

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