PubMed – the Einstein method

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Geneva Workshop 2016
Simple search PubMed interface

Welcome to PubMed
The PubMed database comprises more than 19 million citations for biomedical articles from MEDLINE and life science journals. Citations may include links to full-text articles from PubMed Central or publisher web sites.

Using PubMed
PubMed Quick Start
Search by Author
Search by Journal
Full Text Articles
PubMed FAQs

PubMed Tools
Single Citation Matcher
Batch Citation Matcher
Clinical Queries
Topic-Specific Queries
E-Utilities

More Resources
New and Noteworthy
PubMed Tutorials
MeSH Database
Journals Database
Clinical Trials
Two types of searching

- Keyword
- Subject heading*
  - what I call the Einstein Method.

*Subject headings = standardized phrases describing main ideas.
Keyword searches can give bad results because they...

1. Ignore negating expressions (but, except, never…).

2. Treat all words as equally important.

3. Don’t include synonyms and varieties of a search term (infant, infants, infantile, infancy, neonate, newborn, baby…).

4. Ignore ambiguities (right to life, right vs. left).

Examples
Citations by keywords - HIV infection prevention

Results: 1 to 20 of 11226

   [No authors listed]
   AIDS Alert. 2009 Dec;24(12):140-1. No abstract available.
   PMID: 20063477 [PubMed - indexed for MEDLINE]
   Related articles

2. Treatment for hepatitis B.
   Cooke GS, Main J, Thursz MR.
   PMID: 20051467 [PubMed - indexed for MEDLINE]
   Related articles

3. Intimate partner violence.
   [No authors listed]
   PMID: 20050220 [PubMed - indexed for MEDLINE]
   Related articles

   [No authors listed]
Keyword search results

- Too many to read through
- Lots of false hits
- Results that barely mention your terms
- Headaches and time drains.

1 512 275 results ?!?
What is MeSH?

Medical Subject Headings

- Standardized phrases describing topics specific to the health sciences.
Why use subject headings?

- Humans apply subject headings. In doing so, they
  - Consider negating words like *but, not, except* so your results won’t include citations in which your search terms are specifically excluded.
  - Weigh the relative importance of the search term to the whole article.

Author → Indexer → MeSH
Not all citations in PubMed have MeSH terms

Citations without MeSH terms:

- PMID:21534234[PubMed - as supplied by publisher]
- PMID:21534266[PubMed - in process]
- PMID:14801968[PubMed - OLDMEDLINE]
Evaluating intersectoral collaboration: a model for assessment by service users.

Ahgren B, Axelsson SB, Axelsson R.
Nordic School of Public Health, P.O. Box 12133, SE-402 42 Göteborg, Sweden.

Abstract

INTRODUCTION: DELTA was launched as a project in 1997 to improve intersectoral collaboration in the rehabilitation field. In 2005 DELTA was transformed into a local association for financial co-ordination between the institutions involved. Based on a study of the DELTA service users, the purpose of this article is to develop and to validate a model that can be used to assess the integration of welfare services from the perspective of the service users.

THEORY: The foundation of integration is a well functioning structure of integration. Without such structural conditions, it is difficult to develop a process of integration that combines the resources and competences of the collaborating organisations to create services advantageous for the service users. In this way, both the structure and the process will contribute to the outcome of integration.

METHOD: The study was carried out as a retrospective cross-sectional survey during two weeks, including all the current service users of DELTA. The questionnaire contained 32 questions, which were derived from the theoretical framework and research on service users, capturing perceptions of integration structure, process and outcome. Ordinal scales and open questions were used for the assessment.

RESULTS: The survey had a response rate of 82% and no serious biases of the result were detected. The study shows that the users of the rehabilitation services perceived the services as well integrated, relevant and adapted to their needs. The assessment model was tested for reliability and validity and a few modifications were suggested. Some key measurement themes were derived from the study.

CONCLUSION: The model developed in this study is an important step towards an assessment of service integration from the perspective of the service users. It needs to be further refined, however, before it can be used in other evaluations of collaboration in the provision of integrated welfare services.

PMID: 19348372 [PubMed - in process]  PMC2883704  Free PMC Article
How PubMed’s MeSH database helps

- Enables you to search precisely yet comprehensively on a subject.

- Suggests terms if you’ve typed in a non-MeSH term or mistyped/misspelled a MeSH term.

- Retrieves citations published between 1966 and last week.*

  *Citations published before 1966 or in the previous weeks don’t have Medical Subject Headings, so you’ll need to keyword search to retrieve them.
Subject headings represent unique meanings for homonyms.

Example: Instead of the multi-meaning keyword *delivery*, you would use:

- *Drug Delivery Systems* or
- *Home Childbirth* or
- *Delivery of Health Care.*
Where can I find MeSH terms?

1. Use the links on them in a relevant result from a keyword search.

2. Look them up in the MeSH database.
1. Perform a keyword search on your topic.

2. Find a relevant result.

3. Click on a relevant term from the MeSH terms list to search on it.
Where is the MeSH database?
Click Add to search builder. Click Search PubMed.
To search for specific aspect(s) of a topic

- HIV Infections

21. External envelope protein of the human immunodeficiency virus which is encoded by the HIV env gene. It has a molecular weight of 120 kDa and contains numerous glycosylation sites. Gp120 binds to cells expressing CD4 cell-surface antigens, most notably T4-lymphocytes and monocytes/macrophages. Gp120 has been shown to interfere with the normal function of CD4 and is at least partly responsible for the cytopathic effect of HIV.
Year introduced: 1990

- HIV Seroprevalence
**Attach subheadings to your MeSH term**

**HIV Infections**
Includes the spectrum of human immunodeficiency virus infections that range from asymptomatic seropositivity, thru AIDS-related complex (ARC), to acquired immunodeficiency syndrome (AIDS).

Year introduced: 1990

PubMed search builder options

Subheadings:

- analysis
- anatomy and histology
- blood
- cerebrospinal fluid
- chemically induced
- classification
- complications
- congenital
- cytology
- diagnosis
- diet therapy
- drug therapy
- economics
- epidemiology
- ethnology
- etiology
- genetics
- history
- immunology
- metabolism
- microbiology
- mortality
- nursing
- organization and administration
- parasitology
- pathology
- prevention and control
- psychology
- radiography
- radionuclide imaging
- radiotherapy
- rehabilitation
- statistics and numerical data
- surgery
- therapy
- transmission
- ultrasonography
- urine
- veterinary

For term definitions, click [Subheadings](#).

Click the boxes in front of subheadings you’re interested in. Add many, or none!
More on subheadings

"HIV Infections/prevention and control"[Mesh]

VS

HIV Infections AND Prevention and control
Male circumcision for HIV prevention in sub-Saharan Africa: who, what and when?

White RG, Glynn JR, Orroth KK, Freeman EE, Bakker R, Weiss HA, Kumarasayake L, Habema JD, RJ.

London School of Hygiene and Tropical Medicine, London, UK. richard.white@lshtm.ac.uk

**MeSH Terms**

- Circumcision, Male/economics
- Circumcision, Male/utilization*
- Developing Countries*
- HIV Infections/economics
- HIV Infections/prevention & control*
- HIV- *
- Health Care Costs
"HIV Infections" [Mesh]

Includes

"HIV Infections" [Mesh]
"HIV Infections/prevention & control"[Mesh]
"HIV Infections/any subheading listed"[Mesh]
"HIV Infections" [Major]
"HIV Infections/prevention & control"[Major]
"HIV Infections/any subheading listed"[Major]
1. In the MeSH database type in your term. Search.
2. Click on the most appropriate MeSH term.
3. Click the “Restrict to MeSH Major Topic” checkbox.

**HIV Infections**
Includes the spectrum of human immunodeficiency virus infections that range from asymptomatic seropositivity, thru AIDS-related complex acquired immunodeficiency syndrome (AIDS). Year introduced: 1990

PubMed search builder options
Subheadings:
- analysis
- diet therapy
- drug therapy
- economics
- embryology
- enzymology
- epidemiology
- organization and administration
- parasitology
- pathology
- physiology
- physiopathology
- prevention and control
- ultrasonography
- urine
- veterinary
- virology
- Do not include MeSH terms found below this term in the MeSH hierarchy.
To EXPlode or not to EXPlode?

- **Exploding** means searching for both a term and all the more specific terms under it in the MeSH tree of terms.

- PubMed automatically explodes MeSH terms.

- To unexplode, that is search only for the general topic, click the box immediately beneath Major MeSH.
MeSH: NoExp versus MeSH

Display Settings: □ Summary, 20 per page, Sorted by Recently Added

Results: 1 to 20 of 3555

- Treatment. Supplements improve ART success in Africa.
  1. [No authors listed]
  PMID: 25151678 [PubMed - indexed for MEDLINE]
  Related citations

- HIV-associated renal and genitourinary comorbidities in Africa.
  2. Kalyesubula R, Weame N, Semitala FC, Bowa K.
  PMID: 25117962 [PubMed - indexed for MEDLINE]
  Related citations

- Challenges in the detection, prevention, and treatment of HIV-associated middle-income countries in Africa.
  PMID: 25117007 [PubMed - indexed for MEDLINE]
  Related citations

- [Psychosocial aspects on the treatment of HIV-infection].

Results: 1 to 20 of 23089

- Viral load monitoring and antiretroviral treatment outcomes in a pediatric HIV cohort in Ghana.
  PMID: 26843083 [PubMed - indexed for MEDLINE]
  Related citations

  PMID: 26759248 [PubMed - indexed for MEDLINE]
  Related citations

- Virological outcome among HIV-1 infected patients on first-line antiretroviral treatment in semi-urban HIV clinics in Togo.
  PMID: 26817663 [PubMed - indexed for MEDLINE]
  Related citations

- HIV knowledge, stigma, and illness beliefs among pediatric caregivers in Ghana who have not disclosed their child's HIV status.
  Paintsil E, Renner L, Antwi S, Dame J, Enimill A, Ofot-Atta A, Alhassan A, Ofot IP, Cong X, Kytkali...
Obtain MeSH terms using MeSH database

HIV Infections
Includes the spectrum of human immunodeficiency virus infections that range from asymptomatic seropositivity, thru AIDS-related complex (ARC), to acquired immunodeficiency syndrome (AIDS).
Year introduced: 1990

PubMed search builder options
Subheadings:
- analysis
- anatomy and histology
- blood
- cerebrospinal fluid
- chemically induced
- classification
- complications
- congenital
- cytology
- diagnosis
- diet therapy
- drug therapy
- economics
- embryology
- enzymology
- epidemiology
- ethnology
- etiology
- genetics
- history
- immunology
- metabolism
- microbiology
- mortality
- nursing
- organization and administration
- parasitology
- pathology
- physiology
- physiotherapy
- prevention and control
- psychology
- radiography
- radionuclide imaging
- radiotherapy
- rehabilitation
- statistics and numerical data
- surgery
- therapy
- transmission
- ultrasonography
- urine
- veterinary
- virology

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

Add to search builder
Articles that address the issues of prevention of AIDS in low-income countries?

**Concept 1**

Use OR to combine alternative terms and synonyms.

AIDS

**Concept 2**

Use OR to combine alternative terms and synonyms.

Low Income Countries
AND

“HIV Infections” [Mesh] AND “Developing Countries” [Mesh]

AND= Finds results that contain both keywords.
OR = Finds results that contain either keyword.

“Developing Countries” [Mesh]  OR  “Low income countries” [TIAB]
Incorrect syntax – AND vs and
Problems finding a MeSH term?
Use the [TI] and [SB] tags to find MeSH terms

Search results
Items: 1 to 20 of 115

1. The International Health Regulations 10 years on: the governing framework for global health security.
   Gostin LO, DeBartolo MC, Friedman EA.
   PMID: 26615327
   Similar articles

2. Ebola lessons guide International Health Regulations review.
   Brown C.
   PMID: 26054608
   Similar articles
Identifying the concepts in MeSH terms
Coupling MeSH to create a concept

“World Health Organization” [Mesh]

“Global Health” [Mesh]

“Internationality/legislation and jurisprudence” [Mesh]

Public Health/legislation and jurisprudence” [Mesh]

“Infection Control/legislation and jurisprudence” [Mesh]
Concept 1 AND concept 2 = new single concept

“Global Health" [Mesh] OR "World Health Organization" [Mesh]


“Global Health" + "Infection Control"/lj \(\approx\) International Health Regulations
Nesting using (....)

Parentheses can keep words/MeSH terms together to express one concept:

```
((A OR B) AND (C OR D OR E))
```

```
```
Is Ms Indexer perfect? Not always.
Use of truncation

- PubMed searches for only the first 600 variations of a truncated term.
  - If more than 600 variations (rat*), warning displayed to lengthen the root word.

- Truncation stops term mapping and explosion of a MeSH term.
  - Heart attack* will not map to the MeSH terms Myocardial Infarction, Myocardial Stunning, Shock or Cardiogenic.
MeSHing – behind the scenes
193 537 results

Query Translation:
"myocardial infarction"[MeSH Terms] OR ("myocardial"[All Fields] AND "infarction"[All Fields]) OR "myocardial infarction"[All Fields] OR ("heart"[All Fields] AND "attack"[All Fields]) OR "heart attack"[All Fields]
Different citations results
4414 versus 193 537

Truncation turns off the search for related MeSH terms.
Use search details

Search details will give you an overview of how PubMed has Meshed your terms and which fields have been searched.
Check search details

Query Translation:

```
```

Result:

Quoted phrase not found:

- "HIV Infections[MeSH]"
- "hiv infect*"[tw]
- "human immun*"
- "acquired immun*"
Is “aids”[ALL Fields] retrieving too many irrelevant citations?

Query Translation:

Articles addressing AIDS prevention in developing countries

Concept 1
Use OR to combine alternative terms and synonyms

“HIV infections”[Mesh]

OR

HIV infection*[TW]

OR

AIDS[TI]

Concept 2
Use OR to combine alternative terms and synonyms

“Developing countries”[Mesh]

OR

“Africa”[Mesh]

OR

“low income countries”[All Fields] OR “low income country” [All Fields]
Using **tags** or **Advanced Search**

# Search Field Descriptions and Tags

<table>
<thead>
<tr>
<th>Affiliation [AD]</th>
<th>Issue [IP]</th>
<th>Place of Publication [PL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article Identifier [AID]</td>
<td>Journal Title [TA]</td>
<td>PMCID &amp; MID</td>
</tr>
<tr>
<td>All Fields [ALL]</td>
<td>Language [LA]</td>
<td>Publication Date [DP]</td>
</tr>
<tr>
<td>Author [AU]</td>
<td>Last Author [LASTAU]</td>
<td>Publication Type [PT]</td>
</tr>
<tr>
<td>Comment Corrections</td>
<td>Location ID [LID]</td>
<td>Secondary Source ID [SI]</td>
</tr>
<tr>
<td>Corporate Author [CN]</td>
<td>MeSH Date [MHDA]</td>
<td>Subset [SB]</td>
</tr>
<tr>
<td>Create Date [CRDT]</td>
<td>MeSH Major Topic [MAJR]</td>
<td>Substance Name [NM]</td>
</tr>
<tr>
<td>Entrez Date [EDAT]</td>
<td>MeSH Terms [MH]</td>
<td>Title [TI]</td>
</tr>
<tr>
<td>Filter [FILTER]</td>
<td>NLM Unique ID [JID]</td>
<td>Title/Abstract [TIAB]</td>
</tr>
<tr>
<td>First Author Name [1AU]</td>
<td>Other Term [OT]</td>
<td>Transliterated Title [TT]</td>
</tr>
<tr>
<td>Full Author Name [FAU]</td>
<td>Owner</td>
<td>UID [PMID]</td>
</tr>
<tr>
<td>Full Investigator Name [FIR]</td>
<td>Pagination [PG]</td>
<td>Volume [VI]</td>
</tr>
<tr>
<td>Grant Number [GR]</td>
<td>Personal Name as Subject [PS]</td>
<td>Pharmacological Action MeSH Terms [PA]</td>
</tr>
</tbody>
</table>
Use of tags

- "world health" [TIAB]
- "world health" [AD]
- "world health" [TA]
- "world health" [ALL]
- “world health” [MH]
- “Global Health” [MH]
- "Global Health" [MAJR]
- “Global Health” [MAJR]
Use tags appropriately

- Tags such as [AU] = author or [TI] = title can be ANY terms.

- However some tags are specific
  - [Mesh]
  - [Major]
  - [SH] = subheading
  - [PS]
  - [PA]

- These tags need to be looked up as they are standardised. [Mesh] tags must be in the database.
Using * for truncation

- Replaces any letters in a word
  - HIV Infection*
  - "HIV Infection" or "HIV Infections"
  - "HIV Infections" [Mesh] OR HIV infection*
  - "HIV Infections"[Mesh] OR "HIV infection"[All Fields] OR "HIV infections"[All Fields] OR "HIV infected"[All Fields]

- Use carefully and always test your results.

- Turns off the ability of PubMed to find the correct MeSH term.
Quantity vs precision

#1 yields fewer results than #5

1. "HIV Infections/prevention and control" [Major]
2. "HIV infections/prevention and control" [Mesh]
4. (HIV infection* OR HIV infections [Mesh] ) AND (prevention OR control OR "prevention and control"[Subheading])
5. (AIDS OR HIV OR HIV infections [Mesh] ) AND ((Prevent* AND control*) or ("prevention and control"[Subheading]))
Precision vs quantity

#1 yields more relevant results than #5

Relevance to the question

1. "HIV Infections/prevention and control" [Major]
2. "HIV infections/prevention and control" [Mesh]
3. HIV infections [Mesh] AND "prevention and control "[Subheading]
4. (HIV infection* OR HIV infections [Mesh] ) AND (prevention OR control OR "prevention and control "[Subheading])
5. (AIDS OR HIV OR HIV infections [Mesh] ) AND ((Prevent* AND control*) or ("prevention and control "[Subheading]))
Test your search strategy

- Check your search strategy for spelling mistakes, truncation problems.
- Adapt your strategy for each database.
- Have someone go over the strategy.
Use Word and PubMed’s Search History

Developing countries
"Developing Countries" [Mesh] OR "Africa" [Mesh] OR "low income countries"
OR "low income country" OR low resource setting* OR “LMIC”

HIV concept 1
(AIDS OR HIV OR HIV infections [Mesh]) AND ((Prevent* AND control*) or
("prevention and control" [Subheading]))

HIV concept 2
"HIV Infections/prevention and control" [Major]
Quantity vs. precise results
Advantages of Word/Search History combo

- Easy to add and remove search terms or otherwise adjust search strings.
- Allows us to reuse search strings and strategies.
- Makes it simple to add new search concepts to existing strategies.
- Easy to correct mistakes.
- Saves our strategies beyond eight hours.
Use Word to build strategy

Type in the keywords you would like to include, put phrases in quotation marks and truncate where appropriate.

Template or model format

\[
\left( \text{"HIV Infections"[Mesh]} \text{ OR } \text{HIV infection*} \text{ OR } \text{"Acquired immunodeficiency"} \text{ OR } \text{AIDS} \right)
\]

AND

\[
\left( \text{"Developing Countries"[Mesh]} \text{ OR } \text{"Africa"[Mesh]} \text{ OR } \text{"low income countries"} \text{ OR } \text{"low income country"} \text{ OR } \text{low resource setting*} \text{ OR } \text{"LMIC"} \right)
\]

AND

\[
\left( \text{Other concept [MH]} \text{ OR } \text{other concept [ALL]} \text{ OR } \text{other concept [TIAB]} \right)
\]
Don't re-invent Einstein's Theory of Relativity

- Try to find other searchers' strategies they have used.
- The Cochrane Library's systematic reviews will usually list at least the key search terms, if not the entire search strategy.
- Other systematic or literature reviews, guidelines etc will document the search strategy.
- Look for filters or hedges (PubMed's Systematic Review filter).
Plot your search strategy

Search Planning Form

Use this form to identify/clarify the key concepts and the scope of your research topic. For each section, refer to the guidance notes on the following page for further explanation.

Name: __________________________________________________________

Date search started: _______________ Date search completed: _______________

1. Your Research Topic

2. Consider how the following four categories apply to your research topic

<table>
<thead>
<tr>
<th>Patient/Population and/or Problem</th>
<th>Intervention</th>
<th>Comparison/Control (if applicable)</th>
<th>Outcomes (or Effects)</th>
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</tbody>
</table>

Alternative Words


Reporting your search

- Qualifications of searchers
- Search strategy
- Effort to include all available studies
- Search software
- Use of hand searching
- List of citations found
- Method of addressing non-English studies
- Handling of unpublished literature
- Description of any contact with authors.