Systematic reviews: a brief overview

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SCENARIO

A randomized controlled trial (RCT) was conducted to determine if drug B improves survival when compared with drug A in patients with condition Y. A systematic review (SR) can also answer this same question; however, it is important to differentiate between these study designs.

THE PROCESS OF A SYSTEMATIC REVIEW

SRs summarize the body of research from primary studies that address a well-defined research question. It also evaluates the quality of the studies and their conclusions using a systematic and reproducible approach.[1] SRs commonly answer questions related to therapy, diagnosis, or prognosis. They are particularly useful when similar studies show conflicting results, when various studies with a small number of participants show inconclusive results, or when practice guidelines are being developed.

The conduct of an SR follows a strict methodological process, which includes the definition of inclusion and exclusion criteria and evaluation of the risk of errors (bias).[1] The process (or "system") for an SR is summarized in Table 1.

First, the PICOT format can be used to define the different components of the research question: the population (P), the intervention or exposure (I), the comparison group (C), the outcome (O), and the type of study design (T). These components will depend on the nature of the study question (intervention, diagnosis, or prognosis). In our hypothetical example, we are interested in comparing the effects of two drugs (interventions) on survival, and the most appropriate study design is an RCT.

Once the question and the detailed study eligibility criteria have been defined, a comprehensive literature search is conducted. This step is elaborate and often requires a librarian who provides the "language" for the search. In contrast to a search that we often conduct as clinicians, in order to conduct an SR, the search has to use clear terms, be comprehensive and reproducible, and be performed across all important medical databases, including the gray literature. Once the search is completed, researchers screen the list of references for eligibility. Typically, two researchers complete this step and the data extraction that follows. A key component of an SR is the evaluation of the quality of the studies included. Different tools are available according to the nature of the question.[2] For RCTs, for example, questions about randomization and allocation concealment are asked. For prognostic studies, it is essential to understand if patient selection is representative.

Once all steps are completed, data are summarized and often analyzed to provide quantitative estimates with their corresponding confidence intervals. This last part corresponds to the meta-analysis, which will be discussed in a forthcoming article. In some cases, an SR does not include a meta-analysis; when this occurs, a transparent report of the methodology should be provided.

KEY CONCEPTS

- An SR is a summary of the evidence that addresses a well-defined research question in a systematic and reproducible manner.
- One study of interventions, diagnosis, or prognosis alone is unlikely to represent the entirety of the evidence. SRs are useful because they summarize the body of evidence after a comprehensive and reproducible medical literature search and assessment of the risk of bias.

Table 1. The process of a systematic review.

1. Definition of the question: PICOT format	Systematic review	Systematic review + Meta-analysis
2. Inclusion and exclusion criteria		
3. Literature search for studies		
4. Screening of studies for eligibility		
5. Data collection from studies		
6. Assessment of risk of bias of the studies included		
7. Analysis of results (synthesis)	Meta-analysis	
8. Interpretation of the results		
9. Conclusions on the estimates		

PICOT: P: population; I: intervention/exposure; C: control group or comparator; O: outcome; and T: type of study design.

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- A quantitative analysis (meta-analysis) often accompanies the summary of the evidence, yielding a higher precision in the results than individual studies.

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