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Systematic Review

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Systematic review describes a specific methodology for conducting reviews of literature. This methodology prescribes explicit, reproducible, and transparent processes for collating the best available evidence in answer to specific questions. In particular, it requires the use of robust techniques for searching for and identifying primary studies, appraising the quality of these studies, selecting the studies to be included in the review, extracting the data from the studies, and synthesizing the findings narratively and/or through pooling suitable quantitative data in META-ANALYSIS. Systematic review has developed in response to the perceived problems of traditional "narrative" reviews, where haphazard and idiosyncratic techniques, such as nonsystematic methods of literature identification and informal summary, can introduce bias. In health care, these problems had led to delayed introduction of effective treatments and continuation of ineffective treatments. Increasingly, systematic review extends beyond evaluation of interventions to embrace a diversity of research questions.

Systematic review has benefited from the development of electronic databases, allowing for more extensive and precise searching for candidate articles. Importantly, systematic reviews may, to reduce the risk of publication biases, also seek unpublished studies.

Systematic reviews critically appraise the quality of the relevant primary research, sometimes facilitated by checklists and scoring systems. RANDOMIZED CONTROL TRIALS (RCTs) are often seen as the "gold standard" of study design for evaluating interventions and are frequently found at the top of "hierarchies of evidence," which grade study designs according to the RELIABILITY of the evidence they are likely to produce. However, conducting RCTs may not always be possible for practical, ethical, or economic reasons; sometimes, it is more appropriate or necessary to use non-RCT evidence.

Once the studies to be included in the review have been selected, and relevant data extracted, some form of synthesis can be attempted. Meta-analysis refers to statistical methods for pooling quantitative results from different studies (Egger, Davey Smith, & Altman, 2001). Sometimes, meta-analysis is used as a synonym for systematic review, but generally, a meta-analysis will form only part of a systematic review, and many systematic reviews do not include meta-analyses. The feasibility of extending meta-analysis to include qualitative evidence using Bayesian statistical methods has recently been investigated. More usually, qualitative evidence, and quantitative evidence not meta-analyzed, are summarized narratively.

Since its introduction in the 1980s, systematic review has become central to the evidence-based practice movement in the health sciences. It is the core activity of the Cochrane Collaboration, an international network of groups producing systematic reviews of health

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interventions. The more recently established Campbell Collaboration will conduct systematic reviews in areas of social, behavioral, educational, and criminological intervention.

Well-conducted systematic reviews have already yielded significant benefits. The methodology has had only a short time to develop, and it will gain from further development and refinement. The frequent exclusion from some systematic reviews of some relevant data sources (e.g., from observational and qualitative studies) has been criticized (Dixon-Woods, Fitzpatrick, & Roberts, 2001). Recent guidance on the conduct of systematic reviews (NHS Centre for Reviews and Dissemination, 2001) has recognized these problems, and methods are now rapidly evolving to extend the science of systematic review to incorporate more diverse forms of evidence.

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