Evidence Based Library and Information Practice

Evidence Summary

New Search Strategies Optimize MEDLINE Retrieval of Sound Studies on Treatment or Prevention of Health Disorders

A review of:

Haynes, R. Brian, K. Ann McKibbon, Nancy L. Wilczynski, Stephen D. Walter, and Stephen R. Were. "Optimal search strategies for retrieving scientifically strong studies of treatment from Medline: analytical survey." BMJ 330.7501 (21 May 2005): 1179.

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Abstract

Objective – To develop and test search strategies for retrieving clinically sound studies from the MEDLINE database on the prevention or treatment of health disorders.

Design – Analytical survey.

Subjects – The data sources were articles about treatment studies selected from 161 journal titles indexed for MEDLINE in the year 2000.

Setting – MEDLINE database searches performed at the Health Information Research Unit, McMaster University, in Ontario, Canada.

Methods – Researchers hand searched each issue of 161 journal titles indexed in MEDLINE in the year 2000 to find treatment studies. Journal content included internal medicine, family practice, nursing, and mental health titles. Selected studies met the following criteria: randomisation of subjects, outcome assessment for at least 80% of who entered the study, and an analysis consistent with study design. Of 49,028 potential articles, 6,568 were identified as being treatment or prevention related, and 1,587 met the evaluation criteria. The study authors then created search strategies designed to retrieve articles in MEDLINE that met the same criteria, while excluding articles that did not. They compiled a list of 4,862 unique terms related to study criteria, and tested them using the Ovid Technologies search platform. Overall,

18,404 multiple-term search strategies were tested. Single terms with specificity greater than 75% and sensitivity greater than 25% were combined into strategies with two or more terms. These multiple term strategies were tested if they yielded sensitivity or accuracy greater than 75% and specificity of at least 50%.

Main Results – Of the 4,862 unique terms, 3,807 retrieved citations from MEDLINE that researchers used to assess sensitivity, specificity, precision, and accuracy. The single term that yielded the best accuracy while keeping sensitivity greater than 50% was 'randomized controlled trial.pt.'.The single term that yielded the best precision while keeping sensitivity greater than 50% was also 'randomized controlled trial.pt.'.This term also gave the greatest balance of sensitivity and specificity. Combination strategies varied. Some two-term combinations outperformed single term strategies and three-term combinations. Tables in the article provide the top three search strategies yielding the highest sensitivity, specificity, accuracy, and balance between sensitivity and specificity.

Search strategies with sensitivity greater than 50% and specificity greater than 95% were evaluated further by adding search terms using logistic regression techniques. The best strategies for maximizing sensitivity had sensitivity greater than 99% and specificity higher than 70%. The best strategies for maximizing specificity had sensitivity greater than 93% and specificity more than 97%.

Conclusion – In addition to providing the best strategies developed in this study, authors compared their results with the results from 19 other published strategies. The published strategies had a sensitivity range of 1.3% to 98.8% on the basis of the hand searched articles. These were all lower than this study's best sensitivity of 99.3%.

Two strategies published by Dumbrigue, with specificities of 98.1% and 97.6%, outperformed this study's most specific strategy of 97.4%.

Commentary

The authors clearly state the purpose of the study, and their choice of an analytical survey is the appropriate methodology for this research question. While the methods are described in detail, the description is somewhat disjointed and extends into the section discussing results. Readers might have been better served by a chronological discussion of study methods. The authors provide a straightforward diagram detailing their data collection procedures.

The authors selected 161 clinical journals to hand search. Although they do not detail the process by which these titles were selected, they direct readers to two prior studies containing specific methods (Haynes and Wilczynski, Montori et al.). The journal list evolved from an iterative process over several years, based on a hand search examination of more than 400 journals recommended by physicians, librarians, and editors. Other factors used to determine the journal list included Science Citation Index impact factors and the authors' assessment of the journals' scientific merit.

The top strategies are presented in a series of seven tables that are visually streamlined and easy to read and interpret. Formulas for calculating sensitivity, specificity, precision, and accuracy are presented in another table. Many searchers are familiar with the concepts of sensitivity and specificity, but less familiar with precision and accuracy, so the inclusion of these formulas is important. Data in Table 4 indicate that the top three search strategies yielding the highest specificity had sensitivity greater than 93%, while the text of the Results section indicates

this was 94%. This is a minor error and does not affect the subsequent discussion.

Also curious is why the Dumbrigue strategies mentioned in the Results section were not included in the specificity range of the 19 other published strategies. The authors write, "The specificities for the published strategies ranged from 63.3% to 96.6%." Yet in the next sentence, Dumbrigue (who is included in the list of the 19 strategies) is credited for having two strategies with specificity figures of 98.1% and 97.6%. It is not clear why the one with the sensitivity greater than 50% was not included in the range.

The authors point to the reasons why no one search strategy is perfect. Factors such as indexing inconsistency, indexing rule changes over time, and the inclusion of many non-clinical journals in MEDLINE will affect retrieval.

While searching for research evidence is only one part of the complete skill set needed to practice evidence based medicine, it is the one area for which many clinicians have little or no training. Most clinicians will not have the time or the patience to learn to construct multiple-term search strategies using controlled vocabulary, which means that tested and predefined search strategies become doubly important. Strategies that have been submitted to rigorous statistical testing and that have demonstrated high sensitivity and/or specificity, can be incorporated into clinical literature databases to assist novice searchers in retrieving relevant and scientifically strong studies.

This is exactly what happened with the results of this study. The most sensitive and the most specific search strategies developed by the study authors have been incorporated into the PubMed Clinical Queries search filter and into the search features of the Ovid Technologies MEDLINE interface. The single most optimal strategy was added to Skolar search options. A busy clinician looking for only one or two papers most relevant to a particular clinical question, can use the Specificity filter. A researcher more interested in the universe of evidence for a clinical question can use the Sensitivity filter to retrieve a larger number of potentially useful articles.

One problem with the focus of these search strategies being limited to randomised controlled trials is that they exclude studies where randomisation is not possible. Critics of evidence based practice have previously written of this problem (Ray, Schelling, Vincent). Population-based studies, certain treatment modalities, cohort studies, and other study designs are excluded from the search, potentially leading searchers to incorrectly conclude that these other papers are not rigorous or scientifically sound.

This shortcoming aside, this is evidence based practice at its best. Even librarians with years of search experience can, and do, benefit from the work done by this Health Information Research team to develop and test high quality search strategies.

Works Cited

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