

The Cochrane Library: A Resource for Clinical Problem Solving in Emergency Medicine

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INTRODUCTION

You are asked to formulate a clinical policy pertaining to several therapeutic options for the treatment of acute asthma in your emergency department. To accomplish this task, you will need to select the therapeutic issues and options most likely to influence your patients' outcomes and to define focused questions relevant to those options. No matter how determined you may be to restrict the scope of your undertaking to a relatively few important issues, it is likely that you will be faced with researching a number of independent clinical questions.

Is there a single resource that could provide you with the definitive and updated reviews on relevant questions for your guideline? Moreover, is there a quick and reliable way of locating individual randomized trials and other focused overviews on the relevant questions of therapy for this guideline? For many questions of importance to emergency medicine practice, including questions pertaining to the management of acute asthma, the Cochrane Library is one such resource.¹ The Cochrane Library is the main product of the Cochrane Collaboration, a respected and well-known effort in evidence-based medicine.

The effective use of the Cochrane Library requires knowledge of its component databases and of how these databases compare with more familiar databases containing standard clinical research publications. In addition, it is necessary to know how access to the Cochrane databases may be obtained. This article describes the Cochrane Library and how it can be used and accessed as a resource for clinical problem solving by emergency physicians.

SYSTEMATIC REVIEWS AND THE COCHRANE LIBRARY

Systematic reviews refer to comprehensive, structured reviews, often associated with metaanalytic summary statistics, which synthesize the results from research on a particular topic.²⁻⁴ They represent an important and rapidly expanding body of literature for the emergency physician and they are an integral component of evidence-based medicine. Despite a recent increase in the production of systematic reviews of studies pertaining to diagnostic testing, the most common application of systematic reviews to clinical practice is in the area of therapeutic interventions. Well-conducted and valid systematic reviews represent the highest level of evidence on which to base clinical decisions.⁵

Considerable debate exists regarding the relative merits of evidence derived from large individual trials versus systematic reviews.⁶ However, because of the costs associated with large, multicenter trials, they remain uncommon across many clinical specialties and topic areas. Consequently, it is probable that systematic reviews will play an increasingly important role in the future in informing therapy-based decisions made by patients, clinicians, administrators, and society in all areas of health care.

The Cochrane Library is a compendium of databases and related instructional tools. As such, it is the principal product of a large international volunteer effort called the Cochrane Collaboration. The Cochrane Collaboration is a network of health care professionals, consumers, researchers, and policymakers whose major goals are to produce, maintain, and distribute systematic reviews of the effects of health care interventions.

The Cochrane Collaboration takes its name from the British epidemiologist, Archie Cochrane, who drew attention to the overwhelming and seemingly unmanageable state of information pertaining to clinical medicine. A famous quote from Cochrane summarizes his thoughts on the topic⁷: "It is surely a great criticism of our profession that we have not organized a critical summary, by specialty or subspecialty, adapted periodically of all relevant randomized controlled trials."

Systematic reviews produced by members of the Cochrane Collaboration are products of a priori research protocols, meet rigorous methodologic standards, and are peer reviewed for content and methods prior to dissemination. Specifically, this process of review production is designed to reduce bias and to ensure validity, using criteria discussed in the JAMA "Users' Guides" series² and outlined elsewhere.^{3,4}

ACCESS TO THE COCHRANE LIBRARY

The Cochrane Library is readily available on CD-ROM and online (URL: <http://www.updateusa.com/cochrane.htm>) from Update Software Inc. (Vista, CA) for single or multiple users as a personal subscription or on a network. Abstracts of the systematic reviews produced by members of the Cochrane Collaboration are available on the Web site without a subscription. The Cochrane Library CD-ROM runs on most personal computers and is extremely user-friendly. The full content of the Cochrane Library is available only on the CD-ROM version, which is updated quarterly for all subscribers. However, the Cochrane Database of Systematic Reviews (CDSR), without the MetaView components, can also be accessed through OVID-R; and abstracts of the reviews will soon be added to the National Library of Medicine for MEDLINE searching. Finally, access is also available through the Internet, and many medical libraries will have access to the Cochrane Library in the near future.

DATABASES ON THE COCHRANE LIBRARY

The main work of generating the reviews in the Cochrane Collaboration is the responsibility of a variety of Collaborative Review Groups (CRGs). Examples of CRGs with relevance to emergency practice include, but are not limited to, Airways (eg, asthma, chronic obstructive pulmonary disease, rhinitis), Stroke, Infectious Diseases, and Injuries. In the scenario described above, the Airways CRG produces reviews relevant to asthma, although only some of these relate to acute asthma (Table).

Searching the Cochrane Library is accomplished through activation of a screen search icon and uses familiar search strategies. Simple and advanced (multiple search terms) search strategies are available to the user. The search strategy will identify successful "hits" from each of 4 separate databases available on the Library.

CDSR

The main Cochrane Library database is the Cochrane Database of Systematic Reviews (CDSR), which contains systematic reviews produced by members of CRGs. The CDSR contains specific modules (such as the Airways Module) of Cochrane reviews, and currently contains many reviews of relevance to common clinical problems presenting to the emergency practice setting.

In the clinical scenario described, the Airways module contains reviews that could assist the clinician in developing clinical policies or a guideline for acute asthma. For example, the following would be relevant: anticholinergics

in acute pediatric asthma,⁸ corticosteroids to prevent relapse,⁹ nebulizers versus inhalers in acute asthma,¹⁰ and brief asthma education.¹¹ Proposed reviews related to acute asthma include the use of intravenous magnesium,¹² intravenous β_2 -agonists,¹³ continuous versus intermittent nebulization,¹⁴ and corticosteroids to reduce admissions to hospital.¹⁵

DARE

The second Cochrane Library database is the Database of Abstracts of Reviews of Effectiveness (DARE). DARE provides structured abstracts of non-Cochrane reviews that have been critically appraised by reviewers using a uniform approach. The majority of citations included in this somewhat incomplete database arise from published reviews contained in journals. Your search identifies several important articles relevant to acute asthma in the DARE database, including a review of aminophylline in acute childhood¹⁶ and severe acute asthma.¹⁷ The DARE citations also identify an asthma guideline produced by the Canadian Association of Emergency

Physicians, which the reader could use as a resource for his or her own guideline or policy development.¹⁸

CCTR

The Cochrane Controlled Trials Register (CCTR) is a bibliographic database of controlled trials that is maintained by the Cochrane Collaboration. The CCTR contains a compilation of references to controlled trials in health care that meet certain quality criteria and are likely to be randomized or quasi-randomized trials. The 1999 (Issue 1) version of the Cochrane Library contains more than 218,000 references in the CCTR. The CCTR is the largest single source of controlled trials because it contains records from MEDLINE and (Excerpta Medica) EMBASE searches, as well as a variety of other sources. EMBASE is a European register of pharmacologic and biomedical literature whose journal indexing and inclusions are somewhat different from those of MEDLINE.

Currently, the Cochrane Collaboration is coordinating an effort to hand search all current journals and to tag those articles that have been identified as controlled

Table.

Output from Cochrane Library search for topics relevant to asthma, with selective citations to develop a clinical policy for treating acute asthma.

1 The Cochrane Database of Systematic Reviews (78 hits, 1,014 total)

- Complete reviews (40 hits, 522 total)
 - Asthma education and regular review
 - Chambers/nebulizers—acute asthma
 - Combined inhaled anticholinergics and β_2 -agonists
 - Effects of limited asthma education
 - Steroids and asthma relapse
- Protocols (58 hits, 492 total)
 - Adrenergic β_2 -agonists for acute asthma
 - Asthma exacerbations and magnesium sulfate
 - Continuous β_2 -agonists in acute asthma
 - Dosages of corticosteroids in acute severe asthma
 - Steroids and asthma hospital admissions

2 Database of Abstracts of Reviews of Effectiveness (21 hits, 1,895 total)

- Abstracts of quality assesses systematic reviews (14 hits, 727 total)
 - Efficacy of ipratropium bromide in acute childhood asthma: a metaanalysis
 - Theophylline in acute childhood asthma: a metaanalysis of its efficacy
- ACP Journal Club: abstracts of reviews (2 hits, 38 total)
- Other assessed reviews: Bibliographic details only (3 hits, 328 total)
 - Guidelines for the emergency management of asthma in adults
- Other reviews: Bibliographic details only (2 hits, 802 total)
 - Aminophylline treatment in severe, acute asthma: a metaanalysis

3 The Cochrane Controlled Trials Register (CENTRAL/CCTR) (597 hits, 218,355 total)

4 The Cochrane Review Methodology Database (2 hits, 866 total)

5 Other sources of information (5 hits, 524 total)

This output was generated using a simple search of the 1999 (Issue 1) version of the Cochrane Library, using *asthma* as the key word.

clinical trials. The National Library of Medicine plans to use this information to update their databases so that in the future MEDLINE searches will be more complete. In summary, the CCTR provides an efficient method of searching for primary studies in a topic area.

The simple asthma search identifies 597 individual trials in the CCTR. Most clinicians would consider this to be an unreasonably large number of citations and would not be inclined to examine this volume of literature in relationship to a specific clinical question or policy for their department. However, this resource constitutes an invaluable aid to those developing either an original sys-

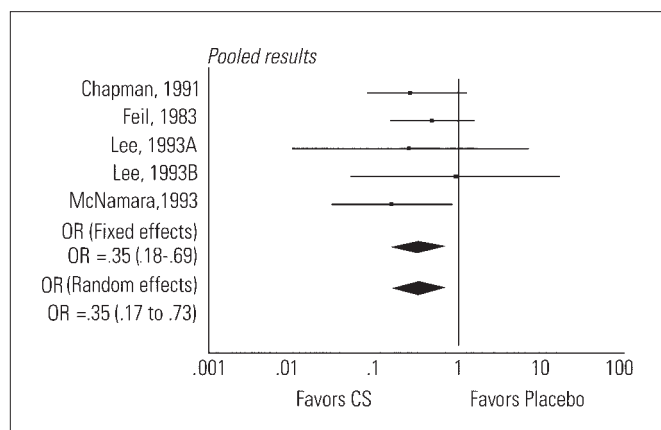
tematic review or a comprehensive practice guideline. Furthermore, a more focused search on a less well-researched area might provide access to a sentinel article or to a manageable handful of published studies relevant to that topic area.

Others

The Cochrane Review Methodology Data Base is a bibliographic database of articles on the science of research synthesis. The CD-ROM version of the Cochrane Library also contains the Cochrane Handbook, which provides information about research and about the methods of conducting a systematic review. Finally, a glossary containing the methodologic terms used in reviews and contact details for review groups are also available.

Figure.

Graphic display of CDSR data. Oral or intramuscular corticosteroids for the treatment of acute asthma after ED discharge: analysis of short-term (7 to 10 days) relapse rates. Each study is represented by the point estimate for the outcome in question and by confidence intervals on either side of that value. The vertical line corresponds to an odds ratio (OR) of 1.0; studies where the confidence interval crosses the 1.0 line demonstrate no statistically significant difference between the groups (ie, those receiving corticosteroids versus those receiving placebo). Values to the left and not crossing the vertical line indicate a benefit of corticosteroids. Values to the right and not crossing the vertical line indicate that patients receiving placebo had better outcomes than those receiving corticosteroids. The 2 large horizontal diamonds at the bottom of the figure correspond to the pooled results of the individual studies with narrower confidence intervals. They reflect slightly different statistical approaches to pooling the data. In the Cochrane Library MetaView, the user may vary the methods of statistical analysis or rearrange the order of the individual studies with respect to criteria such as study quality or year of publication. (Adapted with permission from Rowe BH, Spooner CH, Ducharme FM, et al: *The effectiveness of corticosteroids in the treatment of acute exacerbations of asthma: A meta-analysis of their effect on relapse following acute assessment* [Cochrane Review]. In: Cochrane Collaboration, issue 1. Oxford, United Kingdom: Update Software, 1999.)



UNIQUE FEATURES OF THE COCHRANE LIBRARY

Given the nature of the databases available on the Cochrane Library, it is reasonable to assume that clinicians will find this resource for obtaining information advantageous. The Cochrane Library is a multipurpose resource to aid clinicians with decisionmaking in the area of therapy, using products that are consistently rigorous and of high quality.

Moreover, one of the important strengths of the information on the CDSR is its regular updating and the interactive component. The comments and criticisms section permits feedback to the authors of reviews, and these comments are addressed promptly by reviewers providing the opportunity to add missed or new references and to correct any errors. This process permits the Cochrane Library to remain up-to-date, an advantage over reviews published in standard journals, which may be out-of-date by the time they are printed. In the Cochrane Library, a review is tagged as being an "update" or having "comments" with a special colored icon, to make the reader aware of any changes in a previously published review. Each review is expected to be updated as new trials arise or on an annual basis.

A second important aspect of the Cochrane Library is the companion graphics program called MetaView (Figure). The program permits the complex results of a review to be presented in a graphic and more understandable fashion. MetaView expands on the text provided within the review. Special display features allow viewers to further explore the presentation of data.

Finally, the CDSR provides extensive information about articles that have been included and excluded

from the review. The list of included and excluded studies allows readers to more thoroughly examine the components (eg, methods, participants, interventions, outcomes, and notes) of studies contained in the review. The reasons for any study exclusion are also documented in the Excluded Studies section.

THE FUTURE

The 1999 (Issue 1) version of the Cochrane Library contains a collection of 522 completed and 492 proposed systematic reviews. Each new issue provides expanded information in each of the elements described above. Emergency physicians will find many reviews within this database relevant to their practice. Although the Cochrane Library is not a panacea, it does provide an efficient and timely method for assisting clinicians in making appropriate decisions about care for individual patients.

The products contained in the Cochrane Library will become an increasingly important tool for emergency physicians. In addition, the availability of an up-to-date register of clinical trials and reviews will provide additional information for clinicians, educators, and planners. It has become an invaluable information resource for both continuing medical education activities and education for physician learners.

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