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The art and science of writing a scientific review article

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Review articles were and remain resources of major value across science. However, the landscape of review articles underwent major changes over the last 50 years. Whereas review articles in Medicine and Public Health in the pre-evidence-based era were almost exclusively unsystematic [1], the 1990s and the new millennium witnessed the rise of research synthesis as a scientific discipline in its own right [2,3]. For example, in 1999, about 300 systematic review references were indexed in PubMed, whereas 20 years later, in 2019, more than 27 thousand records of systematic reviews were added to that database. Not only did the number of reviews grow exponentially, the complexity and diversity of the review methods also underwent dramatic progress, to such an extent that it is often impossible for a single researcher to keep pace and master all the burgeoning advances in this field [4,5,6,7].

But why are good literature reviews so important? The 1904 Nobel Prize laureate in Physics, John W. Strutt (Lord Rayleigh), in his presidential address to the British Association for the Advancement of Science in 1884, argued that the scientific endeavor is a process consisting of both the production of new knowledge and its integration with the old [8]. He argued that if science consisted only in the accumulation of facts, it would be crushed by its own weight. In that regard, literature reviews play a major role in the judicious integration of new and old knowledge. Reviews are also valuable for providing historical context, pointing out gaps in the existing knowledge, and future directions [9]. Increasingly, a major driver of the rise of the research synthesis field involves the fact that high-quality reviews have been consumed and demanded not only by researchers and practitioners but also by policy makers and the public more generally [3]. Indeed, both Cochrane (The Cochrane Collaboration. http://www.cochrane.org, accessed on 07/Mar/2021) and Campbell (The Campbell Collaboration. https://www.campbellcollaboration.org/, accessed on 07/Mar/2021) Collaborations offer plain-language summaries of their research syntheses on health and social science issues for laypeople.

Given the growing complexity of review methods, what advice can be given to novice researchers considering writing a review article? Our first advice concerns being clear about the aims of the review. Researchers should ask themselves why the review is needed and to which public it is intended. A clear understanding of the aims of the review will

often signal the most appropriate methods to fulfill those aims. For instance, if researchers have a focused question regarding the efficacy/effectiveness of a certain practice or treatment on a given set of outcomes and aim for their synthesis to influence guidelines or policy, then a systematic review would be the method of choice. Importantly, there are at least 10 types of systematic reviews, ranging from economic evaluations to qualitative meta-synthesis [6]. If they aim to understand the extent and nature of the literature on a given subject to determine the value and scope of future systematic reviews or gaps in the literature, then a scoping review would probably be the best approach to suit their needs [10]. On the other hand, if researchers aim to provide a broad perspective on a certain subject, ranging from its history to recent advances, current standards, controversies, and future directions, then a narrative review would probably be the way to go [11].

Our second piece of advice involves becoming very intimate with the fundamental principles and methods of the review approach that was chosen and building a review team whose collective expertise and commitment should be sufficient to address the main challenges of the review. For example, becoming familiar with the methods of systematic reviews of interventions demands a good understanding of the contents of the Cochrane [12] and GRADE [13] Handbooks, the PRISMA statements (http://prisma-statement.org/, accessed on 07/Mar/2021), and the AMSTAR 2 tool [14]. For scoping reviews, authors should be familiar with Arksey & O'Malley's [15] seminal work and recent developments [10,16,17]. Although recently a scale was developed for the assessment of the quality of narrative reviews [18] that instrument seems far from ideal. Hence, for authors interested in narrative reviews, we recommend a close examination of the structure of narrative reviews published in the *State of the Art* series [19] of the *British Medical Journal*, which provide broad overviews on the main subject while drawing as much as possible on the results of previous systematic reviews. Ideally, the review team should include at least one expert on the subject of the review and another on its specific methods.

Our last piece of advice regards what not to do in a review article. First, avoid at all costs tedious data presentation patterns where one engages in an extensive list of statements that author A found X, author B found Y, while author C found Z. Such approaches to the presentation of data do not lead to any palpable synthesis and easily become a source of dismay to readers. Second, avoid simplistic conclusions that do not take into account the complexity of the subject at hand, such as jumping to causal conclusions without considering the (un)certainty or quality of the evidence. Third, in systematic reviews, where the assessment of risk of bias is mandatory, avoid the use of instruments such as the Newcastle-Ottawa and Downs & Black Scales, that yield numeric scores as their final parameter for the evaluation of the risk of bias in included studies. Although commonly used, such tools will often fail to identify studies at high risk of bias when a single or few critical domains are severely compromised within studies included in the review [20,21]. Several instruments are currently available that avoid the illusion of objectivity posed by numeric scores to assess risk of bias. Those instruments require authors to think carefully about important issues such as the major sources of confounding within a certain causal framework of interest for their reviews (Risk of bias tools. https://sites.google.com/site/riskofbiastool/, accessed on 08/Mar/2021) [22]. Fourth, avoid the overuse of abbreviations and jargon that are habitual only for those within that specific field because reviews should be useful for a broad audience, including those who are approaching their subject for the first time [9]. Finally, do not attempt to disguise the introductory chapters of a thesis or dissertation as

a review article. Although those introductory chapters are supposed to present a review of the literature, they have different aims, audience, and rigor than what is expected from a good review article.

In conclusion, good review articles dwell at the heart of the scientific endeavor. The craft of writing them involves a balancing act between the scientific rigor needed to select and critically appraise original studies, and the art of telling a story by providing context, exploring the known and the unknown, and pointing the way forward.

Contributors

E. I. O. Vidal contributed to the conception of the article, writing of the first draft of the manuscript and approval of the final version. F. B. Fukushima contributed to the critical review of the manuscript, approval of the final version. Both authors agree to take responsibility for the content of the same.

Additional informations

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