Information Retrieval Search

What is Biomedical & Health Informatics?
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Retrieval

• Two general approaches – most systems make use of both, e.g., PubMed and Google
  – Boolean, set-based, exact-match
  – Natural language, automated, partial-match
• Early systems tended to be Boolean
  – Preferred by power users?
• More recent systems based on natural language
  – Simpler for less experienced searchers?
Boolean retrieval

• Basic approach
  – Build sets of content items (i.e., documents) based on search terms from controlled vocabulary or text words
  – Combine with AND, OR, NOT

• Most bibliographic systems use Boolean operators
  – Allow searching on both assigned indexing terms and text words

• Systems retrieving other types of content use them too, though they are sometimes hidden, e.g., Google performs AND of all words in query
Boolean operators

- **AND** – only content items that have all terms

- **OR** – content items that have any term

- **NOT** – content items with one term but not other
Some advanced features of Boolean systems

• Proximity operators require words to be within a certain range
  – e.g., colon (4) cancer, “colon cancer”

• Explosions perform OR down a hierarchy
  – PubMed “autoexplodes” many MeSH terms, e.g.,
    • All diseases in a category, e.g., anemias
    • All drugs in a certain class, e.g., ACE inhibitors

• Subheadings refine a heading
  – e.g., diagnosis of hypertension

• NLM system for searching MEDLINE
  – Includes some OLDMEDLINE (before 1966) as well as other records not indexed in MEDLINE

• Based on Boolean heritage but has added automated features over the years
  – Search algorithm tries to map input to MeSH terms, author name, and other phrases
  – Has traditional Boolean set capability in Advanced interface but most users do not use it

• Historical output order was reverse chronological but now defaults to “Sort by Relevance” (Fiorini, 2018)
Other valuable features of PubMed

• Spelling correction
• Proximity searching using quotes ("...")
• Graphical interface for applying filters
• Link Out to full text (and other resources)
  – Link to publisher site, may not be free
• Clinical Queries
  – Help find best evidence for EBM question types
• MyNCBI
  – Allows saved searches, custom filters, emailing of results, etc.
Tour of PubMed

• User wants to know about treatment of congestive heart failure with angiotensin-converting enzyme (ACE) inhibitors
  – PubMed maps query into appropriate Boolean statement

• Simple AND yields way too many results, so want to narrow down, especially to best evidence
  – Done by applying filters or using Clinical Queries
Main screen at:

pubmed.gov
A search on: congestive heart Failure

Note many features, to be discussed in following slides
A search on: ACE inhibitors

(Angiotensin-converting enzyme inhibitors)
Combined with a Boolean AND
You actually don’t need to type the AND.
How does it do all of this?
Can sort output by (traditional) reverse chronological or “relevance”
What we want: the MEDLINE record

Assessment of Limitations to Optimization of Guideline-Directed Medical Therapy in Heart Failure From the GUIDE-IT Trial: A Secondary Analysis of a Randomized Clinical Trial

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Abstract

Importance: Despite evidence that guideline-directed medical therapy (GDMT) improves outcomes in patients with heart failure (HF) and reduced ejection fraction, many patients are undertreated. The Guiding Evidence-Based Therapy Using Biomarker-Intensified Treatment (GUIDE-IT) trial tested whether a strategy of using target concentrations of N-terminal pro-brain natriuretic peptide (NT-proBNP) to guide optimization of GDMT could improve outcomes.

Objective: To examine medical therapy for HF in GUIDE-IT and potential reasons why the intervention did not produce improvements in medical therapy.

Design, setting, and participants: GUIDE-IT, a randomized clinical trial performed at 45 sites in the United States and Canada, was conducted from January 16, 2013, to September 20, 2016. A total of 894 patients with HF and reduced ejection fraction (≤40%) were randomized to NT-proBNP-guided treatment with a goal to suppress NT-proBNP concentrations to less than 1000 pg/L, vs usual care. This secondary analysis examined the medical therapy titration and reasons why the intervention did not produce improvements in care and outcomes. Data were analyzed March 27 to June 28, 2019.

Main outcomes and measures: For each encounter, medication titrations were captured. A reason was requested if a modification was not made. A Cox proportional hazards regression model was used to assess the independent association of drug class with outcomes.

Results: Among the 833 patients available for analysis (566 men [67.9%]; median age, 62.0 years), 6223 visits occurred during 24 months. Adjustments of HF medication were made
But 11K+ still way too many

Can filter by RCT
Still too many, so can filter by Systematic Review
Or even by Practice Guideline

8.5a
Can also use “advanced” interface
Another option: Clinical Queries

PubMed Clinical Queries

Results of searches on this page are limited to specific clinical research areas. For comprehensive searches, use PubMed directly.

Clinical Study Categories
This column displays citations filtered to a specific clinical study category and scope. These search filters were developed by Hayes RE et al. See more filter information.

Systematic Reviews
This column displays citations for systematic reviews. See filter information or additional related sources.

Medical Genetics
This column displays citations pertaining to topics in medical genetics. See more filter information.
Three clinical areas

PubMed Clinical Queries

Results of searches on this page are limited to specific clinical research areas. For comprehensive searches, use PubMed directly.

Search: Heart failure ACE inhibitors

Clinical Study Categories

Category: Therapy
Scope: Broad

Systematic Reviews

Results: 5 of 123
Pharmacological interventions for heart failure in people with chronic kidney disease.


Effects of Blood Pressure-Lowering Agents on Cardiovascular Outcomes in Moderate-Stage CKD: A Systematic Review and Meta-Analysis.

Khot PA, de Zeeuw D, de Sanjose S, Gudex CT, Atsumi T, Cardiovascular Drugs. 2020 Jan 5; Cardiovasc Drugs IV: Medline 2020 Jan 5.

Role of cardio-protective agents on chemotherapy-induced heart failure: A systematic review and network meta-analysis of randomized-controlled trials.


Medical Genetics

Results: 5 of 358
Current Management and Treatment

Methods: A systematic review and meta-analysis of randomized controlled trials.

Mechanism: Systolic and diastolic dysfunction, left ventricular hypertrophy, and increased fibrosis.

Efficacy of Metformin and Sodium-glucose Cotransporter 2 Inhibitors in Patients with Heart Failure and Reduced Ejection Fraction: A Systematic Review and Meta-Analysis.


8.5a
Types of clinical studies based on EBM-style queries

PubMed Clinical Queries

Results of searches on this page are limited to specific

congestive heart failure ace inhibitors

Clinical Category

- Etiology
- Diagnosis
- Therapy
- Prognosis
- Clinical prediction guides
Types of Medical Genetics studies

- Diagnosis
- Differential Diagnosis
- Clinical Description
- Management
- Genetic Counseling
- Molecular Genetics
- Genetic Testing
Can also set up myNBCI account

• Saved searches
  – Can be sent via email
• MyBibliography
Which features do expert searchers value most (Russell-Rose, 2017)?