

Searching for studies for inclusion in Cochrane Systematic Reviews on injury prevention

The Cochrane Injuries Group (CIG) prepares and maintains Cochrane Systematic Reviews of interventions for the prevention, treatment, and rehabilitation of traumatic injury. In this edition of Cochrane Corner, we describe how to search for studies to be included in a systematic review. Researchers and policy makers may also find these strategies useful when conducting general literature reviews on injury topics.

An adequate search is key to ensuring high quality of the resultant review. To achieve the aim of identifying all relevant evidence, sophisticated information searching techniques are required. It is, however, a challenge to devise a search strategy with the appropriate balance between sensitivity and specificity; a sensitive search is required in order to identify as much of the relevant evidence as possible, yet specificity is required to ensure that the review author is not forced to wade through extensive amounts of irrelevant information. Search methods for every review need careful consideration to ensure that eligible studies are not missed or rejected, which could compromise the review's findings.

Injury prevention reviews pose a particular challenge when it comes to searching, as much of the relevant evidence is present in sources that are not indexed on the major databases such as Medline, EMBASE, and PubMed. Thus, searching of other, sometimes less standard, resources is an important part of conducting such a review. For example, authors of some of the CIG's interventions for road safety reviews have found that much relevant evidence can be identified from general internet searches and websites of related institutions such as the National Highway Traffic Safety Administration (NHTSA), the Transportation Research Board (TRB), the Transport Research Laboratory (TRL), European Road Safety Observatory (ERSO), Office of Road Safety (ORS), and the Australian Transport Safety Bureau (ATSB).

The search methods for a review should be considered early on in the review's development. The following issues should

be kept in mind when planning sources to search:

- ▶ much research is never published
- ▶ not all research is published in journals
- ▶ not all research published in journals is indexed on the main databases
- ▶ not all research indexed on databases can be easily retrieved

Methods to address these issues can be put in place, and the following can be used to identify any trials not picked up with an electronic bibliographic database search:

- ▶ searching the web
- ▶ hand searching
- ▶ scanning reference lists of relevant articles
- ▶ personal communication
- ▶ searching specialized databases and websites
- ▶ searching citation databases

The quality of the literature search can have important implications on the quality of the completed review. Bias in a review can be avoided if you remain aware of certain biases that may be present in the available literature.

Positive results are generally more likely to be published. They are also more likely to be published in the English language and in journals produced in "the developed world". Ways of avoiding such biases can be addressed by searching beyond published articles, by using the internet to browse suitable trials databases, and searching for suitable websites to locate ongoing research or experts in the field.

Searching electronic databases is part of the whole search for information that needs to be carried out when embarking on a review. It is essential that a comprehensive search strategy is developed to ensure that relevant studies are found within the indexed material.

When running electronic searches, it is useful to break down the search question into individual components or concepts. This can be done by using the PICO template as follows:

- ▶ Population (eg, children)
- ▶ Intervention(s) (eg, educational interventions)
- ▶ Comparison(s) (eg, versus no intervention or alternative interventions/methods)
- ▶ Outcome(s) (eg, reduced incidence of burn injuries)

There is no strict rule as to how many of the concepts need to be incorporated in the search, as this can depend on how much literature is available within the field of the review. The search may not need to be "narrowed down" if the field is already quite narrow. It is also possible that the population may be dictated by the condition. For example, a search for interventions that treat age-related macular degeneration would automatically restrict the search to a population of older adults.

It is important to gather terms that accurately describe each of the components of the search strategy and build this up to a comprehensive and useful list. Before entering terms into the search box, it is important to consider how an author may use synonyms, abbreviations, and sometimes alternative terms to describe the subject in question. Transatlantic spelling differences will also need to be identified, and allowances made (eg, pediatric/paediatric).

Despite the need to identify as many as possible of the available terms and text words so that they can be added to the search strategy, it is sometimes more effective if the search is kept simple. Adding multiple terms and text words that describe outcomes, for example, can sometimes be surplus to requirements. It may be possible to retrieve relevant material by only using terms to describe the population and the intervention. Trying out different combinations of terms and examining and comparing the results is the best way to ensure that a search is effectively retrieving the necessary results.

Limits can be added to a search in order to search for specific elements in an electronic record such as dates, study designs, and population. Search filters can also be useful for "narrowing down" a search and can help to retrieve specific types of article such as those that report randomized controlled trials (RCTs). Much debate surrounds the designing of a search filter to identify RCTs, but most will include the words or headings; Random, Randomized (or Randomised),

Randomly, Double-blind, Single-blind, Placebo, Control, Comparison, Comparative, or Crossover.

Many injury reviews include non-randomized studies, which are often best identified without limiting to study type. The diversity of vocabulary used in non-randomized research makes it difficult to add such limits, as the aim is to identify the required studies without eliminating those that may also be relevant. If the search strategy accurately describes the population and the intervention, this will create a sensitive search. Adding terms for one or two of the major outcomes to be examined in the review may add to the specificity of the search.

Running a search on one of the citation indexes can be a useful place to find a collection of papers on a particular topic. You can begin by using the “general search” facility to look for topics. Once

relevant papers have been found, a good way to build on this material is to run a search using the “Cited reference” search. Cited reference searching enables you to find articles that have cited a previously published work.

All methods used in Cochrane Reviews must be transparent and must be able to be replicated whenever necessary. Comprehensive records need to be kept of all sources searched, the search strategies used, the dates the search covered, as well as the date the searches were carried out. In the case of personal communication, it is important to record who was contacted, why they were contacted (for what information), the method of communication, and when.

Recording this information is an important part of the review methodology and can also highlight gaps. This helps to ensure that the search is as comprehensive

as possible. Without such a comprehensive search, it is unlikely that all of the available literature would be retrieved and examined. This process is one of the most important elements of a Cochrane Review and is why they are regarded as the “gold standard” in the hierarchy of evidence.

For more information about the Cochrane Injuries Group, visit the website at <http://www.cochrane-injuries.lshtm.ac.uk/> or email Emma Sydenham, the Review Group Coordinator, at Emma.Sydenham@lshtm.ac.uk.

K Blackhall, K Ker

Cochrane Injuries Group

Correspondence to: Karen Blackhall, London School of Hygiene & Tropical Medicine, Keppel Street, London WC1E 7HT, UK; karen.blackhall@lshtm.ac.uk

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