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REVIEW ARTICLE

Living systematic review: 1. Introduction—the why, what, when, and how

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Abstract

Systematic reviews are difficult to keep up to date, but failure to do so leads to a decay in review currency, accuracy, and utility. We are developing a novel approach to systematic review updating termed "Living systematic review" (LSR): systematic reviews that are continually updated, incorporating relevant new evidence as it becomes available. LSRs may be particularly important in fields where research evidence is emerging rapidly, current evidence is uncertain, and new research may change policy or practice decisions. We hypothesize that a continual approach to updating will achieve greater currency and validity, and increase the benefits to end users, with feasible resource requirements over time. © 2017 Published by Elsevier Inc.

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This paper is the first in a series published in this issue of the journal, providing an overview of living systematic reviews (LSRs) and living guideline recommendations. This introductory paper introduces the why, what, when, and how of LSRs. Key issues in LSRs are discussed, including searching, updating scenarios, production processes, editorial and peer review, and publication. Other papers in the series explore the contribution from new technologies, such as text mining, machine learning, and crowd sourcing (Thomas et al., this issue); examine the statistical issues associated with repeated meta-analysis (Simmonds et al., this issue); and describe the opportunities to link LSRs with living guidelines (Akl et al., this issue).

1. Keeping evidence up to date

Health research is a key driver of health and well-being, but health professionals often make decisions based on a patchy understanding of what the research says; consumers are confronted by disparate and often conflicting research findings; and society's return on investment in health research is eroded as research findings are lost in the deluge of new research [1]. Over the last 30 years, Cochrane and others have tackled these challenges by developing the science of evidence synthesis, designed to enable health decisions informed by the best available evidence.

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What is new?

- Living systematic review was proposed in 2014 as an approach to systematic review updating. Since that time, many issues associated with the production and publication of living systematic reviews have been explored and are now being tested in a series of living systematic review projects (Cochrane and non-Cochrane).
- This series presents the current state of development of living systematic reviews by members of the international Living Systematic Review Network.
- This paper gives an overview of recent living systematic review developments in production and publication, including a working definition of living systematic review, when living systematic reviews are appropriate, and current approaches to living systematic review production.

Achieving the goal of providing the "best available evidence" requires careful attention to the methods used to identify, appraise, and synthesize relevant research. These methods are well developed [2–4], but resource intensive [5], making it difficult to keep up to date as new research becomes available [6]. Systematic reviews that are out of date and have not incorporated recent data are at risk of serious inaccuracy [7]. Indeed, systematic review currency is challenged by the increasing rate of research output [6], which increases the frequency with which reviews need to be updated to remain accurate, and increasing research volume and rising methodological expectations which increase the work of updating.

Conventionally, systematic reviews are not updated or updated intermittently [8]. Intermittent updating leaves gaps between updates during which time the systematic review may be missing important new research, placing it at risk of inaccuracy [7] and wasting the potential contribution of new research to evidence synthesis and decision-making [9]. Furthermore, reassembling an author team and restarting the review process is often difficult, and much of the institutional memory of the original team can be lost. So much work needs to be repeated that many teams describe updating as "just like starting a review from scratch."

2. Continual updating

We have proposed a continual approach to review updating termed "living systematic review" (see Box 1) [10]. We hypothesize that this approach will achieve greater currency, and therefore accuracy and benefits to end users, with feasible resource requirements over time.

In this paper, we provide an introduction to LSRs, including a working definition and thoughts on when this approach to review currency may be appropriate. We give an overview of how to undertake an LSR and introduce key considerations, including searching, updating scenarios, production processes, editorial and peer review, and publication. Subsequent papers in this series will describe other important aspects of LSR in more detail (see Box 2).

Box 1 Living systematic reviews

- A systematic review that is continually updated, incorporating relevant new evidence as it becomes available
- An approach to review updating, not a formal review methodology
- Can be applied to any type of review
- Uses standard systematic review methods
- Explicit and a priori commitment to a predetermined frequency of search and review updating

3. What is a living systematic review?

We define an LSR as a systematic review that is continually updated, incorporating relevant new evidence as it becomes available. In practice, this means continual surveillance for new research evidence through ongoing or frequent searches and the inclusion of relevant new information into the review in a timely manner so that the findings of the systematic review remain current.

LSR is an approach to review updating, not a formal review methodology, and can be applied to any type of review. The frequency of searching and the time taken to include new information into the review are critical to achieving the currency of an LSR but are not specified in this definition. Just as there are pragmatic limits on identifying "all" research in a systematic review search, there are many logistical hurdles to achieving optimal review currency and so pragmatic solutions must be found that balance currency with feasibility. Also, end user needs should guide the definition of optimal "currency", but empirical evidence of this is currently lacking. In the interim, we propose that LSRs should incorporate relevant new information within a maximum of 6 months of the information becoming available. We expect this proposed upper limit to reduce over time as production and publication systems evolve. In practice, most current LSR pilot projects aim to search most sources at least monthly and make the results of these searches visible to end users within another month.

In contrast to rapid reviews where methods may be modified to support faster production [11,12], LSRs use standard systematic review methods [13]. LSRs differ from frequent, standard review updating by an explicit