

Is There a Role for Medical Librarians in the "Brave New World" of Systematic Reviews Development?

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INTRODUCTION

Medical Review Articles : From Traditional to Systematic

Medical reviews have been popular for decades; in the past, it was sufficient for review authors to be experts in their field, and no special information skills were necessary to find relevant articles. Nevertheless, with the steady growth of published medical research in the last 25 years it has become obvious that clinical expertise has to be combined with systematic approach to the literature to produce reliable, high-quality reviews with evidence-based conclusions. According to Sauerland and Seiler [27], systematic reviews are easy to identify due to their outline which includes a methodology section with a detailed description of the search strategy, study selection criteria, critical appraisal procedure and data synthesis. The emergence of systematic reviews does not inevitably mean that traditional, narrative review articles are useless. The practical significance of narrative reviews is in their broader scope; if written properly, they can offer a valuable, current educational tool both for undergraduate and continuing medical education.

Systematic reviews were first mentioned about a century ago [24], but their actual development dates back to the 1970s, when meta-analysis was proposed by Glass [10] to combine results of various investigations and summarize research evidence. Systematic reviews became a corner-stone of a new evidence-based practice movement. A good systematic review is a great advantage for individual researchers and experts in the field, because they do not have to find and appraise primary studies for every particular decision. For librarians involved in search services, they represent a valuable information retrieval result to be offered to their clients. As stated above, an important feature of systematic reviews is meta-analysis which means in principle the application of statistical methods to combine results of different studies. It very much depends on homogeneity of the studies to be pooled whether meta-analysis is or is not a part of a systematic review in question [25]. As a result, meta-analysis is a possible, but not a mandatory component and/or extension of a systematic review. Thus, the two terms are not synonyms.

A. L. Cochrane and His Dream that Came True: Cochrane Collaboration

It may be claimed with a considerable confidence that the pioneer of systematic evaluation of published research was a British epidemiologist A. L. Cochrane (1909-1988) who emphasized, among others, that evidence about the effective healthcare, though published, may not be easily accessible to practical use. In 1979 he wrote: „It is surely a great criticism of our profession that we have not organized a critical summary, adapted periodically, of all relevant randomized controlled trials“[6]. In the 1980s, inspired by A. Cochrane's ideals, healthcare professionals started to lay foundations of an international movement to review results of randomized controlled trials. Cochrane lived long enough to

see the first fruits of his efforts. In 1987, a year before he died, he appreciated the value of the systematic review of RCTs of care during pregnancy and childbirth as „a real milestone in the history of randomized trials and in the evaluation of care“. He further proposed that other specialties copy the method in question [7].

Since 1990s, The Cochrane Collaboration has been active in preparing, updating and promoting the accessibility of systematic reviews of evidence [4]. It was a lucky coincidence that the emerging electronic media provided a technological support for future success of this movement. The present Cochrane Collaboration (<http://www.cochrane.org>) is an independent, not-for-profit organisation working together with over 27,000 contributors from more than 100 countries, dedicated to making up-to-date, accurate information about the effects of health care readily available worldwide. It has a sophisticated managerial structure offering methodological assistance to reviewers who are interested in contributing the results of their work to the Cochrane Database of Systematic Reviews. It now includes a total of 51 review groups by medical specialties.

Systematic Reviews in the Mirror of Time-Resistant Definitions

In 1997 the Systematic Review Series was published in Annals of Internal Medicine (Vols. 126, 127) which comprised 10 papers covering a broad spectrum of the then knowledge on systematic reviews retrieval, appraisal, development and practical use to make best possible health care decisions. Here are some of the definitions that are still valid, motivating and inspiring:

- “Systematic reviews summarize large amounts of information and are more likely than individual trials to describe the true clinical effect of an intervention.” [21].
- “Systematic reviews can link medical questions with the results of research that would otherwise be difficult to locate, read, and appraise. They are a uniquely powerful mechanism for teaching, and they offer teachers a new opportunity to model rational and effective use of information.” [1].
- “To maximize available data and reduce the risk for bias, as many relevant studies as possible need to be identified, regardless of publication status or language.”
- “Reviewers must therefore take the time to plan their search systematically and get help from persons who are experienced in using particular databases, such as medical librarians.” [9].
- “Primary studies should be selected, appraised, and reported in sufficient detail to allow readers to judge the applicability of the review to clinical practice.” [22].
- “The final common pathway for most systematic reviews is a statistical summary of the data, or meta-analysis. Most meta-analyses summarize data from randomized trials.” [18].
- “Heterogeneity of data sources complicates integration of both direct and indirect evidence.” [23].
- “Systematic reviews can aid in guideline development because they involve searching for, selecting, critically appraising, and summarizing the results of primary research.” [8].
- “The participation of consumers and policymakers in the design, conduct, and reporting of systematic reviews can help to produce reviews that are relevant and understandable to target audiences.” [2].

Systematic Reviews and Librarians

Even though exhaustive searching for literature has always been considered an important step in systematic review production [4; 9], it took some time before medical and health sciences librarians started to be trusted enough to take up their irreplaceable role in this process. In general, there has not been much published evidence on this issue [3; 11-15; 19-20; 28], but most resources report similar findings:

- Searching is a critical part of conducting systematic reviews;
- Comprehensive searching for all relevant studies & documentation of explicit strategies are essential steps;
- Librarian is a key player in a systematic review team;
- Multiple roles for librarians include: literature search consultant/assistant, expert searcher, search process reporter, reference manager, document supplier, report writer; information scientist.

In this context, it should be reminded that systematic reviews are scientific investigations with pre-determined methodology, allocating original studies as their "subjects." The synthesis of at least several primary studies is carried out by means of strategies reducing bias and error. No study or investigation can be performed without an information specialist involvement.

AIM

The aim of the contribution is to present preliminary results of a Cochrane review elaboration by a multiprofessional team of experts, working together in accordance with the Cochrane Renal Group methodology.

Clinical Background & Definitions

The author of the idea to develop a Cochrane review (PG) is a pediatric nephrologist and clinician teacher of Palacky University Faculty of Medicine, Department of Pediatrics. Since 2009, he has been affiliated with Children's Hospital of Eastern Ontario, Ottawa (Canada). For years, he has been a protagonist of evidence-based medicine in clinical practice and undergraduate medical education. He made the first step to make the idea a reality by contacting The Cochrane Renal Group editorial office to get the approval for the future Cochrane review title "Diuretics for a nephrotic syndrome".

- *Nephrotic syndrome* is caused by various disorders that damage the kidneys, particularly the basement membrane of the glomerulus. This immediately causes abnormal excretion of protein in the urine. Swelling (edema) is the most common symptom. It can affect all age groups (<http://www.medlineplus.gov>).
- *Treatment* of the nephrotic edema remains controversial. In many cases, the edema resolves spontaneously at the time of remission induced by *steroid treatment*. However, this can take several days.
 - *Medical supportive treatment* is aimed at increasing urinary sodium and water excretion. It is indicated when nephrotic syndrome is steroid-resistant or the edema is massive and leads to adverse effects.
 - *Diuretics* and albumin are the most often used supportive medications.

Review Objectives and Criteria for Considering Studies

- To evaluate the efficacy of different diuretic agents and albumin used in the treatment of nephrotic oedema.
- To compare benefits and harms of different doses of the same diuretic medication.
- To assess the efficacy of different combinations of diuretic medications.
- All randomized controlled trials (RCTs) or quasi-RCTs where diuretics, albumin or manitol are used in the treatment of children or adults with nephrotic oedema.

MATERIALS and METHODS

Human Resources

Collaboration within a multiprofessional team of authors, namely three pediatricians (PG, KK, JF), a pharmacologist (JS) and a librarian (JP). The respective responsibilities of the team members were strictly designated as follows:

- P. Geier, contact reviewer; selection of included studies, data extraction, analysis of data, final entry of review;
- J. Potomkova – co-reviewer; search of literature;
- J. Strojil – co-reviewer; selection of included studies, data extraction, analysis of data;
- K. Kutrova - co-reviewer; selection of included studies, data extraction, analysis of data;
- J. Feber – co-reviewer; analysis of data, arbitration of disputed studies, observations and conclusions.

Fund-raising

It has long been a generally accepted fact that systematic review development, contrary to narrative review production, is a highly demanding task, comparable to a scientific research (Chalmers 1994). Nevertheless, it was not easy to find a grant agency in the Czech Republic to approve, support and finance such a proposal. PG had to make two attempts in 2 successive years to finally get funding in 2009 by the Grant Agency of Ministry of Health (IGA) for project „Systematic review focusing on diuretics and nephrotic syndrome”. It is registered in the Research, Development & Innovation Information System of the Czech Republic [26] under code NS9936.

Institutional Information Resources

- OvidMEDLINE® 1950-2010
- All EBM Reviews - Cochrane DSR, ACP Journal Club, DARE, CCTR, CMR, HTA, and NHSEED
- EMBASE/Ovid SP 1988-2010

Cochrane Methodology

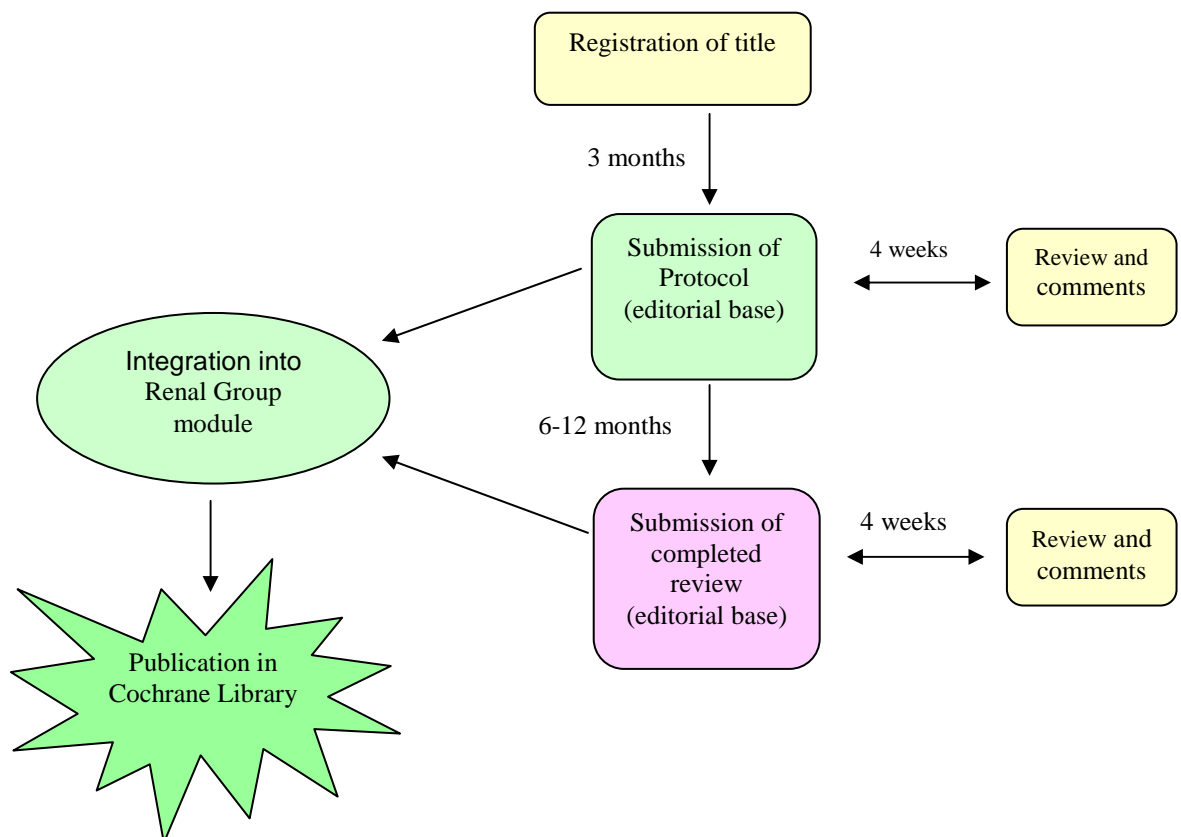
Undoubtedly, there are substantial differences between the peer review process used by most journals and the Cochrane methodology. Potential authors of journal articles are not provided with explicit instructions to elaborate systematic reviews and meta-analyses; the peer reviewers assess the completed reviews. Moreover, there is little chance for correcting or updating the published findings [16]. On the other hand, Cochrane review development is strictly dependent on standardized review process methodology, represented by several

essential tools| that can be downloaded from the Cochrane Collaboration official website (<http://www.cochrane.org>), section „Authors, Researchers“.

- Cochrane Handbook for Systematic Reviews of Interventions [14].
This handbook is the official document that describes in detail the process of creating Cochrane systematic Reviews.
- Review Manager - RevMan V5.0.24 *updated 2010*
The Cochrane Collaboration's program for preparing and maintaining Cochrane reviews.
- Locating studies for your systematic review
A brief guide on the help in developing search strategies and locating studies for reviews.
 - Cochrane Collaboration Randomised Controlled Trials [RCTs] search strategy filter for: Medline and Embase.

Cochrane Review Groups

From the very beginning, all activities related to the development of a systematic review focusing on diuretics and nephrotic syndrome have been managed by The Cochrane Renal Group. The complete review process is illustrated in the figure below (Source: <http://www.cochrane-renal.org>)



For the respective steps of the review process there are useful guidelines available online, e.g. Title Guideline, Title Registration Form, How to Write a Protocol, Protocol Submission Checklist, Review Guideline, Review Submission Checklist, and Data Extraction Form (<http://www.cochrane-renal.org>).

Searching for Studies & Documenting Search Process

As mentioned above, a key document for review development is Cochrane Handbook for Systematic Reviews of Interventions [14]. Detailed instructions for medical librarians acting as expert searchers can be found in Chapter 6: Searching for studies. Most CRGs employ a Trials Search Co-ordinator to support review authors in studies identification. This may include designing search strategies or advising on their design, running searches, in particular in databases not available to the review author at their institution. This is a great advantage and benefit for review authors.

The authors conducting searches on their own are also instructed by their Trials Search Co-ordinator about database(s) to search and the exact strategies to be run. Their responsibility is to document the search process in detail to be further reported in the review to ensure reproducibility. The search strategies for each database should be included in the review in an Appendix.

RESULTS and DISCUSSION

We are presenting partial results of our efforts to develop a Cochrane review following the instructions of the Cochrane Renal Group. In terms of the Cochrane methodology, all authors must be prepared for the fact that a Cochrane review is a never-ending story. Still, there are rough time estimates to make a framework for collaborative working: you will need at least 3 months from title to protocol, and from 6 to 12 months from the approved protocol to review.

Outcome 1: Title development

Procedure: Titles must be registered before work begins on a review. Cochrane Renal Group (CRG) Editorial Base assisted in formulating our idea into a title: “Diuretics for nephrotic syndrome”. After that, a registration form was completed and the title was approved by the CRG editorial office.

Outcome 2: Protocol development

Procedure: In principle, the protocol is a sort of expansion of the well-formulated title following a rough guide as follows: purpose of the review – comparison groups – sources and search methods to find primary studies – explicit criteria for inclusion of studies in the review – avoidance of bias in selection of articles – reasons for study exclusion – description of criteria for quality assessment of the studies – appropriate methods for combining the findings. At this level, health care professionals were focused on the medical part of the protocol, the librarian was planning and designing search strategy with essential input from the CRG Trial Search Coordinator to locate all relevant trials in the following databases:

- The Cochrane Renal Groups Specialised Register and the Cochrane Central Register of Controlled Trials (CENTRAL) in The Cochrane Library (most recent).
 - CENTRAL and the Renal Groups Specialised Register contain the handsearched results of conference proceedings from general and speciality meetings. This is an ongoing activity across Therefore we will not specifically search conference proceedings.
- Medline (1966 to most recent)
- EMBASE (from 1980 to most recent).

These three bibliographic databases are generally considered to be the most important sources to search for reports of trials. In concert with the Cochrane Handbook [14], searching for systematic reviews has to be as extensive as possible to retrieve as many as possible of relevant studies to be included in the review. This phenomenon is called sensitivity, defined as the number of relevant reports identified divided by the total number of relevant reports in existence contrary to precision defined as the number of relevant reports identified divided by the total number of reports identified.

It should be noted, however, that article abstracts identified through a literature search can be 'scan-read' very quickly to ascertain potential relevance. At a conservatively-estimated reading rate of two abstracts per minute, the results of a database search can be 'scan-read' at the rate of 120 per hour (or approximately 1,000 over an 8-hour period), so the high yield and low precision associated with systematic review searching is not as daunting as it might at first appear in comparison with the total time to be invested in the review.

Besides search strategy planning and design, the librarian is responsible for acquisition of information resources for retrieving studies. Under conditions of Palacky University, we are facing a minor problem with the retrospective of EMBASE that is shorter than required; thus, we will benefit from the assistance of the CRG Search Coordinator.

Outcome 3: Protocol approval

Procedure: It took nearly 6 months before we got the protocol comments summary. All of the comments were accepted, and they substantially improved the quality of the Protocol. There were three major editorial comments:

- The previous title „Diuretics for nephrotic syndrome“ was changed to „Diuretics for treating oedema in nephrotic syndrome“ as the original title seemed misleading, because diuretics can be only used either „in“ nephrotic syndrome or „for treatment of oedema“ in nephrotic syndrome.
- The Editors strongly recommended including all diuretics and refine the search strategy accordingly.
- The term „oedema“ did not figure as a search term in the strategy. This should be discussed with the Trials Search Coordinator.

Having made the necessary revisions our systematic review team was happy to be informed by the Cochrane Renal Group managing editor that the protocol would be included in the Cochrane Database of Systematic Reviews. In six to twelve months to come this protocol will guide us in developing our review.

Our experience is in a good agreement with McKibbin [20] who points out that „all good research is question driven“. All members of the team should be actively involved in brushing-up the question to be as perfect as possible, because it will guide the whole review production process. It is noteworthy that Cochrane reviews can focus either on broad or narrower questions; both have advantages and disadvantages. Broad questions are better to get generalizable results, but they are more difficult for a review team to search, collect and analyse data. Narrower questions are easier to manage and read.

Even though Cochrane review questions should be formulated in the protocol, they cannot be considered a straitjacket preventing to solve unexpected issues [17]. When refining questions it is inevitable to bear in mind that this change will have an impact e.g. on search strategies, methods of data collection etc.

As emphasized earlier, searching is a critical step in systematic review development, and the librarians' skills can be useful in designing search strategies. As reported by McGowan [19] „...changes in scope or in the focus of questions might require that the search be modified to provide a sound evidence base for the review“. Looking back at Chapter 6

„Searching for studies“ of the Cochrane Handbook [14], we can summarize the forthcoming tasks to be done by the librarian after modification of the question: re-designing the search strategy in cooperation with the Cochrane Renal Group Trials Search Coordinator, performing searches in the selected databases, managing references, documenting and reporting the search process [29].

The description of search strategies in the protocol for a Cochrane review is optional. Some CRGs recommend that no searches should be undertaken before protocol submission for publication because knowledge of the available studies might influence some aspects of the protocol, eg. inclusion criteria.

CONCLUSIONS

For medical and health sciences librarians, the involvement in systematic review process is an expanding option and great challenge. Once information professionals become members of an interdisciplinary research team they (must) learn appropriate methodology to answer scientific questions to get the best evidence.

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