

Methodology of Literature Search





This work is licensed under a
[Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/).

Last update: 31/12/2017

Contents edited by: Nicoletta Colombi nicoletta.colombi@unito.it

Summary

1. **Systematic literature search:** steps
2. **From scenarios to search questions:** background vs foreground questions
3. **The P.I.C.O. model:** a well-built foreground (clinical) question
4. **From search question to search query:** Boolean operators, and other search syntax elements
5. **Precision & recall:** search query performance
6. **Biomedical bibliographic databases:** an overview
7. **How do the bibliographic databases work?:** records, thesaurus and search fields



Systematic Literature Search

Steps

Start from a specific and **well-built search question**, in order to find a specific answer on the basis of declared **inclusion criteria**



Select the most appropriate **sources** to perform your search



Translate your search question into a **specific search query for each selected databases**



Use all the **database-specific search tools**, to find the biggest number of relevant results and the lowest number of irrelevant ones ("noise")



Select and save the relevant results



Save your search strings, in order to document them and to set up alerts and automatic updates




Document all the performed steps (search date, sources, strings, number of obtained results, number of relevant results)




From Scenarios to Search Questions

Background vs Foreground Questions






SCENARIO = it includes all your information needs about a topic.
Usually the scenario is characterised by a high level of uncertainty.
It can originate one or more...



SEARCH QUESTION = the «translation of uncertainty to an answerable question» (Dawes et al., 2005).
It must be translated to one or more...



SEARCH QUERY = the search question in a readable form for databases and search engines (keywords linked by Boolean operators and other syntax elements)



What am I looking for? _____
= the main topics in the scenario

QUESTION



Which terms shall I use? _____
= the best terms to express your topics
(textwords, thesaurus terms, synonyms, antonyms...)

QUERY



Which connections should I build among them? _____
= their logic relationships (Boolean operators)

Background vs Foreground Questions

Background Questions

- They are **general** (clinical) questions about a topic (e.g.: What are the clinical manifestations of Parkinson disease? How high is its incidence among the adult population?)
- **Structure of the BQ:** question root (who, what, when, where, how, why) + a disorder, test, treatment, or other aspect of health care

Foreground Questions

- They are **specific** (clinical) questions (about a problem and/or a patient/population), arising from already acquired basic knowledge on a topic. They usually concern choices, and can affect decision-making. They can be grouped in 4 categories: **treatment/intervention – diagnosis – prognosis – etiology/harm**. Often they perform **effectiveness comparisons** (between 2 drugs, diagnostic tests, etc.) to support EBP.
- **Structure of the FQ:** P.I.C.O.

Foreground Question Categories

Treatment (Therapy)/Intervention

Questions regarding **treatment (therapy)/intervention** (drug, surgical intervention, counselling...) performed **to achieve one or more outcomes**. → Strongest evidences found in **RCTs**

Diagnosis

Questions regarding **diagnostic test/intervention for the identification of a disorder in a patient** presenting with specific symptoms. → Strongest evidences found in **RCTs**

Prognosis

Questions regarding **the progression of a disease or the likelihood of a disease occurring**. → Strongest evidences found in **Cohort/Case Control Studies**

Etiology/Harm

Questions regarding **the negative impact of an intervention or other exposure**. → Strongest evidences found in **Cohort/Case Control Studies**



The P.I.C.O. Model

A Well-Built Foreground (Clinical) Question

The P.I.C.O. Model

P

Patient, Population, or Problem (or Disease or Condition)

How would you describe a group of patients similar to yours? What are the most important characteristics of the patient?

I

Intervention (or Exposure or Prognostic Factor)

Which intervention, risk factor, diagnostic test or exposure are you considering?

C

Comparison or Control

What is the main alternative to compare with the intervention? Are you trying to decide between two drugs, a drug and no medication or placebo, or two diagnostic tests?
It can be **none** or placebo.

O

Outcome

What are you trying to accomplish, measure, improve or influence? Outcomes may be disease-oriented or patient-oriented.

P.I.C.O.: Treatment/Intervention Foreground Question

P In a **woman** with frequent **migraine attacks**

I would **sumatriptan**

C

O reduce the severity of headache **pain**?

Oxman AD, Sackett DL, Guyatt GH, et al. Users' Guides to the Medical Literature I. How to Get Started. JAMA. 1993;270(17):2093-2095. doi:10.1001/jama.1993.03510170083036. Available from: <http://jamanetwork.com/journals/jama/fullarticle/409068> (retrieved 15/1/2017)

P.I.C.O.: Diagnosis Foreground Question

- P** In a symptomless **elderly man**
- I** would a **prostate-specific antigen test**
- C**
- O** decrease his **risk of dying** from **prostate cancer**?

Oxman AD, Sackett DL, Guyatt GH, et al. Users' Guides to the Medical Literature I. How to Get Started. JAMA. 1993;270(17):2093-2095. doi:10.1001/jama.1993.03510170083036. Available from: <http://jamanetwork.com/journals/jama/fullarticle/409068> (retrieved 15/1/2017)

P.I.C.O.: Prognosis Foreground Question

- P** In a **6-month-old infant**
- I** do **febrile seizures**
- C**
- O** increase the likelihood that he will develop **epilepsy**?

Oxman AD, Sackett DL, Guyatt GH, et al. Users' Guides to the Medical Literature I. How to Get Started. JAMA. 1993;270(17):2093-2095. doi:10.1001/jama.1993.03510170083036. Available from: <http://jamanetwork.com/journals/jama/fullarticle/409068> (retrieved 15/1/2017)

P.I.C.O.: Etiology/Harm Foreground Question

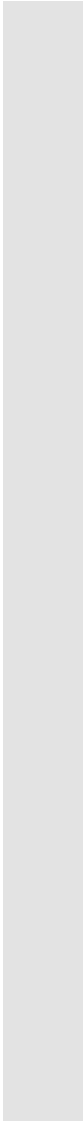
- P** In an **asthmatic man**
- I** do **β -agonists**
- C**
- O** increase the **risk of death?**

Oxman AD, Sackett DL, Guyatt GH, et al. Users' Guides to the Medical Literature I. How to Get Started. JAMA. 1993;270(17):2093-2095. doi:10.1001/jama.1993.03510170083036. Available from: <http://jamanetwork.com/journals/jama/fullarticle/409068> (retrieved 15/1/2017)



From Search Question to Search Query

Boolean operators, and other search syntax elements
(parentheses, truncation, quotation marks)



Boolean Operators

They were developed in the 19th century by George Boole, mathematician at Cork University College.

In information retrieval, they allow to combine the words of the query to perform the logic operations of:

- **conjunction** (AND)
- **disjunction** (OR)
- **negation** (or logical complement -NOT)

Usually they need to be written in CAPITAL LETTERS, otherwise they are read just as “stop words” and filtered out by search engines before processing the search string.

Wikipedia. *Boolean algebra*. Last updated: 8/12/2016. Available from:

https://en.wikipedia.org/w/index.php?title=Boolean_algebra&oldid=753655665 (retrieved 15/1/2017).

Wikipedia. *Logical conjunction*. Last updated: 20/7/2016. Available from:

https://en.wikipedia.org/w/index.php?title=Logical_conjunction&oldid=730731141 (retrieved 15/1/2017).

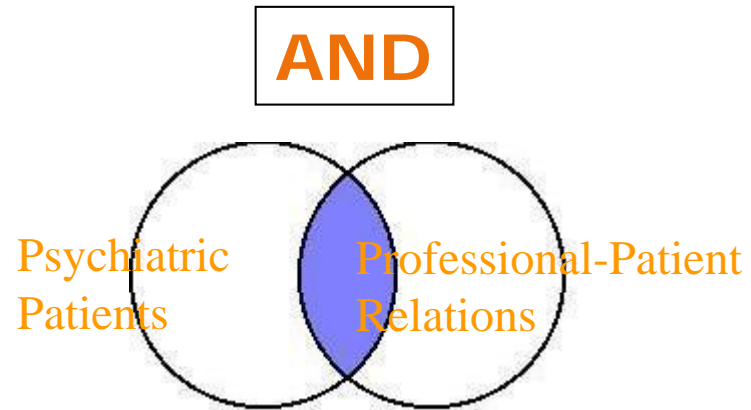
Wikipedia. *Logical disjunction*. Last updated: 29/12/2016. Available from:

https://en.wikipedia.org/w/index.php?title=Logical_disjunction&oldid=757184739 (retrieved 15/1/2017).

Wikipedia. *Negation*. Last updated: 29/12/2016. Available from:

<https://en.wikipedia.org/w/index.php?title=Negation&oldid=757235556> (retrieved 15/1/2017).

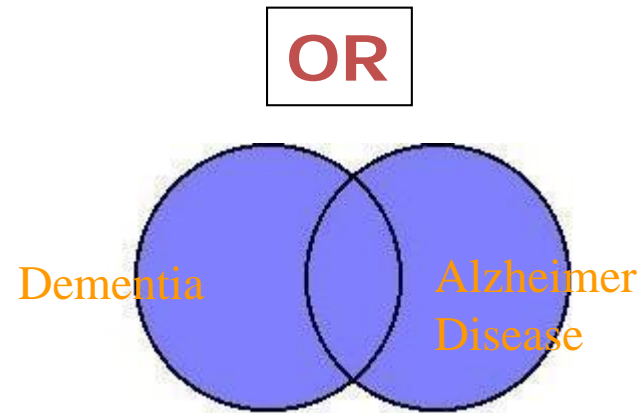
Boolean Operators: AND



Conjunction = It **NARROWS** the search field (→ coexistence of 2 or more terms)

This query retrieves only records that contain both keywords (coexistence). Records that contain only the term "Psychiatric Patients" or only the term "Professional-Patient Relations" are excluded from results.

Use AND to narrow the search field, by requiring the coexistence of all the essential elements of your search question



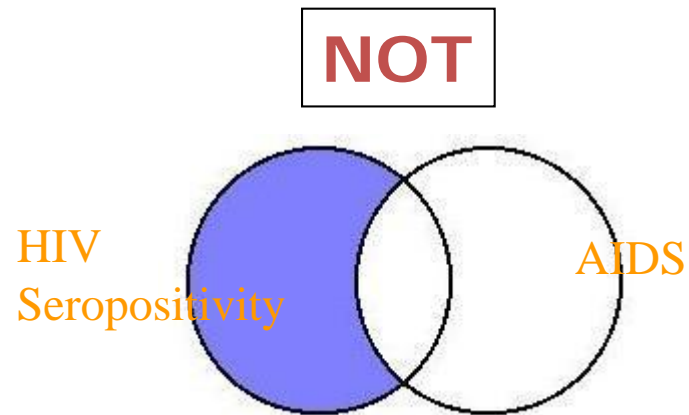
Disjunction = It **BROADENS** the search field (→ equivalence of concepts = search for synonyms/variants)



This query retrieves records that contain either keyword, or both. Results include not only records considering "Dementia" together with "Alzheimer Disease", but also records dealing with "Dementia" or "Alzheimer Disease" alone.

Use OR to broaden the search field by including synonyms, antonyms, similar concepts, or variant spellings of a word in your string

Boolean Operators: **NOT**



This query retrieves records that contain "HIV Seropositivity", but are not dealing with "AIDS".

→ **Negation** = It **NARROWS** the search field
(→ exclusion of terms)

Use NOT to narrow the search field by excluding unwanted words (usually to further refine a search string)

Other Syntax Elements

- PARENTHESES

Use parentheses to specify the order of string processing (algebraic grouping of concepts):

Migraine OR Headache AND Zolmitriptan

=

(Migraine OR Headache) AND Zolmitriptan

=

Zolmitriptan AND (Migraine OR Headache)

≠

Zolmitriptan AND Migraine OR Headache

- TRUNCATION (Wildcard)

Use asterisk (or other wildcard) to truncate search terms, in order to automatically retrieve multiple forms of a word:

nurs* = nursing OR nurse OR nurses OR nursery OR nurseries OR ...

- QUOTATION MARKS

Use quotation marks (" ") to search for exact phrases:

"molecular cloning"



Precision & Recall

Search Query Performance

A search query performance is measured against:

Precision (Positive Predictive Value)

Recall (Sensitivity)

Precision (Positive Predictive Value)

Precision is the fraction of retrieved documents that are relevant to the user's information need:

$$\frac{\text{n. of relevant retrieved documents}}{\text{total n. of retrieved documents}}$$

i.e.

$$\frac{\text{correct results (true positives)}}{\text{correct results + non-relevant results (true positives) + (false positives)}}$$

Wikipedia. *Precision and Recall*. Last updated: 19/12/2016. Available from:

https://en.wikipedia.org/w/index.php?title=Precision_and_recall&oldid=755633573 (retrieved 15/1/2017).

Recall is the fraction of documents that are relevant to the query and are successfully retrieved:

$$\frac{\text{n. of relevant retrieved documents}}{\text{tot. n. of relevant documents in the source}}$$

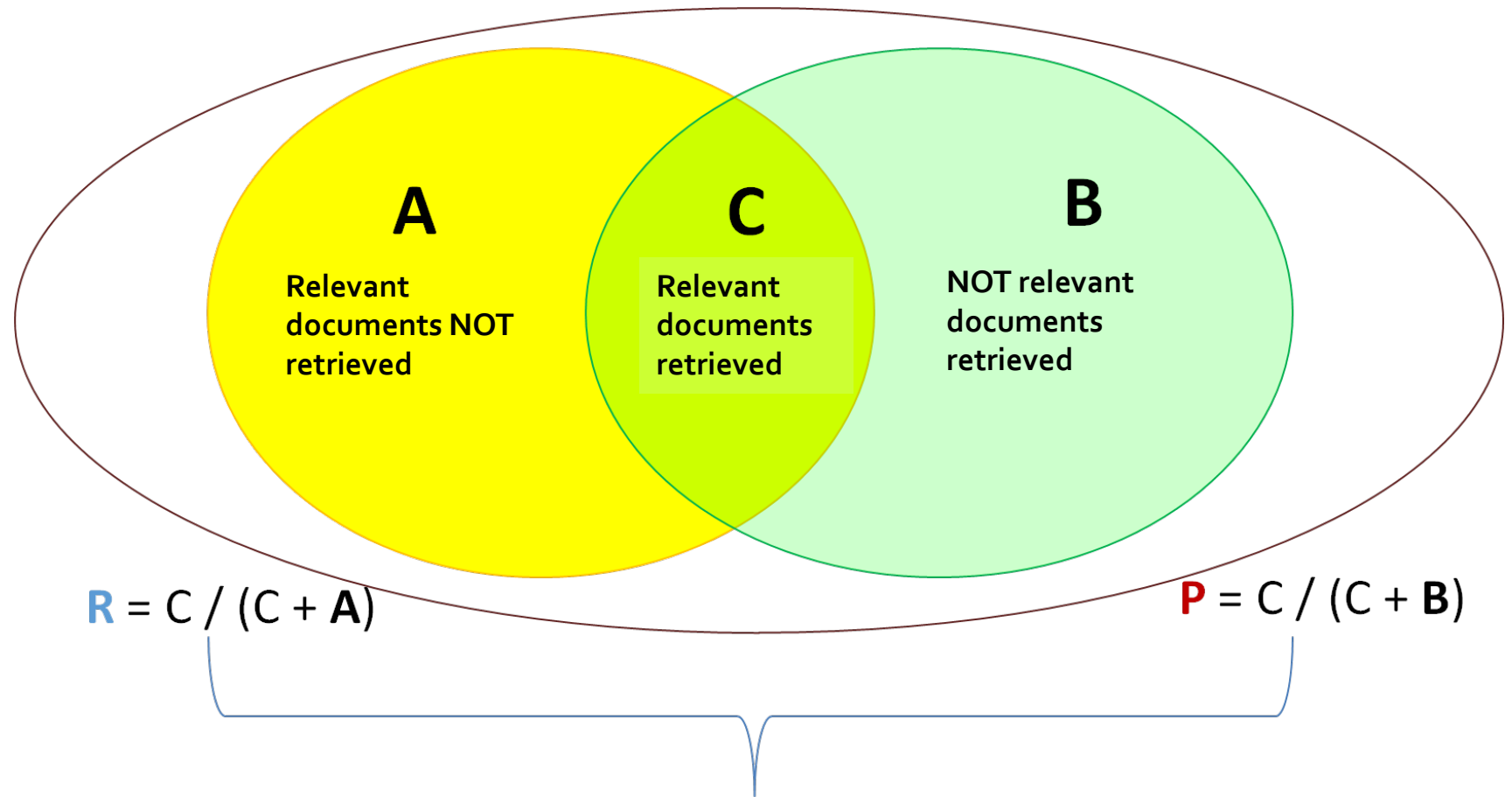
i.e.

$$\frac{\text{correct results (true positives)}}{\text{correct results + missing correct results (true positives) + (false positives)}}$$

It is trivial to achieve recall of 100% by returning all documents in response to any query.

Wikipedia. *Precision and Recall*. Last updated: 19/12/2016. Available from: https://en.wikipedia.org/w/index.php?title=Precision_and_recall&oldid=755633573 (retrieved 15/1/2017).

Precision vs Recall



Precision and recall generally vary inversely; as precision increases, recall generally decreases, and vice versa.



“Searches for systematic reviews aim to be as extensive as possible in order to ensure that as many as possible of the necessary and relevant studies are included in the review. It is, however, **necessary to strike a balance between striving for comprehensiveness and maintaining relevance when developing a search strategy. [...]**”

Julian PT Higgins and Sally Green (eds.), *Cochrane Handbook for Systematic Reviews of Interventions*, version 5.1.0, Chap. 6.4.4. Available from: <http://handbook.cochrane.org/> (retrieved 15/1/2017).

Precision/Recall and Boolean Operators

AND and **NOT** optimise **Precision**

OR optimises **Recall**

So, if you want to increase Recall (with a small reduction in Precision)...

- Avoid using too many concepts linked with AND

“It is usually unnecessary, and even undesirable, to search on every aspect of the review’s clinical question often referred to as PICO [...]). [...] In general databases, such as MEDLINE, a search strategy to identify studies for a Cochrane review will typically have three sets of terms:

(1) terms to search for the health condition of interest, i.e. the population;

(2) terms to search for the intervention(s) evaluated; and

(3) terms to search for the types of study design to be included [...].”

“[...] Sets of terms should usually be developed for the healthcare condition, intervention(s) and study design. **These three sets of terms can then be joined together with the AND operator.** This final step of joining the three sets with the AND operator limits the retrieved set to articles of the appropriate study design that address both the health condition of interest and the intervention(s) to be evaluated. [...].”

- Avoid (as much as possible) using NOT;
it may exclude potentially relevant comparison studies from results

“[...] **The NOT operator should be avoided where possible** to avoid the danger of inadvertently removing from the search set records that are relevant. For example, when searching for records indexed as female, “NOT male” would remove any record that was about both males and females.[...]”

- Include a wide range of terms linked with OR for each concept:
 - **Controlled vocabulary** (Thesaurus) or **Textwords** (e.g.: MESH “Neoplasms” OR cancer)
 - **Synonyms** (e.g.: pressure sore OR decubitus ulcer)
 - **Related terms** (e.g.: caregivers OR relatives)
 - **Variant spellings** (e.g.: tumour OR tumor)
 - **Acronyms** (e.g.: ICU OR Intensive Care Unit)

To find more terms for the OR search:

- Check which terms are used in relevant documents previously retrieved
- Use truncation (which generates an automatic OR string → diabet* = diabetes OR diabetic OR diabetology [but with caution...])



Biomedical Bibliographic Databases

An Overview



Bibliographic vs Citation DBs

Bibliographic DBs

- They contain references to papers published in various journals and publications (**REFERENCES** = author's name, publication's title, date of publication, abstract, journal name, and other information helpful in locating the publication)
- In this category: **PubMed – Medline – Embase – CINAHL – PsycINFO** – (most of the) **Cochrane Library**

Citation DBs

- In addition to **REFERENCES**, they contain also information about who has cited a paper, and how many times a paper/author has been cited (→ **CITATION TRACKING**)
- In this category: **Scopus – Web of Science (WoS) – Google Scholar**



Producer: NLM

Access: Free

Coverage: Over **26 M** records (US journal articles + 80 other countries).
Medline + in process citations + non-medical journals + ebooks.
Back to 1966 (selectively to 1809).

Subject: medical, biomedical & life sciences

Controlled vocabulary: yes.
MESH (headings + subheadings)

Automatic mapping: yes.



Producer: NLM through commercial suppliers (OVID)

Access: Subscription required

Coverage: Over **22 M** records (articles from 5600 journals – mainly US).
Medline (= a subset [98%] of PubMed).
Back to 1946.

Subject: medical, biomedical sciences

Controlled vocabulary: yes.
MESH (headings + subheadings)

Automatic mapping: yes.



Producer: Elsevier

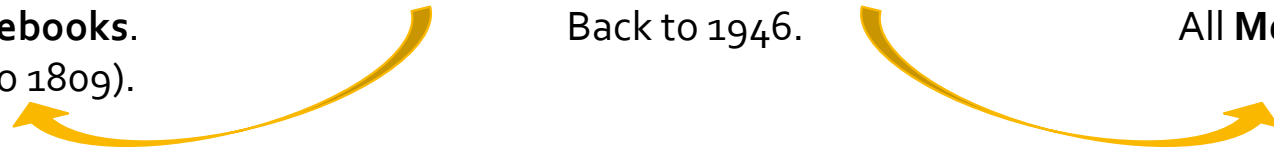
Access: Subscription required

Coverage: Over **29 M** records (articles from 8500 journals from more than 90 countries).
All Medline + 2000 extra titles (mainly EU) + **260.000 conference abstracts.**
Back to 1947 (selectively to 1902).

Subject: Medline + drug & pharmacy

Controlled vocabulary: yes.
EMTREE (headings + subheadings – specific drug-related topics)

Automatic mapping: yes.



CINAHL

Producer: EBSCO

Access: Subscription required

Coverage: Over **5.3 M** records.
Journal articles, conference proceedings, books, book chapters, dissertations, audio-visual materials.
Full coverage of English nursing journals, National League for Nursing and American Nurses' Association publications.
Back to 1937.

Subject: **nursing & allied health** (nursing specialties, speech and language pathology, nutrition, general health and medicine, CAM...)

Controlled vocabulary: yes.
CINAHL HEADINGS (headings + subheadings)

Automatic mapping: no.



Producer: APA through commercial suppliers (EBSCO)

Access: Subscription required

Coverage: Over **4 M** records.
Articles from more than 2,500 journals, books, book reviews, book chapters, dissertations.
1800s to present (selectively XVII & XVIII centuries).

Subject: **Psychology, behavioural & social sciences**

Controlled vocabulary: yes.
THESAURUS OF PSYCHOLOGICAL INDEX TERMS (headings)

Automatic mapping: no.



Producer: Cochrane Collaboration through commercial supplier (Wiley)

Access: Subscription required

Coverage: 7 evidence-based oriented DBs (allowing simultaneous search):

Controlled vocabulary: yes.
MESH (headings + subheadings)

Automatic mapping: no.

-
- 1. Cochrane Database of Systematic Reviews (CDSR)**
Over 9.000 systematic reviews (& protocols) prepared by Cochrane Review Groups (citations + FTs)
 - 2. Database of Abstracts of Reviews of Effects (DARE)**
Over 36.000 abstracts of quality-assessed systematic reviews that have not yet been carried out by Cochrane.
 - 3. Cochrane Central Register of Controlled Trials (CENTRAL)**
Over 990.000 citations of randomised and quasi-randomised controlled trials taken from Medline, Embase, and from other published and unpublished sources.
 - 4. Cochrane Methodology Register (CMR)**
Over 15.000 citations of journal articles, books and conference proceedings - from MEDLINE and hand searches - that report on methods used in the conduct of CTs.
 - 5. Health Technology Assessment (HTA) Database**
Over 16.000 citations of worldwide completed and ongoing HTAs (studies of medical, social, ethical, and economic implications of healthcare interventions).
 - 6. NHS Economic Evaluation Database (EED)**
Over 15.000 abstracts of quality-appraised economic evaluations from around the world.
 - 7. About the Cochrane Collaboration Database**
Information on the Cochrane groups.

Citation DBs



Producer: Elsevier

Access: Subscription required

Coverage: Over **60 M** records (articles from over 20.000 journals, conference proceedings, books and patents)
Medline + Embase + other DBs.
Citation indexing starting from 1996.

Subject: Interdisciplinary

Controlled vocabulary: none.

Citation tracking: yes.



Producer: Clarivate Analytics (ISI)

Access: Subscription required

Coverage: Over **55 M** records (articles from over 13.000 journals, books, conference proceedings).
Arts & Humanities Citation Index + Social Sciences Citation Index + Science Citation Index.
Databases & starting year depending on subscriptions.

Subject: Interdisciplinary

Controlled vocabulary: none.

Citation tracking: yes.



Producer: Google

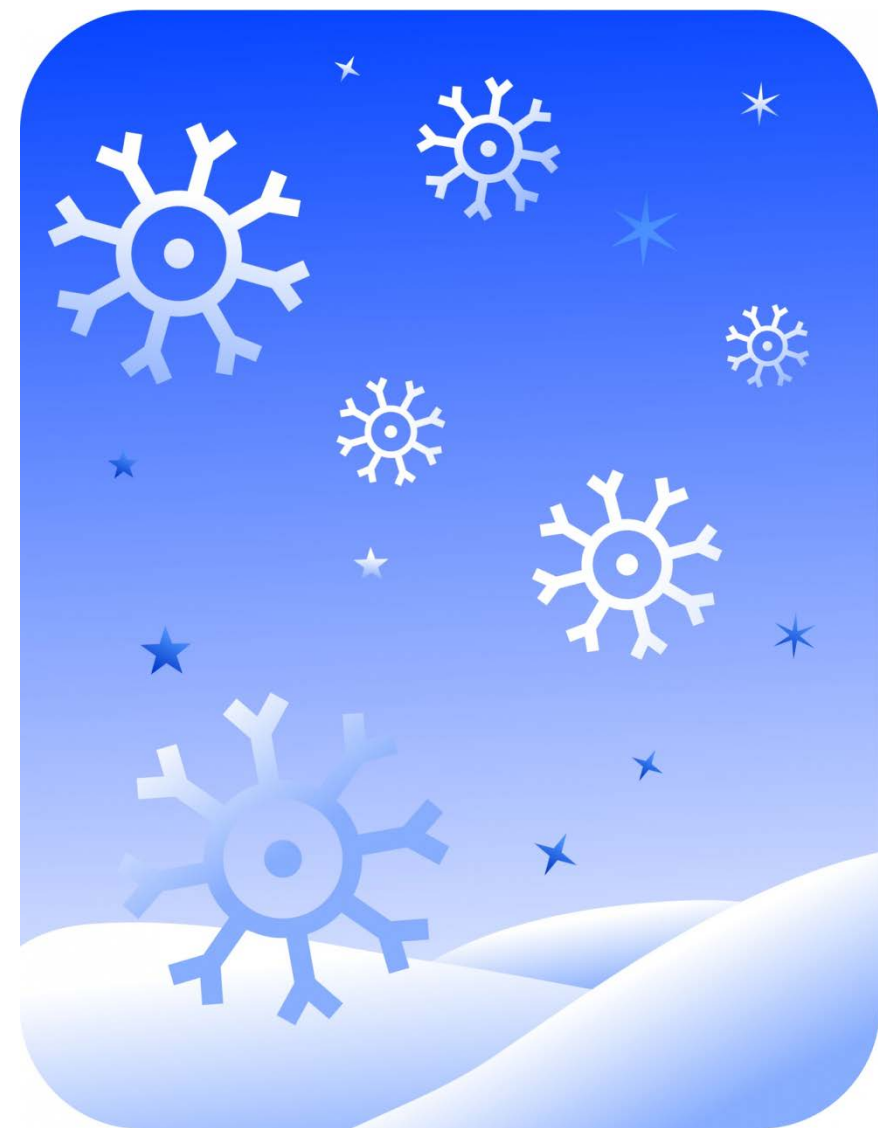
Access: Free

Coverage: All the scholarly literature that Google Scholar can retrieve and index on the Internet.
Generally unsuitable for publications prior to 1990.

Subject: Interdisciplinary

Controlled vocabulary: none.

Citation tracking: yes.



Citation databases allow easy
SNOWBALLING
i.e. tracking down references (or citations) in relevant,
retrieved documents
to ensure high levels of recall for literature reviews.

HLWIKI Canada, *Snowballing*. Last updated: 4/10/2016. Available from:
<http://hlwiki.slais.ubc.ca/index.php/Snowballing> (retrieved 15/1/2017).



How Do the Bibliographic Databases Work?

Records, Thesaurus and Search Fields

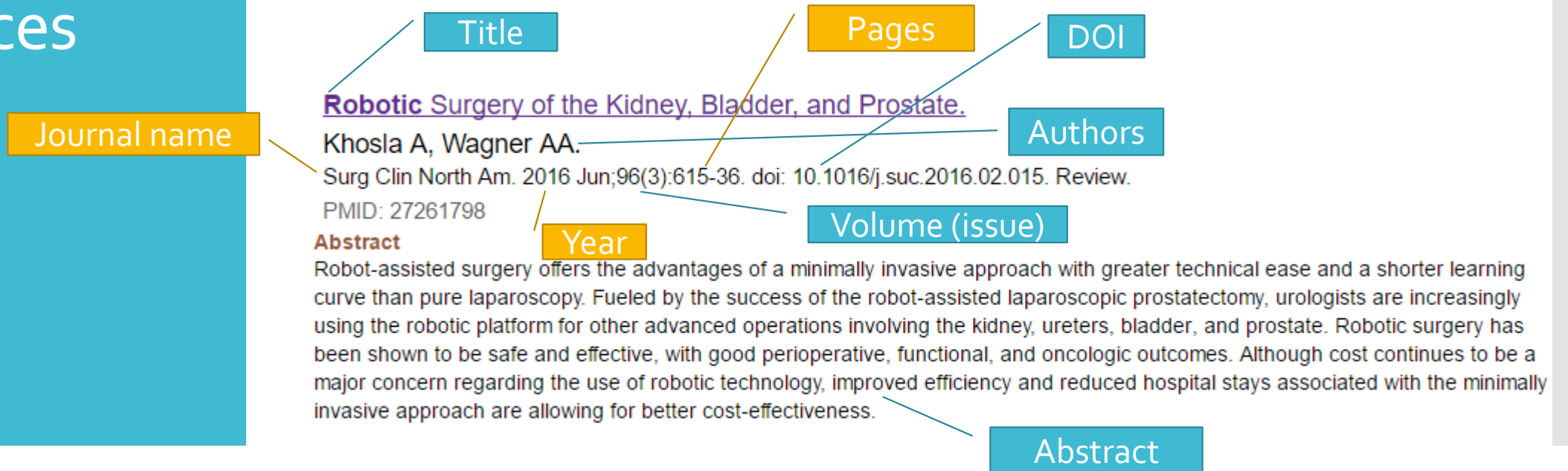


References

In Bibliographic databases we find
REFERENCES

=

a set of **metadata**, i.e. information about the main elements of a published work, helpful in describing and locating the publication



Records

The main “bricks” of which DBs are made are called **RECORDS**

1 reference = 1 record

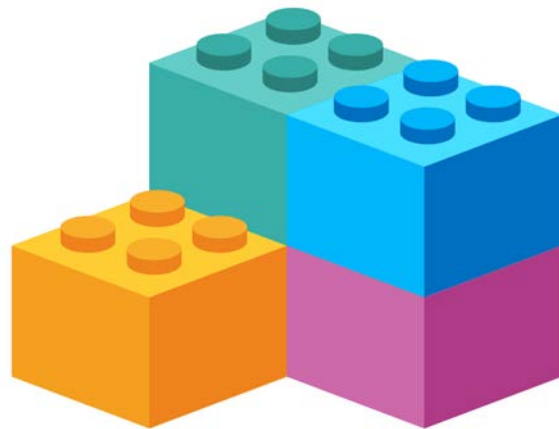
Each record is uniquely identified by a serial number...

[Robotic Surgery of the Kidney, Bladder, and Prostate.](#)

Khosla A, Wagner AA.

Surg Clin North Am. 2016 Jun;96(3):615-36. doi: 10.1016/j.suc.2016.02.015. Review.

PMID: 27261798



... called PMID, ID, Accession Number...
(depending on the database).

```
PMID- 27261798
OWN - NLM
STAT- MEDLINE
DA - 20160605
DCOM- 20161221
LR - 20161230
IS - 1558-3171 (Electronic)
IS - 0039-6109 (Linking)
VI - 96
IP - 3
DP - 2016 Jun
TI - Robotic Surgery of the Kidney, Bladder, and Prostate.
PG - 615-36
LID - 10.1016/j.suc.2016.02.015 [doi]
LID - S0039-6109(16)00017-7 [pii]
AB - Robot-assisted surgery offers the advantages of a minimally invasive approach
with greater technical ease and a shorter learning curve than pure laparoscopy.
Fueled by the success of the robot-assisted laparoscopic prostatectomy,
urologists are increasingly using the robotic platform for other advanced
operations involving the kidney, ureters, bladder, and prostate. Robotic surgery
has been shown to be safe and effective, with good perioperative, functional, and
oncologic outcomes. Although cost continues to be a major concern regarding the
use of robotic technology, improved efficiency and reduced hospital stays
FAU - Khosla, Arjun
AU - Khosla A
AD - Division of Urology, Department of Surgery, Beth Israel Deaconess Medical Center,
Harvard Medical School, Boston, MA, USA.
FAU - Wagner, Andrew A
AU - Wagner AA
AD - Division of Urology, Department of Surgery, Beth Israel Deaconess Medical Center,
Harvard Medical School, Boston, MA, USA. Electronic address:
awagner@bidmc.harvard.edu.
LA - eng
PT - Journal Article
PT - Review
PL - United States
TA - Surg Clin North Am
JT - The Surgical clinics of North America
JID - 0074243
SB - AIM
SB - IM
MH - Female
MH - Humans
MH - Kidney/*surgery
MH - Male
MH - Prostate/*surgery
MH - Robotic Surgical Procedures/*methods
MH - Urinary Bladder/*surgery
```

Each record is made of **FIELDS**
(e.g. PubMed [TI], [AB],[AU]).

Each field contains the same kind of
information, and is an access point
for searches



FIELD SEARCH
through
FIELD TAGS

Search Field Tags – Example from PubMed

Liver[**ALL FIELDS**] = search for “liver” in all the record fields

Liver[**TI**] = search for “liver” only in article titles

Liver[**AU**] = search for “liver” only in author names

Liver[**TIAB**] = search for “liver” only in titles & abstracts

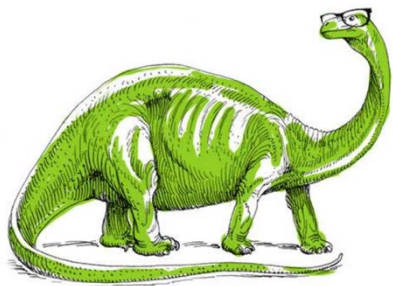
Liver[**TA**] = search for “liver” only in journal name

Liver[**MESH**] = search for “liver” only in MESH descriptors

Each database has its own tag syntax.
e.g. PubMed → liver[**TI**] = Embase → liver:**ti**

Controlled Vocabulary

A thesaurus.



Grammarly Punography

In each bibliographic database, a specific record field includes subject headings describing the contents of the publication.

Subject headings are taken from a **THESAURUS** (controlled vocabulary), specific to each database:

PubMed/Medline	→	MeSH
Embase	→	EMTREE
CINAHL	→	CINAHL Headings
PsycINFO	→	Thesaurus of Psychological Index Terms

Wikipedia. *Thesaurus*. Last updated: 16/1/2017. Available from:

<https://en.wikipedia.org/w/index.php?title=Thesaurus&oldid=760342893> (retrieved 15/1/2017).

Wikipedia. *Controlled Vocabulary*. Last updated: 10/12/2016. Available from:

https://en.wikipedia.org/w/index.php?title=Controlled_vocabulary&oldid=753986026 (retrieved 15/1/2017)

Thesaurus headings are linked by:

1. HIERARCHY

Broader Terms / Narrower Terms (**Tree Structure** → **Explosion**) **C19 - Endocrine System Diseases**

Endocrine System Diseases [C19]
Adrenal Gland Diseases [C19.053]
Adrenal Cortex Diseases [C19.053.098]
Adrenal Cortex Neoplasms [C19.053.098.265]
Adrenocortical Adenoma [C19.053.098.265.500]
Adrenocortical Carcinoma [C19.053.098.265.750]
Adrenal Gland Neoplasms [C19.053.347]
Adrenal Cortex Neoplasms [C19.053.347.500]
Adrenocortical Adenoma [C19.053.347.500.500]
Adrenocortical Carcinoma [C19.053.347.500.750]
Adrenal Hyperplasia, Congenital [C19.053.440]
Adrenal Insufficiency [C19.053.500]
Addison Disease [C19.053.500.263]
Adrenoleukodystrophy [C19.053.500.270]
Hypoaldosteronism [C19.053.500.480]
Pseudohypoaldosteronism [C19.053.500.610]
Waterhouse-Friderichsen Syndrome [C19.053.500.740]
Adrenocortical Hyperfunction [C19.053.800]
Cushing Syndrome [C19.053.800.367]
Hyperaldosteronism [C19.053.800.604]
Bartter Syndrome [C19.053.800.604.249]
Diabetes Mellitus [C19.246]
Diabetes Complications [C19.246.099]
Diabetic Angiopathies [C19.246.099.500]
Diabetic Foot [C19.246.099.500.191]

2. EQUIVALENCE

Authorized Terms / Entry Terms

e.g.: Neoplasms *vs* Cancer / Tumour...

3. ASSOCIATION

Related Terms (see also)

e.g.: Infection *see also* Anti-infective Agents

→ it's a **controlled vocabulary**

Controlled vocabulary – Search results from PubMed

PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed

[Limits](#) [Advanced](#)

Display Settings: Summary, Sorted by Recently Added [Send](#)

Clipboard: 4 [Remove all items](#)

- [A high level of carcinoembryonic antigen as initial manifestation of medullary thyroid carcinoma in a patient with subclinical hyperthyroidism.](#)
1. Akbulut S, Sogutcu N.
Int Surg. 2011 Jul-Sep;96(3):254-9. Review.
PMID: 22216705 [PubMed - indexed for MEDLINE]
[Related citations](#) [Remove from clipboard](#)
- [Complications after pancreaticoduodenectomy for pancreatic cancer: a retrospective study.](#)
2. Ren S, Liu P, Zhou N, Dong J, Liu R, Ji W.
Int Surg. 2011 Jul-Sep;96(3):220-7.
PMID: 22216700 [PubMed - indexed for MEDLINE]
[Related citations](#) [Remove from clipboard](#)
- [Incorporation of bevacizumab in the primary treatment of ovarian cancer.](#)
3. Burger RA, Brady MF, Bookman MA, Fleming GF, Monk BJ, Huang H, Mannel RS, Homesley HD, Fowler J, Greer BE, Boente M, MJ, Liang SX; Gynecologic Oncology Group.
N Engl J Med. 2011 Dec 29;365(26):2473-83.
PMID: 22204724 [PubMed - indexed for MEDLINE]
[Related citations](#) [Remove from clipboard](#)
- [Adrenal incidentalomas: a disease of modern technology.](#)
4. Das JP, McDermott J, Torreggiani WC.
Ir Med J. 2011 Sep;104(8):229-30. No abstract available.
PMID: 22125873 [PubMed - indexed for MEDLINE]
[Related citations](#) [Remove from clipboard](#)

Standard **SUBHEADINGS** (= qualifiers) can be added to a thesaurus subject heading to narrow down the topic (→ specific point of view).

e.g.:

Multiple Sclerosis

An autoimmune disorder mainly affecting young adults and characterized by destruction of myelin in the central nervous system. Pathologic findings include multiple sharply demarcated areas of demyelination throughout the white matter of the central nervous system. Clinical manifestations include visual loss, extra-ocular movement disorders, paresthesias, loss of sensation, weakness, dysarthria, spasticity, ataxia, and bladder dysfunction. The usual pattern is one of recurrent attacks followed by partial recovery (see **MULTIPLE SCLEROSIS, RELAPSING-REMITTING**), but acute fulminating and chronic progressive forms (see **MULTIPLE SCLEROSIS, CHRONIC PROGRESSIVE**) also occur. (Adams et al., Principles of Neurology, 6th ed, p903)

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"/> chemistry | <input type="checkbox"/> history | <input type="checkbox"/> radionuclide imaging |
| <input type="checkbox"/> classification | <input type="checkbox"/> immunology | <input type="checkbox"/> radiotherapy |
| <input type="checkbox"/> complications | <input type="checkbox"/> legislation and jurisprudence | <input checked="" type="checkbox"/> rehabilitation |
| <input type="checkbox"/> congenital | <input type="checkbox"/> metabolism | <input type="checkbox"/> statistics and numerical data |
| <input type="checkbox"/> diagnosis | <input type="checkbox"/> microbiology | <input type="checkbox"/> surgery |
| <input type="checkbox"/> diet therapy | <input type="checkbox"/> mortality | <input checked="" type="checkbox"/> therapy |
| <input type="checkbox"/> drug therapy | <input type="checkbox"/> nursing | <input type="checkbox"/> transmission |

Subheadings improve the Precision.

Controlled Vocabulary or Textwords?

Controlled Vocabulary Search

- Good for Precision and Recall
- It applies only to already indexed-records, excluding in-process citations

Textword Search

- Good for Recall (but bad for Noise)
- It includes non-indexed records in results (in-process citations)

The choice depends on your search goals.
For a systematic search, you may consider to use both.