

### Response to Glanville et al.: how to identify randomized controlled trials in MEDLINE: ten years on

A recent study by Glanville et al. [1] assessed whether the 1994 Cochrane Highly Sensitive Search Strategy (HSSS) for detecting randomized controlled trials (RCTs) in MEDLINE could be improved. In this paper, they also compared the sensitivity and precision of the six strategies they developed with seven published strategies (twelve total sets of strategies because one strategy was the same in both groups). One of the strategies compared in their evaluation was the sensitive therapy filter available on the Clinical Queries screen in PubMed <<http://www.ncbi.nlm.nih.gov/entrez/query/static/clinical.shtml>>, which was developed by our research group at McMaster University [2]. We welcome such an analysis of our work and encourage researchers to continue to investigate improved ways of searching for desired article types in MEDLINE.

Glanville et al. indicated that one of the advantages of the method they used to develop the search strategies reported in the paper was the objectivity in deriving the most efficient search terms to find desired types of records. Their derivation used the techniques of word frequency analysis and discriminate analysis. This method was contrasted to the subjectivity used to derive the list of search terms when the 1994 Cochrane HSSS was developed and when we derived and tested our therapy filter in 2002. Comparing the performance of our most sensitive therapy filter

(the McMaster strategy or filter) with the performance of the search strategies reported in the paper by Glanville et al. (Glanville strategies or filters) is important. This letter reports the testing of the Glanville filters in the McMaster Clinical Hedges Database and the testing of the McMaster filters in the Glanville database reported in their paper. This two-way, two-database method provides the most useful comparison of the strategies to determine their relative merits as highly sensitive search strategies for detecting RCTs in MEDLINE.

The most sensitive McMaster search strategy for detecting therapy articles, available through the Clinical Queries screen of PubMed, was tested by Glanville et al., and the data are provided in Table 1. Their testing set of documents (gold standard) included 425 records, of which 392 were indexed trials and 32 were unindexed trials. These records came from hand-searching 4,681 records published in 2003 that were retrieved by searching MEDLINE using the exploded Medical Subject Headings terms, "Otitis Media," "Migraine," "Cataract Extraction," and "Asthma." Testing the McMaster search strategy in the Glanville database produced a sensitivity of 96.46% and a precision of 25.89%. In the McMaster test database, our performance results with the same strategy were 99.3% and 9.9%, respectively.

To complete the cycle of comparing the McMaster and Glanville strategies, the Glanville strategies should be run in the McMaster test database. The McMaster Clinical Hedges Database has 49,028 articles, of which 6,568 articles were classified in a hand-search as orig-

inal studies evaluating a treatment. Of the latter, 1,507 (3.2%) met our methodological criteria for being a high-quality RCT (i.e., RCT with at least 80% follow-up of those randomized and analysis consistent with the study design). The Glanville test database was smaller (4,681 articles), was proportionally richer in RCTs (425 RCTs or 9.1%), and included RCTs without any methodological criteria requirement.

The results of testing the Glanville search strategies in the McMaster Clinical Hedges Database are shown in Table 2. We find that the sensitivity and precision of these strategies are somewhat different when tested in the McMaster database than their reported characteristics when run in the Glanville database. In some cases, the sensitivity has increased, and, in some cases, it has decreased. As described below, because the proportion of RCTs is lower in the McMaster database, the precision has decreased in all cases.

The data presented in Tables 1 and 2 show that the McMaster sensitive therapy search strategy available through PubMed is in fact highly sensitive, when compared with the Glanville strategies, and has fewer terms. Thus, it appears that the subjective method of deriving the list of search terms that we used to develop the sensitive therapy filter available through PubMed has favorable performance and likely does not introduce bias.

An additional aspect of the comparison between the McMaster search filter and the Glanville strategies requires further comment. Precision depends on the concentration of target articles (in this case, therapy articles) in the entire

**Table 1**

McMaster strategy in McMaster database: most sensitive search strategy for detecting therapy articles in MEDLINE, shown in Ovid syntax but also available through the Clinical Queries Screen of PubMed

Search strategy	Sensitivity (95% CI)	Specificity (95% CI)	Precision (95% CI)	Accuracy (95% CI)
clinical.trial.mp. OR clinical.trial.pt. OR random:.mp. OR tu.xs.	99.3 (98.7 to 99.8) <b>G = 96.46</b>	70.4 (69.8 to 70.9)	9.9 (9.3 to 10.5) <b>G = 25.89</b>	71.3 (70.8 to 71.8)

Performance reported by Glanville et al. in their *JMLA* paper shown in bold and indicated as G = ... (McMaster strategy in Glanville database).

**Table 2**

Glanville strategies in McMaster database: search strategies reported in Glanville et al. paper to identify randomized controlled trials in MEDLINE, performance in the Clinical Hedges database

Search strategy	Sensitivity (95% CI)	Specificity (95% CI)	Precision (95% CI)	Accuracy (95% CI)
<b>Strategy A</b>				
clinical trial.pt. OR randomized.ab. OR placebo.ab. OR dt.fs. OR randomly.ab. OR trial.ab. OR groups.ab.	98.5 (97.9 to 99.1)	74.8 (74.4 to 75.1)	11.5 (11.0 to 12.1)	75.5 (75.1 to 75.9)
	<b>G = 99.29</b>		<b>G = 21.39</b>	
<b>Strategy B</b>				
clinical trial.pt. OR randomized.ab. OR placebo.ab. OR dt.fs. OR randomly.ab. OR trial.ab.	98.2 (97.5 to 98.8)	80.9 (80.6 to 81.3)	14.7 (14.0 to 15.4)	81.5 (81.1 to 81.8)
	<b>G = 96.93</b>		<b>G = 24.02</b>	
<b>Strategy C</b>				
clinical trial.pt. OR randomized.ab. OR placebo.ab. OR clinical trials.sh. OR randomly.ab. OR trial.ti.	97.7 (96.7 to 98.5)	91.1 (90.8 to 91.2)	26.9 (25.7 to 28.0)	91.3 (91.1 to 91.6)
	<b>G = 95.05</b>		<b>G = 55.36</b>	
<b>Strategy D</b>				
clinical trial.pt. OR randomized.ab. OR placebo.ab. OR clinical trials.sh. OR randomly.ab. OR trial.ti. OR dt.fs. OR effects.ti. OR comparative study.sh.	98.7 (98.2 to 99.3)	72.7 (72.3 to 73.1)	10.8 (10.3 to 11.3)	73.5 (73.9 to 73.9)
	<b>G = 99.06</b>		<b>G = 19.97</b>	
<b>Strategy E</b>				
randomized controlled trial.pt.	92.8 (91.1 to 94.5)	97.6 (97.4 to 97.7)	55.5 (52.8 to 57.8)	97.4 (97.2 to 97.6)
	<b>G = 82.78</b>		<b>G = 100.00</b>	
<b>Strategy F</b>				
clinical trial.pt.	95.4 (94.4 to 94.6)	94.4 (94.2 to 94.6)	36.1 (34.7 to 37.6)	94.4 (94.2 to 94.6)
	<b>G = 92.69</b>		<b>G = 81.03</b>	

Performance reported by Glanville et al. in their *JMLA* paper are shown in bold and indicated as G = ... (Glanville strategies in Glanville database).

database. Both research groups tested the search strategies in a subset of MEDLINE records. The precision figures reported by the Glanville and McMaster groups for search strategies in both databases are, therefore, only an illustration of search strategy performance. When searching in the entire MEDLINE database, precision will likely be lower.

Much important work has been done by many groups in developing search strategies for quickly and efficiently selecting articles based on research methodologies. Studies of comparisons are important for all who are interested in the area of information retrieval and knowledge synthesis in health care. Clarifying differences in methods between such comparisons is important for understanding the implications of the searching techniques. To accommodate further comparisons, we have the capability of testing strategies in the McMaster database and are

willing to do so. Please contact us for further information.

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## Response to Glanville et al.

The April 2006 issue of the *Journal of the Medical Library Association (JMLA)* included a highly interesting paper by Glanville et al. [1] about searching for randomized controlled trials in MEDLINE or PubMed. Three different search strategies were identified, a simple strategy, a simple strategy for increased sensitivity, and a Cochrane Highly Sensitive Search Strategy. The last strategy is especially interesting for information specialists for performing a sensitive search for finding clinical trials on a specific topic.

In the July 2006 issue of the *JMLA*, an erratum was published by the authors [2] addressing this highly sensitive search strategy. Search term number 2 of the original search strategy, "randomized[ab]," was replaced by "randomized[tiab]," because the [ab] search tag was discontinued by the National Library of Medicine. A similar [tiab] replace-

ment took place with other search terms as well.

However, this is not the only change the authors have made. Search term number 4 of the first highly sensitive search strategy [1], "clinical trials[mh]," has been replaced in the erratum [2] by "dt[sh]," the floating subheading "drug therapy." Next, search item number 7, "groups[tiab]," has been added in the second search strategy as published in the erratum [2]. In this erratum [2], the authors do not mention these changes and, as a consequence, do not explain why these changes have been made.

As this highly sensitive search strategy might be used in the future by the Cochrane Collaboration as the standard search strategy to find clinical trials in MEDLINE or PubMed, would the authors clarify their rationale for withdrawing the Medical Subject Heading term "clinical trials" in the changed version of the search strategy and replacing it with the floating subheading "drug therapy" and for adding the search term "groups[tiab]?"

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2. Glanville JM, Lefebvre C, Miles JNV, Camosso-Stefinovic J. How to identify randomized controlled trials in MEDLINE: ten years on [erratum]. *J Med Libr Assoc* 2006 Jul;94(3):354.

## Authors' response

Thank you for the invitation to respond to the letters about our paper in the *Journal of the Medical Library Association (JMLA)* [1].

In response to Leclercq's letter, we noted in our erratum not only a proofreading error in the third strategy, but also replacement of the PubMed [ab] search tag with the [tiab] search tag due to changes introduced in PubMed. The proofreading error was that we had failed to notice that the incorrect search strategy had been included as the CRD/Cochrane Highly Sensitive Search Strategy in Figure 2. This was, therefore, corrected by including the correct search strategy in the erratum.

In response to the letter from Wilczynski and colleagues at McMaster, we agree that the testing and reporting of search filter performance on a wide variety of relevant gold standards is important. It can provide important performance data to enable users to decide which filters to use in which circumstances. We welcome the interest in our work shown by the McMaster team and the opportunity to see the performance results for our filters when tested on the McMaster database.

Our methods were based on gold standards derived in two ways. Firstly, the search strategies themselves were objectively derived, using discriminant analysis, from a gold standard set of records of randomized controlled trials (RCTs) randomly selected from all MEDLINE RCTs and a comparison set of non-RCTs from MEDLINE in three specific years. Secondly, the strategies were tested on full subject subsets of MEDLINE records in four different disease areas in one year by hand-searching all the records retrieved in those disease areas to identify RCTs. The McMaster database was compiled using a different process, 171 core health journals were hand-searched over 1 year, records were classified as "evaluating a treatment," and, within that classification, as "high-quality RCTs," which are defined as RCTs with at least 80% follow-

up of those randomized and analysis consistent with the study design.

These different approaches present challenges in terms of generalizability for others wishing to select which filters to use in the future, as discussed in our paper, but the subject approach we used to test the performance of our search filters against a full subject subset of MEDLINE, we believe, is likely to be more generalizable as it captures whole subject segments of MEDLINE (with the complete range of journals that segment may include) without removing anything other than animal studies. We, therefore, feel that the precision figures we report are more likely to be close to the precision figures that users of our filters will achieve in MEDLINE when searching for RCTs in other clinical areas.

The definitions of RCTs used by the two research groups also differ. The McMaster definition is outlined above. The definition of RCT in The Cochrane Collaboration includes all studies involving humans in which the participants are randomly allocated prospectively to the intervention or control groups. The purpose of the RCT filters we designed was to identify in MEDLINE as many reports of RCTs as possible, with a balance between sensitivity and precision offered by the range of filters. Decisions about the quality of an RCT and whether to include it in a Cochrane review are downstream of the task of identifying potentially eligible studies. In our view, therefore, the McMaster filter may raise concerns about preselection with respect to quality. This is borne out by the testing of our strategy E (randomized controlled trial.pt.) in the McMaster database. The test resulted in a precision of 55.5%, which indicates that the McMaster team considered 44.5% of the records in their database, which had been indexed as RCTs by the US National Library of Medicine for MEDLINE, to not meet their criteria as "high-quality RCTs."

It is not surprising that our filters generate different sensitivity and precision results in the McMaster database compared with the MED-

LINE subject subsets that we tested them in. The same applies to differences in results for the McMaster filter.

We support continued testing of search filters over a range of subject areas, on gold standards developed in different ways. These detailed data will provide searchers with useful information as to which filters to use according to their needs. The UK InterTASC Information Specialists' Subgroup (ISSG), the group of information professionals supporting research groups in England and Scotland providing technology assessments to the National Institute for Health and Clinical Excellence, is developing a resource to encourage researchers and information professionals to submit search filter performance data after the conclusion of their research <<http://www.york.ac.uk/inst/crd/intertasc/>>. This resource, along with a critical appraisal tool for search filter publications currently under development, will be an increasingly useful resource for users deciding which filters to use. We would encourage others to test out the McMaster team's, ours, and other search filters after using them to identify RCTs in their own subject areas and report the performance on the ISSG Website.

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## Response to Perryman

Perryman's article on library services to patients that appeared in the July 2006 issue of the *Journal of the Medical Library Association* [1] mischaracterized—inadvertently, I am sure—some of what I wrote on the topic for the *Bulletin of the Medical Library Association* in 1996 [2].

On page 264, the author cited my article in noting that the "first hospital library intended for patients was begun at Massachusetts General Hospital." In fact, because primary research was never able to definitively prove that, my article instead said that the Massachusetts General Hospital's library was "thought to be the oldest of its kind" in a general hospital. A number of United States general hospitals were founded before the Massachusetts General Hospital, and any one of them could and perhaps did have collections of materials for patients. To date, though, research that could comprehensively address that appears to be lacking.

In the same paragraph, the author (seemingly referring to the mid-nineteenth century era), cited my article as noting that the term

hospital library "was actually used to designate what we might now term patient or consumer health libraries." However, my article did not mention consumer health libraries and did not equate patients' libraries with them. Rather, in pointing out the ambiguity inherent in the nonspecific term "hospital library," it noted that in the

first four decades of [the twentieth century], hospital library most often meant a library for patients. Because those libraries usually extended services to professional staff and other hospital personnel, they sometimes were called the "general library" or the "library for patients and personnel."

The history of the development of libraries for patients is a long and fascinating one. Thank you to the *Bulletin of the Medical Library Association* and subsequent *Journal of the Medical Library Association* for publishing much of it.

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