Evidence Based Library and Information Practice

Evidence Summary

New Search Strategies Successfully Optimize Retrieval of Clinically Sound Treatment Studies in EMBASE

A review of:

Wong, Sharon S-L, Nancy L. Wilczynski, and R. Brian Haynes. "Developing Optimal Search Strategies for Detecting Clinically Sound Treatment Studies in *EMBASE*." Journal of the Medical Library Association 94.1 (Jan. 2006): 41-47. 14 May 2007 http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1324770.

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Abstract

Objective – To develop and test the sensitivity and specificity, precision and accuracy of search strategies to retrieve clinically sound treatment studies in the *EMBASE* database.

Design – Analytical study.

Setting – Methodologically sound studies of treatment from 55 journals indexed in *EMBASE* for the year 2000.

Subjects – *EMBASE* and hand searches performed at the Health Information Research Unit of McMaster University, Ontario, Canada.

Methods – The authors compare the results of *EMBASE* searches using their search strategies with the "gold standard" of articles retrieved by hand search. Research assistants initially hand searched each issue of 55 selected journals published in 2000 to identify articles detailing studies on healthcare treatment of humans. Subject coverage of the journals was wide ranging and included obstetrics and gynaecology, psychiatry, oncology, neurology, surgery and general practice. Studies were then assessed to ensure they met the qualifying criteria: random allocation of participants to groups, outcome assessment of at least 80% of participants who began the study, and analysis consistent with study design.

Initially, 3850 articles on treatment were identified, of which 1256 (32.6%) were methodologically sound. To construct a comprehensive set of search terms, input was sought from librarians and researchers in the US and Canada. This initially produced a list of 5385 terms, of which 4843 were unique and 3524 produced hits. Individual search terms with sensitivity greater then 25% and specificity greater then 75% were incorporated into search strategies for use within the OVID interface for the *EMBASE* database to retrieve articles meeting the same criteria. These strategies were developed using all 27,769 articles published in the 55 journals in 2000. This all-inclusive approach was used to test the search strategies' ability to identify high-quality treatment articles from a larger pool of material.

Main results – The single term which achieved best sensitivity was "random:mp," with a sensitivity of 95.1%. This same term achieved a high specificity of 92.5%. The best-performing single term for specificity was "randomized:tw" at 96.7%, but this did reduce sensitivity to 63.2%. The single term to achieve the best balance between the two was "clinical trial:mp," with a sensitivity of 88.3% and specificity of 88.0%. Combining terms produced varied results, and Table 3 within the article details terms used to give the best combinations for sensitivity, specificity and optimisation of both. The best three-term search strategies for sensitivity achieved a rate just shy of 99% with a specificity of 72.0%, while the optimum three-term strategy for specificity achieved 96.7% but with a trade off of lowering the rate of sensitivity to 51.7%. The best-performing combination of search terms to optimise sensitivity and specificity produced values exceeding 92% for both.

Conclusion – The authors present search strategies which can successfully be used to retrieve methodologically sound studies on the prevention and treatment of disease and health complications indexed on the *EMBASE* database. A clear outline of the trade-off between sensitivity and specificity of the strategies is included.

Commentary

As the authors highlight in their introduction, keeping up to date with a healthcare knowledge base which is expanding at the rate of over 2 million new articles a year is a labour-intensive business. Separating the wheat from the chaff in order to focus on high quality evidence based literature is an increasingly important role for library services in supporting the busy clinician. With this objective, the authors set out to develop optimal search strategies in order to identify high-quality treatment studies in *EMBASE*. The work is believed to be the first time such strategies have been developed for this database and the authors most certainly achieve their objective.

This is one of several articles by Wilczynski and colleagues on search strategies, all of which are referenced in the original article, and as their earlier work has been adapted for use as Clinical Queries search filters in *PubMed*, we can be assured that we are in safe hands. In many ways this is a follow-up piece to an article the authors conducted on the *MEDLINE* database (Haynes 2005) and which itself was the subject of an Evidence Summary published in *EBLIP* (Brown 2006) .That *MEDLINE* study was praised in *EBLIP* as "evidence-based practice at its best" and this companion piece is of an equally high calibre.

The authors are able to build on their previous work in the field, being confident to test the strategies on a comparatively small set of 55 journals whittled down from an initial 135 titles. Their previous work using *MEDLINE* had demonstrated that using a smaller dataset had produced no

statistically significant differences from using a larger one, whilst significantly decreasing computation time.

A possible shortcoming of the study, and one not addressed by the authors, presents itself when contemplating the 55 titles selected. These 55 are all "big-name" mainstream journals which also are indexed in *MEDLINE*. As the overlap between *MEDLINE* and *EMBASE* is 30-50%, one wonders whether the filters would work as well if applied to a broader selection of journal titles and subject headings which are available within *EMBASE* but not *MEDLINE*.

One of the great features of this article is the exemplary use of tables throughout, each one clearly laid out and easy to interpret. The complex search strategies are detailed in a straightforward table where at a glance it is easy to compare sensitivity, specificity, precision and accuracy. Considering the numerous figures involved and the potential for confusion, the result is refreshingly simple to absorb, and other authors should take note of how to present complex data in an easily digestible manner.

The authors are also prepared to highlight the limitations of their study. We are made aware that there is a real trade off between specificity and sensitivity of search results. Using their best specificity strategy, the sensitivity of the search drops dramatically to nearly 50%, meaning that almost 1 in 2 clinically relevant articles would be missed. Searchers need to ponder which is the most appropriate filter for their needs.

It never hurts to remind ourselves that while RCTs are a robust methodology, not all research lends itself to the format of a randomized controlled trial**.** While an RCT will be the research methodology of choice for high-quality treatment research, its use is not always possible or appropriate. A great deal of rigorous and methodologically sound research takes place using, for example, cohort studies, which is an equally valid methodology. Even if we do embrace the RCT as king we must remember that not all RCTs included on *EMBASE* will have been conducted to the same standards, coming as they do from a wide variety of journals with differing publication criteria.

An excellent illustration is included of what all this means in practical terms, with a worked example of a search on herbal medicine in Table 4. Taking the initial results of 5696 articles, and combining them with the search strategy to optimise sensitivity and specificity, the results are reduced to 427 hits or around 7.5% of the original number. While completists may be prepared to hunt through nearly 6000 references, I for one will be happy to use the filters presented here and be confident that any research of note is unlikely to be missing.

Works cited

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." British Medical Journal 330.7501 (21 May 2005): 1179-1182. 14 May 2007 <http://www.bmj.com/cgi/content/abstract/330/7501/1179#otherarticles>.

Brown, Marcy L. "New Search Strategies Optimize *MEDLINE* Retrieval of Sound Studies on Treatment or Prevention of Health Disorders." Evidence Based Library and Information Practice 1.2 (2006): 23-25. 14 May 2007 <http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/45/111>.