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Editorial: Review Articles, Systematic Reviews, Meta-Analysis, and the Updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 Guidelines

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Abstract Subjective narrative review articles have an educational and informative role in medical and scientific journals. Systematic review of the literature requires an objective and complete review of all available publications on an identified topic. Systematic review that undergoes meta-analysis aims to provide a complete and objective evaluation of all the published data. Data from systematic review and meta-analysis publications support evidence-based medical practice and are prepared as original research articles. These studies require a clear aim and detailed planning with registration and approval of the study protocol before the study commences. Systematic review and meta-analysis studies are designed, conducted, and reported according to mandatory guidelines. The number of these publications has continued to rise during the past decade. However, concerns with the quality of the studies have resulted in more stringent study guidelines. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, guidelines, reporting checklist, and study flow diagram from 2009 were updated and published in March 2021 as PRISMA 2020. The Editorial aims to present the roles and requirements of subjective narrative review articles, systematic review of the literature, and systematic review and meta-analysis, and introduces the revisions and aims of the PRISMA 2020 guidelines.

Keywords: Editorial • Review • Systematic Reviews as Topic • Meta-Analysis as Topic • Guidelines as Topic

In 2006, a former Editor of the British Medical Journal (BMJ) commented that medical journals represent ‘*a confluence of medicine, science, and journalism*’ [1]. The narrative review article contains these three elements to provide a balanced view without the conflicting or sensational style of modern journalism, with a subjective approach, but with all statements supported with reference citations [1,2]. Medical and life sciences journals publish review articles that are usually narrative reviews written subjectively by the author to support an area of medical research, a clinical topic, or a hypothesis [3]. Because of the subjective nature of review articles, there is no expectation that all publications on the topic are cited [4]. However, there is an expectation that the review’s aims are made clear in the publication title, abstract, and introduction [3,4]. All statements made by the authors are supported by key references and with a clear conclusion [3,4]. Key researchers or senior clinicians write some invited review articles to overview recent developments, research, and clinical guidelines [4]. For all these reasons, review articles still have an educational and informative role [3,4].

In contrast to a narrative review article, a systematic review of the literature should focus on a specific and clearly defined

topic and include all the eligible published studies, without subjective selection by the author [5,6]. Systematic reviews have been increasingly published to provide evidence from all the available published data to improve clinical decisions in medicine [5,6]. However, even large clinical trials may not provide sufficient answers to a clinical question [7]. The findings from a systematic review of the literature from previously published studies may support or refute the findings or identify deficiencies in the trial design [8]. Without meta-analysis, a systematic review of the literature is most applicable for questions that require answering without quantitative data, such as how and why a therapeutic intervention may improve an aspect of medicine or health that is not quantifiable [6]. Also, some studies are too different to combine for quantitative analysis, such as how several varieties of non-standard treatment combinations may improve a subjective clinical outcome [6].

Evidence-based medicine and clinical practice rely on evidence from the medical literature, clinical training, expertise, and experience to provide high standards of patient care [8]. Systematic review combined with meta-analysis of the data from all the published evidence is considered the gold standard to support evidence-based clinical decisions [8]. There is still

widespread confusion from authors regarding the difference between systematic reviews and systematic review and meta-analysis, which may be believed to be the same. The word meta-analysis means a 'study about studies.' A meta-analysis study is a formal, quantitative method used to assess specific published research findings [9]. Usually, a meta-analysis study is based on published randomized, controlled clinical trials but may include cohort studies, case-control studies, or preclinical studies [9]. Meta-analysis that combines and analyses the numerical data from multiple separate studies should only be used with systematic literature review and represent original research articles [9]. Systematic review and meta-analysis are methods that combine to synthesize all the available evidence, including the strengths and weaknesses of the identified studies, the study populations, the interventions used, and the specific study outcomes assessed in each study [9].

Clinicians may make decisions from the findings of systematic review and meta-analysis. Because these studies should be conducted objectively as original research studies, guidelines for the conduct and reporting of these studies have been published [9]. In 2009, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and guidelines were published for study conduct and reporting, including a reporting checklist [9]. These PRISMA guidelines helped to establish eight main considerations for authors before undertaking a systematic review and meta-analysis, which included: define the question of the review; write and publish or register the study protocol; undertake an objective and complete systematic review of the literature; identify the included studies by screening the results against the study selection criteria; undertake an appraisal of the quality of the studies; synthesize the evidence of the study using meta-analysis; prepare a manuscript for publication according to the reporting guidelines; update the systematic review and meta-analysis as new data is published [9,10].

A common reason for the rejection of submitted manuscripts that present systematic review and meta-analysis studies is the lack of suitability of the review topic. This problem highlights the importance of approving study protocols before conducting a systematic review and meta-analysis [9]. Therefore, study protocols for systematic review and meta-analysis should be prepared in advance and registered and approved by either PROSPERO or Cochrane [9]. The International Prospective Register of Systematic Reviews (PROSPERO) (www.crd.york.ac.uk/prospero/) has been available since 2011 with the aim of increasing the transparency of systematic reviews [11]. The Cochrane Review is a systematic review of research in health care and health policy published in the Cochrane Database of Systematic Reviews (CDSR) [12,13].

Increasing numbers of systematic reviews compare multiple treatments, often with indirect comparisons, resulting in new

challenges for conducting and reporting systematic reviews incorporating network meta-analyses [14]. In 2015, the PRISMA extension statement was published with guidelines for conducting and reporting network meta-analysis (NMA) studies [15]. The modified 32-item PRISMA extension checklist, or PRISMA-NMA checklist, was also developed to include the main requirements for reporting network meta-analyses and modifications of previously existing items from the PRISMA statement [16].

The number of published systematic review and meta-analysis studies has increased during the past decade, but the quality has declined [17]. In 2018, a review of publication trends from PubMed from 1995 to 2015 showed that although the USA leads in all publication citations and specific publication types, meta-analysis studies were mainly published by authors from China [17]. In the hierarchy of published evidence in medicine and medical research, randomized controlled trials, systematic reviews, and meta-analysis studies are at the top of the evidence standards [8,17]. Increasingly, meta-analysis and review articles have become some of the most highly cited publications [18]. However, the exponential rise in the number of meta-analysis studies has raised concerns regarding the quality and reproducibility of meta-analysis publications [19]. Systematic review and meta-analysis publications inform clinical practice, often when there are no available data from controlled clinical trials. For this reason, the quality of published systematic review and meta-analysis studies, rather than the quantity, should be as high as possible [8].

On March 29, 2021, the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 Statement was published [20]. PRISMA 2020 now replaces PRISMA 2009 for conducting and reporting systematic reviews and meta-analysis studies [20]. The 2020 PRISMA guidelines include a 27-item reporting checklist, a study flow diagram, and an explanation and elaboration document [20]. The PRISMA 2020 expanded checklist for reporting systematic review and meta-analysis summarizes the requirements for the publication title, abstract, introduction, rationale, and objectives [21]. The PRISMA 2020 expanded checklist includes main subsections required in the main Methods section of the publication, which includes: the eligibility criteria of the selected studies; information sources; search strategy; selection process; data collection process; data items; assessment of the risk of bias; effect measures; synthesis methods; assessment of reporting bias; and certainty assessment [21]. The PRISMA 2020 expanded checklist includes main subsections required in the main Results section of the publication, which includes: study selection; study characteristics; risk of bias in the selected studies; results of individual studies; results of study synthesis; reporting bias; and certainty of evidence [21]. The PRISMA 2020 guidelines and reporting checklist make the registration of the study protocol mandatory [20,21]. Modifications included in PRISMA 2020 also require authors to

present full search strategies for all databases, registers, and websites searched, how many reviewers screened each record, and how outcomes were defined [20]. A new item in PRISMA 2020 requires authors to indicate whether the data, analytic codes and other methods and findings used in the systematic review are publicly available and where they can be found [20]. PRISMA 2020 also includes an expanded checklist and a PRISMA 2020 flow diagram template for systematic reviews [22,23].

Conclusions

Subjective narrative review articles have an educational and informative role in medical and scientific journals. However,

systematic review of the literature requires an objective and complete review of all available publications on a clearly defined topic. Systematic review that undergoes meta-analysis aims to provide a complete and objective evaluation of all the published data on a specific topic and the findings are the basis of evidence-based clinical practice. In the past decade, the exponential rise in systematic review and meta-analysis study publications has raised concerns regarding the quality and reproducibility of meta-analysis data and study findings. For this reason, the updated PRISMA 2020 guidelines and checklist, published in March 2021, have been developed to improve the conduct and reporting of systematic review and meta-analysis studies.

References:

1. Smith R. The trouble with medical journals. *J R Soc Med.* 2006;99(3):115-19
2. Gasparyan AY, Ayyazyan L, Blackmore H, Kitas GD. Writing a narrative biomedical review: Considerations for authors, peer reviewers, and editors. *Rheumatol Int.* 2011;31(11):1409-17
3. Dijkers MP; Task Force on Systematic Reviews and Guidelines. The value of traditional reviews in the era of systematic reviewing. *Am J Phys Med Rehabil.* 2009;88(5):423-30
4. Mulrow CD. The medical review article: State of the science. *Ann Intern Med.* 1987;106:485-88
5. Chalmers I, Altman DG (Eds). *Systematic reviews.* BMJ Publishing Group, London, 1995
6. Cook DJ, Mulrow CD, Haynes RB. Systematic reviews: Synthesis of best evidence for clinical decisions. *Ann Intern Med.* 1997;126:376
7. LeLorier J, Grégoire G, Benhaddad A, et al. Discrepancies between meta-analyses and subsequent large randomized, controlled trials. *N Engl J Med.* 1997;337:536
8. Rosenberg WM, Gray JA, Haynes RB, et al. Evidence based medicine: What it is and what it isn't. *BMJ.* 1996;312(7023):71-72
9. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Ann Intern Med.* 2009;151:W65
10. Berlin JA, Golub RM. Meta-analysis as evidence: Building a better pyramid. *JAMA.* 2014;312:603
11. Page MJ, Shamseer L, Tricco AC. Registration of systematic reviews in PROSPERO: 30,000 records and counting. *Syst Rev.* 2018;7(1):32
12. Cochrane Database of Systematic Reviews. Available at: <https://www.cochranelibrary.com/cdsr/about-cdsr>
13. Higgins JP, Altman DG, Gøtzsche PC, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ.* 2011;343:d5928
14. Debray TP, Schuit E, Efthimiou O, et al. An overview of methods for network meta-analysis using individual participant data: when do benefits arise? *Stat Methods Med Res.* 2018;27: 1351-64
15. Hutton B, Salanti G, Caldwell DM, et al. The PRISMA extension statement for reporting of systematic reviews incorporating network meta-analyses of health care interventions: Checklist and explanations. *Ann Intern Med.* 2015;162(11):777-84
16. PRISMA NMA checklist of items to include when reporting a systematic review involving a network meta-analysis. Available at: <http://www.prisma-statement.org/Extensions/NetworkMetaAnalysis>
17. Fontelo P, Liu F. A review of recent publication trends from top publishing countries. *Syst Rev.* 2018;7(1):147
18. Patsopoulos NA, Analatos AA, Ioannidis JP. Relative citation impact of various study designs in the health sciences. *JAMA.* 2005;293(19):2362-66
19. Ioannidis JP. The mass production of redundant, misleading, and conflicted systematic reviews and meta-analyses. *Milbank Q.* 2016;94(3):485-514
20. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *PLoS Medicine* 2021;18(3):e1003583
21. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020. Reporting checklist. Available at: <http://www.prisma-statement.org/PRISMAStatement/Checklist>
22. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020. Expanded reporting checklist. Available at: http://www.prisma-statement.org/documents/PRISMA_2020_expanded_checklist.pdf
23. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020. Flow diagram template. Available at: <https://journals.plos.org/plosmedicine/article/figure?id=10.1371/journal.pmed.1003583.g001>