

# **Evidence Based Library and Information Practice**

#### Article

# Reporting of the Role of the Expert Searcher in Cochrane Reviews

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## Abstract

**Introduction -** This study applied the principles of evidence based information practice to clarify the role of information specialists and librarians in the preparation of Cochrane systematic reviews and to determine whether information specialists impact the quality of searching in Cochrane systematic reviews.

**Objectives** - This research project sought to determine how the contribution of the person responsible for searching in the preparation of Cochrane systematic reviews was reported;

whether the contribution was recognized through authorship or acknowledgement; the qualifications of the searcher; and the association between the type of contributorship and characteristics of the search strategy, assessability, and the presence of certain types of errors.

#### Methods

Data sources: The Cochrane Database of Systematic Reviews, The Cochrane Library 3 (2002).

*Inclusion criteria:* The study included systematic reviews that met the following criteria: one or more sections of the Cochrane Highly Sensitive Search Strategy were utilised, primary studies were either randomised controlled trials (RCTs) or quasi-RCTs, and included and excluded studies were clearly identified.

*Data extraction*: Two librarians assessed the searches for errors, establishing consensus on discordant ratings.

**Results** - Of the 169 reviews screened for this project, 105 met all eligibility criteria. Authors fulfilled the searching role in 41.9% of reviews studied, acknowledged persons or groups in 13.3%, a combination in 9.5%, and the role was not reported in 35.2% of reviews. For the 78 reviews in which meta-analyses were performed, the positions of those responsible for statistical decisions were examined for comparative purposes. The statistical role was performed by an author in 47.4% of cases and unreported in the same number of cases. Insufficient analyzable data was obtained regarding professional qualifications (3/105 for searching, 2/78 for statistical decisions).

Search quality was assessed for 66 searches across 74 reviews. In general, it was more possible to assess the search quality when the searcher role was reported ( $\chi^2$ =7.41, df=1, p<.01). An association was found between the reporting of searcher role and the presence of a consequential error (Fisher's exact  $p_{\text{two-sided}}$ =.003). There was no association between the number of consequential errors and how the contribution of the searcher was reported ( $\chi^2$ =15.536, df=16, p=.486).

**Conclusions** - Qualifications of the persons responsible for searching and statistical decision-making were poorly reported in Cochrane reviews, but more complete role reporting is associated with greater assessability of searches and fewer substantive errors in search strategies.

#### Introduction

The systematic review is one of the most important tools used in the evidence based medicine movement. The *Cochrane Database* of *Systematic Reviews* (*CDSR*) is the main product of the Cochrane Collaboration, an international non-profit organization dedicated to promoting evidence based medicine. The reviews in *CDSR* are conducted primarily by health care

professionals who volunteer for one of the Cochrane Review Groups (the Cochrane Collaboration). A systematic review involves a comprehensive search for relevant studies on a specific topic, and those identified are then assessed and synthesized according to a predetermined and explicit method (Rychetnik et al. 542). Search quality is the foundation of a systematic review, and it is anecdotally known that information specialists and

librarians may play an important role in the systematic reviewing process because of their expertise in information retrieval.

However, whether the involvement of an expert searcher in systematic reviews improves the quality of the search is unknown. Evidence based librarianship and information practice has gained momentum in the past few years. Its ultimate goal is to improve the quality of professional judgment and to develop higher quality information support by utilizing the best available evidence (Booth, "Bridging"). This study applied the principles of evidence based information practice in order to find evidence from the systematic reviews in CDSR to clarify the role of information specialists and librarians in the development of Cochrane systematic reviews and to determine whether information specialists have an impact on the quality of searching in Cochrane systematic reviews.

#### Literature Review

Until quite recently, the methods and reporting of searching have been given little attention in systematic reviews. QUOROM reporting standards, which have been endorsed by numerous journal editors as a guideline for reporting systematic reviews (International Committee of Medical Journal Editors), call only for reporting information sources searched and restrictions such as publication year and language (Moher et al., "QUOROM" 1897). The Oxman and Guyatt quality scale for systematic reviews requires only two or more searching methods, main terms, and dates for electronic searching (1274). Although the Cochrane Collaboration gives guidelines on how to report the literature search process, the structure of Cochrane systematic reviews places the search outside of the methods section of the report (Alderson, Green, and Higgins 17). Newer guidance requires more complete reporting (Sampson et al., "Search

Reporting"), but only two studies advocate reporting the qualifications of the person doing the search (Jensen and Ket; Stroup et al. 2009).

Complete reporting of literature searching for systematic reviews would allow readers to judge the breadth and depth of the search, thus they could make informed decisions about the applicability and credibility of the systematic review results based on the evidence. However, the bibliographic database search methods used in systematic reviews are often not reported in sufficient detail to allow replication, and some have argued that journal formats are unlikely to support full reporting due to space constraints (Chalmers and Haynes). A study that assessed the quality of reporting of systematic reviews in pediatric complementary and alternative medicine found that half of the reviews reported the search terms used, but that very few (8.5%) actually listed the search strings (Moher et al., "Assessing" 5-6). Patrick and colleagues found that only 6.7% of a random sample of meta-analyses had both reported the search strategies in sufficient detail and had provided evidence of the effectiveness of the search strategy (198).

Further, errors in the search strategies of systematic reviews are common, even when the search strategy is reported in enough detail to allow replication (Sampson and McGowan). The rationale for choices such as selection of databases, years searched, or material to be hand searched, is often not defended (Weller 163-4). More recently, proposed STARLITE criteria suggest greater detail for reporting search strategies for systematic reviews (Booth, "STARLITE"). These criteria include reporting sampling strategy, type of study, approaches, range of year, language, inclusions and exclusions, terms used, and electronic sources.

Weller called for the involvement of a librarian in the search process in order to improve the quality of conducting and documenting search strategies (163). The Cochrane Reviewers' Handbook also advocates librarian involvement (Higgins and Green 71-72). However, whether librarian involvement improves reporting of search methods, improves retrieval, or limits bias of systematic reviews is unknown. For example, a study in 1985 comparing the performance of search strategies developed by librarians and non-librarians found that the librarians did not systematically outperform the non-librarians (Crumley et al.; Kirpalani et al. 544). Listing who is responsible for searching in a systematic review delivers important information, because it not only establishes credit but also indicates who is responsible for the quality of the search (Rennie, Yank, and Emanuel). Knowing the credentials of those undertaking the search could be a surrogate for determining the likely quality of the evidence base in the absence of full reporting of search details. Problems in conducting and reporting the search are common in systematic reviews. In order to find ways to improve the search quality, it is necessary to explore the relationship between the qualifications of the searcher and the assessability of the search strategies. In order to find ways to improve the search quality, it is also necessary to determine, whether errors were apparent in the electronic search strategies. The research results will provide evidence to help systematic reviewers decide whether a librarian should be involved.

#### **Objectives**

1. This research will determine the contribution of the person responsible for searching and will examine the statistician's role for comparison. Specifically, the study will examine the following questions:

- a. How many reviews reported the contribution of the person responsible for searching?
- b. If the contribution of the searcher is recognized, is it through authorship or acknowledgement?
- c. What is the qualification of the person responsible for searching? The term 'qualification' used in this study refers to job title, credential, or professional training, and explains why the person is qualified to perform the job.
- d. How many reviews reported the contribution of the person responsible for statistical decisions?
- e. If the contribution of statistical decision is recognized, is it through authorship or acknowledgement?
- f. What is the qualification of the person responsible for statistical decisions?
- g. This research report will compare the reporting of searchers and statisticians.
- 2. A further purpose of this research is to determine whether there is an association between the type of contributorship and problems in reporting and conducting the search. Specifically, the following questions will be answered:
- a. What is the relationship, if any, between the search role reporting and the assessability of the search?
- b. What is the relationship, if any, between the type of contributorship (author, acknowledged contributor, unknown) and the presence of certain types of search errors?

#### Methods

Sample: A sample of 169 Cochrane reviews from CDSR, The Cochrane Library, 3 (2002) was analysed (representing approximately 10% of reviews published in CDSR at that time). This collection was originally developed for a larger study "Finding Evidence to Inform the Conduct, Reporting,

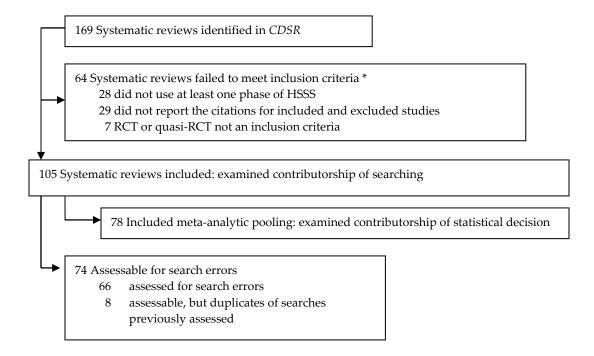
and Dissemination of Systematic Reviews" (abbreviated as "FindEv" hereafter). The method of how this collection was identified was reported elsewhere (Sampson et al., "Search Engines"; Zhang, Ajiferuke, and Sampson). The structured and relatively more detailed reporting found in Cochrane reviews, compared to journal-published reviews, makes the Cochrane Library an efficient lab for studying some aspects of review methodology. Cochrane reviews usually report electronic search strategies and include a section of the review specifically for reporting contributorship (Higgins and Green 38), thus providing data for this study.

Eligibility criteria: To be included in this study (and the "FindEv" study), each systematic review had to meet all three of the following criteria: it had to use at least one phase of the Cochrane Highly Sensitive Search Strategy (HSSS), report the citations for included and excluded studies, and indicate if primary studies were either RCTs

or quasi-RCTs. Of the original 169 reviews screened for the study, 28 were excluded because they did not use at least one phase of HSSS; 29 did not report the citations for included or excluded studies; and 7 did not have 'RCT' or 'quasi-RCT' as an inclusion criterion.

There were 105 that met all three screening criteria, and of those there were 74 studies that reported the search in sufficient detail to allow assessment for search errors. Eight searches were duplicates of those used in other included reviews and were eliminated, leaving 66 unique searches in the final assessment to identify search errors.

For the analysis of contribution to the statistical decision, 78 reviews that pooled 2 or more primary studies in a meta-analysis were examined to determine the contributorship of the person(s) responsible for the statistical decision. (The screening and inclusion/exclusion process is illustrated in Figure 1).



 $\textbf{Figure 1}. \ \textbf{Flow of systematic reviews through the phase of screening and eligibility evaluation}.$ 

<sup>\*</sup> Only the primary exclusion criteria are listed.

Contributorship reporting: Two reviewers (MS and JM) read each included systematic review to determine how the contribution of the bibliographic searcher(s) was reported (i.e., as author, acknowledged, or not reported). The qualifications of the searcher(s) were also examined. For those systematic reviews that included at least one pooled meta-analysis, the contribution and the qualification of the person(s) responsible for statistical decisions was examined for comparison.

Search accuracy assessment: Each included systematic review was further screened to determine if the subject search was presented in enough detail to permit assessment (LZ). The search accuracy for this set of systematic reviews was independently assessed by two reviewers (MS and JM), with discrepancies resolved through consensus. The detailed criteria of search accuracy are reported elsewhere (Sampson and McGowan). Mainly, the types of search errors were classified into consequential error and inconsequential error. The types of search errors that could potentially have negative consequences on the evidence base of the review (meaning

they could affect recall of relevant studies) were defined as consequential errors, and were considered to be the following: spelling errors, missed spelling variants, truncation errors, logical operator errors, missed MeSH, wrong line numbers, search not tailored for other databases, and combining MeSH and free text terms in the same line. Other types of errors such as redundancies without rationale, explosion when no narrower terms existed, and the inclusion of irrelevant terms were considered as inconsequential errors.

Data Analysis: Study characteristics were extracted by a single reviewer (MS). SRS software (<www.trialstat.com>) was used for all data management including screening of items for eligibility and extraction of all data. SPSS (<a href="http://www.spss.com">http://www.spss.com</a>) was used for statistical analysis and table preparation. Analysis was planned by MS, JM and IG, and was conducted by MS and IG.

#### **Results**

The characteristics of the systematic reviews included in this study are listed in Table 1.

	n (Total=105)	<b>%</b>
Year of publication or substantive update		
2002	22	21.0
2001	35	33.3
2000	22	21.0
1999	18	17.1
1998	5	4.8
1997	3	2.9
Focus of the review		
Treatment	89	84.8
Prevention	14	13.3
Diagnosis	1	1.0
Other	1	1.0
Study designs included		
RCT only	55	52.4

RCT and quasi-RCT	39	37.1
RCT and other controlled trials	11	10.5
Meta-analysis done	78	74.3
Country of first author		
UK	48	45.7
Australia	13	12.4
USA	12	11.4
Netherlands	4	3.8
Finland	4	3.8
Canada	4	3.8
New Zealand	4	3.8
Germany	3	2.9
Hong Kong	2	1.9
Norway	2	1.9
Other	9	8.6
Review Group		
Musculoskeletal Injuries	21	20.0
Eyes and Vision	12	11.4
Renal	9	8.6
Prostatic Diseases and Urologic Cancers	8	7.6
Schizophrenia	6	5.7
Back	6	5.7
Depression, Anxiety and Neurosis	5	4.8
Upper Gastrointestinal and Pancreatic Diseases	4	3.8
Infectious Diseases	4	3.8
Skin	3	2.9
Menstrual Disorders and Subfertility	3	2.9
Other	24	22.9

Table 1. Characteristics of included studies.

The contribution of the person responsible for searching was reported in 68/105 reviews (64.8%); authors fulfilled the searching role in 44/105 reviews (41.9%), acknowledged persons or groups (including Trial Search Coordinators of Cochrane Review Groups) in 14/105 (13.3%), a combination in 10/105 (9.5%), and the role was not reported in 37/105 reviews (35.2%). Only 3/105 (2.9%)

reported that the search was conducted by a librarian and in most cases searcher qualifications were not reported. There was insufficient data therefore, to analyze whether the quality of the searches carried out by librarians was better than the quality of those performed by non-librarians. (Table 2).

	Searching	
	n	%
Role fulfilled by:		
Author	44	41.9
Acknowledged named person(s)	8	7.6
Acknowledged group	6	5.7
Combination of the above	10	9.5
Not reported	37	35.2
Total	105	
Was the person fulfilling the role a librarian?		
Yes	3	2.9
No	2	1.9
Can't tell	63	60.0
N/A (role not reported)	37	35.2
Total	105	

**Table 2.** Search role reporting (N=105)

Comparison of reporting contributorship of searchers and persons responsible for statistics

In 78 reviews a meta-analysis was performed, allowing a comparison of the reporting of contributorship of bibliographic searchers and persons responsible for statistics. 57/78 (73.1%) reviews had a statement of contributorship. For both searching and statistical components, when a statement of contributorship was present, role reporting was more likely to be complete (Search role reported Pearson  $\chi$  <sup>2</sup>= 21.914, 1 df,  $p_{\text{one-sided}}$  <.001; Statistical role reported Pearson  $\chi$  <sup>2</sup>= 21.35, 1df,  $p_{\text{one-sided}}$  <.001).

The person responsible for statistical decisions was an author in 37/78 (47.4%) cases, and unreported in the same number of cases. There were 51/78 (65.3%) reviews that reported the types of contributions of the person(s) responsible for searching, while 41/78 (52.5%) reported the types of contributions of the person(s) responsible for statistical analysis (Table 3). Of the 78 reviewed meta-analyses, the qualifications of the person(s) responsible for searching or statistical decisions were not reported or were unclear in all but 3 that indicated library science training and 2 that reported statistical qualifications (Table 4).

	Searching		Statistics	
Role fulfilled by:	n	%	n	%
Author	32	41.0	37	47.4
Acknowledged named person(s)	6	7.7	3	3.8
Acknowledged group	4	5.1	0	0.0
Combination of the above	9	11.5	1	1.3
Not reported	27	34.6	37	47.4
Total	78		78	

**Table 3.** Role reporting for the search and the statistical analysis for reviews that had both a search and a meta-analysis (N=78)

	Searching		Statistics	
Was the person fulfilling the role a librarian or statistician?	n	%	n	%
Yes	3	3.8	2	2.6
No	1	1.3	0	0.0
Can't tell	47	60.2	39	50.0
N/A (role not reported)	27	34.6	37	47.4
Total	78		78	

**Table 4.** Comparison of qualification reporting of librarian and statistician (when a meta-analysis was performed, N = 78)

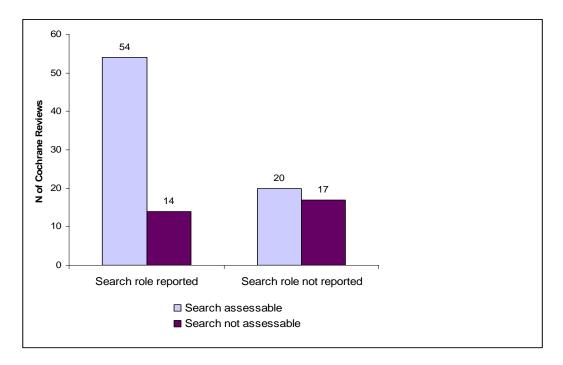


Figure 2. Search role reporting and assessability of the search (N=105)

## Search quality

It was possible to assess 74 of 105 (70.5%) reviews for search quality. Of the 74 reviews, 54 reported the searcher role, 20 did not. It was possible to assess the search accuracy in 54 of 68 (79.4%) reviews where the searching role was reported. Where there was no attribution of the searching role (37 reviews), it was only possible to assess the search strategies in 20 reviews (54.1%) (Figure 2).

This result suggests that it was more likely to be possible to assess search quality when searcher role was reported (  $\chi$  <sup>2</sup>=7.41, df=1, p<.01).

Search quality was assessed for 66 searches across 74 reviews. Consequential error presence rate was 32/47 (68.1%) when the searching role was reported, and 19/19 (100%) when not reported (Table 5). An association between the reporting of

	Number of cons		
	0	≥1	Total
Searching role reported	15	32	47
Searching role not reported	0	19	19
Total	15	51	66

Table 5. Presence of consequential errors and reporting of searching role (Total searches: 66)

		Number of Consequential Errors				Total	
		0	1	2	3	4	
Was the	Author	8	8	7	4	1	28
searching role	Acknowledged named person(s)	2	2	2	1	0	7
fulfilled by	Acknowledged group	3	2	1	0	0	6
an:	Combination of the above	2	3	0	1	0	6
	Not reported	0	9	7	1	2	19
Total		15	24	17	7	3	66

Table 6. Number of consequential errors and types of contributorship reporting (Total searches: 66)

searcher role and the presence of a consequential error (Fisher's exact  $p_{two-sided}$ =.003) was found. When the role of the searcher was reported, a consequential error was less likely to be present. There was no statistical association between the number of consequential errors and how the contributorship (author, acknowledged person, acknowledged group, combination of the above, or not reported) of the searcher was reported ( $\chi$  <sup>2</sup>= 15.536, df=16, p=.486, Table 6). As a result, it was not possible to determine whether fewer consequential errors appeared in searches when search authors were recognized or acknowledged.

# Discussion

In general, more than half of the reviews studied here reported the contribution of the person responsible for the critical tasks of searching and statistical analysis. Librarians who participate in or support systematic

reviews must understand the issues of authorship and contributorship and advocate for the recognition of their professional contribution. Listing contributions imparts important information and establishes accountability, responsibility, and credits (Rennie, Yank, and Emanuel 579). The findings in this study provide superficial evidence to support this statement. Search accuracy could be assessed more frequently when the searching role was reported. Further, more complete role reporting is associated with fewer consequential errors in search strategies. These findings indicate that the disclosure of who performed the search improves the quality of conducting and reporting of searches for systematic reviews, possibly because the named contributor holds responsibility for the work performed. Therefore, it is suggested that all reviews should describe who performed the searching role in the list of contributors,

because high quality searches are the foundation of systematic reviews.

There was inadequate reporting of the qualifications of the searchers to permit an assessment of the association between the involvement of librarians and search quality. It was difficult to assess the professional qualifications of authors and contributors because of the Cochrane Collaboration's practice of not publishing credentials or job titles. The MOOSE statement and a newly developed checklist for reporting literature searches require that authors of metaanalyses report the qualifications of the searchers (Stroup et al. 2009; Jensen and Ket), because this may provide indirect evidence of the quality of the searches (Patrick et al. 199). Only 3 of 105 reviews indicated that the searches were performed by librarians, and most did not report the qualifications of the searchers. Hence, from this limited data, it cannot be concluded that qualifications are a proxy of the search quality in the absence of full reporting of the search methods. More research is needed to explore whether the involvement of a librarian is associated with better conducting and reporting of searches for systematic reviews. Golder and colleagues, for example, recently reported that few searches in systematic reviews of adverse effects were reported in enough detail to allow replication, but that nearly half of those that could be replicated were known to have been conducted by a qualified information specialist (Golder, Loke, and McIntosh 4). For those reviews where a meta-analysis was completed, the qualifications of the person responsible for statistical decisions were also not well reported.

The Cochrane Collaboration has called for improved reporting of contributorship in its reviews. The *Cochrane Reviewers' Handbook* has suggested since 1999 that each review include a list of contributors on the cover sheet (Clarke and Oxman 99). It also

provides a list of descriptions of potential contributions. The contributions that are relevant to searching include developing search strategy, undertaking searches, and organizing retrieval of articles. However, this study showed that 24/105 reviews (23%) reported the searching role in the acknowledgement section or in a combination of author and acknowledgement sections. The overlap between reporting of searcher role on the lists of contributors and acknowledgements suggests that the distinction between contributors and acknowledgements is unclear. It has been suggested that a research paper should have only one list of contributors naming and describing the contributions of all participants, and that the use of an acknowledgements list should be restricted to recognition of funding agencies or corporate bodies (Yank and Rennie 668). This approach would increase the integrity of the research publications.

#### **Conclusions**

This study showed that more complete reporting of the searching role is associated with greater assessability of searches and fewer substantive errors in search strategies. This finding provides evidence to confirm the importance of complete reporting of literature searching for systematic reviews, including reporting who performed the searching role. This evidence should be incorporated into new guidelines for reporting of searching for systematic reviews to improve the quality of the literature search.

Due to a lack of analyzable data, there was insufficient evidence to conclude whether the involvement of a librarian improved the quality of the literature searches reviewed in this study. Further investigation needs to be conducted on this subject. A recommendation for obtaining additional supportive data (e.g., who undertook the

literature search and the qualifications of the searcher) would be to send questionnaires to the corresponding authors of published systematic reviews, asking for their input. Analysis of this information might provide more evidence to determine whether librarian involvement improves the quality of literature searches in systematic reviews, thus ensuring that our information practice is evidence based.

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