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Systematic reviews in health care

A PRACTICAL GUIDE

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Systematic Reviews in Health Care

A Practical Guide

What do we do if different clinical studies appear to give different answers? This user-friendly introduction to this difficult subject provides a clear, unthreatening and structured approach to systematic reviews and incorporates several key features:

- A practical guide to meta-analysis and the fundamental basis of evidence-based medicine
- A step-by-step explanation of how to undertake a systematic review and the pitfalls to avoid
- Liberally illustrated with explanatory examples and exercises
- A review of the available software for meta-analysis

Whether applying research to questions for individual patients or for health policy, one of the challenges is interpreting apparently conflicting research. A systematic review is a method of systematically identifying relevant research, appraising its quality and synthesizing the results. The last two decades have seen increasing interest and developments in methods for doing high-quality systematic reviews. Part 1 of this book provides a clear introduction to the concepts of reviewing, and lucidly describes the difficulties and traps to avoid. A unique feature of the book is its description, in Part 2, of the different methods needed for different types of health care questions: frequency of disease, prognosis, diagnosis, risk and management. As well as illustrative examples, there are exercises for each of the sections.

This is essential reading for those interested in synthesizing health care research, and for those studying for a degree in Public Health.

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Introduction

Systematic literature reviews

Methods for reviewing and evaluating the scientific literature range from highly formal, quantitative information syntheses to subjective summaries of observational data. The purpose of a systematic literature review is to evaluate and interpret all available research evidence relevant to a particular question. In this approach a concerted attempt is made to identify all relevant primary research, a standardized appraisal of study quality is made and the studies of acceptable quality are systematically (and sometimes quantitatively) synthesized. This differs from a traditional review in which previous work is described but not systematically identified, assessed for quality and synthesized.

Advantages

There are two major advantages of systematic reviews (or meta-analyses). Firstly, by combining data they improve the ability to study the consistency of results (that is, they give increased power). This is because many individual studies are too small to detect modest but important effects (that is, they have insufficient power). Combining all the studies that have attempted to answer the same question considerably improves the statistical power.

Secondly, similar effects across a wide variety of settings and designs provide evidence of robustness and transferability of the results to other settings. If the studies are inconsistent between settings, then the sources of variation can be examined.

Thus, while some people see the mixing of ‘apples and oranges’ as a

problem of systematic reviews, it can be a distinct advantage because of its ability to enhance the generalizability and transferability of data.

Disadvantages

Without due care, however, the improved power can also be a disadvantage. It allows the detection of small biases as well as small effects. All studies have flaws, ranging from small to fatal, and it is essential to assess individual studies for such flaws. The added power of a systematic review can allow even small biases to result in an apparent effect. For example, Schulz et al. (1995) showed that unblinded studies gave, on average, a 17% greater risk reduction than blinded studies.

Method

A systematic review generally requires considerably more effort than a traditional review. The process is similar to primary scientific research and involves the careful and systematic collection, measurement and synthesis of data (the 'data' in this instance being research papers). The term 'systematic review' is used to indicate this careful review process and is preferred to 'meta-analysis' which is usually used synonymously but which has a more specific meaning relating to the combining and quantitative summarizing of results from a number of studies.

It may be appropriate to provide a quantitative synthesis of the data but this is neither necessary nor sufficient to make a review 'systematic'.

A systematic review involves a number of discrete steps:

- question formulation;
- finding studies;
- appraisal and selection of studies;
- summary and synthesis of relevant studies; and
- determining the applicability of results.

Before starting the review, it is advisable to develop a protocol outlining the question to be answered and the proposed methods. This is required for all systematic reviews carried out by Cochrane reviewers (Mulrow and Oxman, 1997).

Question formulation

Getting the question right is not easy. It is important to recognize that devising the most relevant and answerable question may take considerable time. Repeatedly asking ‘why is this important to answer?’ is helpful in framing the question correctly.

For example, are you really interested in the accuracy of the new test *per se*? Or would it be better to know whether or not the new test is more accurate than the current standard? If so, are you clear about what the current standard is?

Question formulation also involves deciding what type of question you are asking. Is it a question about an intervention, diagnostic accuracy, aetiology, prediction or prognosis, or an economic question? The multiple perspectives of health service providers, consumers and methodologists may be helpful in getting the question right.

Finding studies

The aim of a systematic review is to answer a question based on all the best available evidence – published and unpublished. Being comprehensive and systematic is important in this critical, and perhaps most difficult phase of a systematic review. Finding some studies is usually easy – finding all relevant studies is almost impossible. However, there are a number of methods and resources that can make the process easier and more productive.

Appraisal and selection of studies

The relevant studies identified usually vary greatly in quality. A critical appraisal of each of the identified potentially relevant studies is therefore needed, so that those that are of appropriate quality can be selected. To avoid a selection that is biased by preconceived ideas, it is important to use a systematic and standardized approach to the appraisal of studies.