Title: Preferred Reporting Items for Systematic Reviews and Meta-Analysis: extension for Scoping Reviews (PRISMA-ScR)

Principal Investigators: Dr. Andrea Tricco, Dr. Sharon Straus, Dr. David Moher

Background: Scoping reviews are used to map the concepts underpinning a research area and the main sources and types of evidence available [1]. Scoping reviews are used to inform research agendas and identify implications for policy or practice. The number of scoping reviews conducted per year has increased steadily since 2012. As such, improvement in the conduct and reporting is imperative. In 2015, the Joanna Briggs Institute published methodological guidance for the conduct of scoping reviews, though guidelines for reporting scoping reviews currently do not exist.

An important component of developing a standard methodology for scoping reviews involves creating reporting guidelines. Use of reporting checklists increases transparency of methods, and allows readers to judge validity and reliability and use research appropriately [2, 3]. Currently, a checklist for reporting scoping reviews in the Enhancing the QUAlity and Transparency of health Research (EQUATOR) library does not exist for health research [4]. Given that more than 494 scoping reviews have been published and they are being conducted in increasing numbers [5], a checklist for reporting is essential.

Research waste from incomplete reporting has been identified as a major problem in biomedical research [6]. To improve the quality of reporting of systematic reviews, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guideline was developed [4], consisting of a 27-item checklist and a flow diagram. The introduction of reporting guidelines has been associated with improved completeness and quality of reporting [7, 8, 9].

PRISMA was developed primarily to facilitate reporting of systematic reviews of healthcare interventions. Though scoping reviews share similarities with systematic reviews, there are also some differences. For example, since the objective of a scoping review is to chart the literature, a meta-analysis is typically not conducted. In addition, in some cases, scoping reviews may involve a qualitative analysis of the data (above and beyond a narrative description). As such, some PRISMA items are not appropriate for reporting scoping reviews, while other important items are missing [10-12].

Over the past years, several extensions of PRISMA have been developed for specific types of reviews [13-17]. We believe that the development of a specific extension of PRISMA for scoping reviews would be a highly effective means of reducing waste in biomedical research.

Objective: To develop a guideline to standardize the reporting of scoping reviews (PRISMA-ScR).

Project leaders and strategy: PRISMA-ScR will be developed according to previously published guidance for establishing reporting guidelines [5], developed by the EQUATOR network.

This project is led by Dr. Andrea Tricco and is complemented by a 5 person advisory board, with extensive experience in knowledge synthesis and the development of reporting guidelines.

A protocol for developing a reporting guideline for scoping reviews will be compiled, based on published guidance for developing reporting guidelines [5]. Areas of modification to the PRISMA Statement [4] will be identified through the advisory board's research program on scoping reviews. Examples of modifications include a broader question than systematic reviews, and optional risk of bias assessment, meta-analysis and/or formal qualitative analysis given that the goal of scoping reviews is to chart the literature and identify areas for future systematic reviews. A list of potential items for inclusion in the PRISMA extension will be drafted, which will be used in an agreement-building exercise (i.e., modified Delphi). An expert panel of 40 individuals will be asked to rank the importance of the proposed items, which is a sufficient sample size for this exercise based on previous studies [18]. Experts will be defined as individuals with extensive experience conducting scoping reviews (e.g.,>5), editors of journals that publish scoping reviews, or those with experience with the conceptualization, dissemination, or uptake of scoping reviews. Experts will be chosen to ensure a broad geographic (i.e. international) and stakeholder (methodologists, funding agencies, clinicians, patients, policy-makers, journal editors) representation. They will be asked to rank a preliminary version of the scoping review reporting guideline checklist using an e-survey (e.g., Fluidsurveys).

The results of the e-survey will be collated and discussed at an in-person meeting involving 30 individuals, which is the sample size used for in-person meetings to develop previous reporting guidelines, such as PRISMA. Only those who participated in the survey will be invited to meet in-person. During the meeting, the results of the e-ranking exercise will be discussed. Using a nominal group technique [19] experts will be asked to re-rank the items using polling software until high percent agreement is achieved (e.g., >80% on the sum of "very much agree" and "extremely agree"). Only the aggregate results will be presented to the group, maintaining anonymity. The results from the two ranking exercises will be summed to calculate the overall

score, median, and mode. A pilot-delphi was already conducted at the Scoping Reviews Methods Meeting that was hosted by members of the advisory board. Items with high agreement will be included in the checklist, which will be circulated for final input from the participants.

The final version of the checklist and explanation and elaboration document will be submitted to a journal for publication, and posted on the Knowledge Translation Program of the Li Ka Shing Knowledge Institute, St. Michael's Hospital website. In addition, we plan to have the scoping review reporting guideline (and checklist) specific to health research and hosted on the EQUATOR website. The reporting guideline for scoping reviews will improve the completeness of reporting; facilitating the appraisal of results, increasing their relevance for decision-making.

Appendix 1: PRISMA-ScR Executive

Name	Affiliation(s)
Andrea Tricco	Li Ka Shing Knowledge Institute of St. Michael's Hospital, Toronto, Canada Epidemiology Division, Dalla Lana School of Public Health, University of Toronto

Appendix 2: PRISMA-ScR Advisory Board

Name	Affiliation(s)
Heather Colquhoun	Department of Occupational Science & Occupational Therapy, University of Toronto
Danielle Levac	School of Rehabilitation Science, University of Ottawa, Canada
David Moher	Ottawa Hospital Research Institute, University of Ottawa, PRISMA Group
Kelly O'Brien	Department of Physical Therapy, University of Toronto Institute of Health Policy, Management and Evaluation, University of Toronto
Sharon Straus	Li Ka Shing Knowledge Institute of St. Michael's Hospital, Toronto Department of Medicine, Faculty of Medicine, University of Toronto

References

1. Arksey H, O'Malley L. Scoping studies: Towards a Methodological Framework. *International journal of social research methodology.* 2005; 8(1): 19-32.

2. Moher D, Tetzlaff J, Tricco AC, Sampson M, Altman DG. Epidemiology and reporting characteristics of systematic reviews. *PLoS Med.* 2007; 4(3): e78.

3. Daudt HM, Van Mossel C, Scott SJ. Enhancing the scoping study methodology: a large, interprofessional team's experience with Arksey and O'Malley's framework. *BMC medical research methodology.* 2013; 13(1):48.

4. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ.* 2009; 339:b2535.

5. Moher D, Schulz KF, Simera I, Altman DG. Guidance for developers of health research reporting guidelines. *PLoS Med.* 2010; 7(2): e1000217.

6. Glasziou P, Altman DG, Bossuyt P, Boutron I, Clarke M, Julious S, et al. Reducing waste from incomplete or unusable reports of biomedical research. Lancet. 2014; 383(9913): 267-76. doi: 10.1016/S0140-6736(13)62228-X. PubMed PMID: 24411647.

7. Tunis AS, McInnes MD, Hanna R, Esmail K. Association of study quality with completeness of reporting: have completeness of reporting and quality of systematic reviews and meta-analyses in major radiology journals changed since publication of the PRISMA statement? Radiology. 2013; 269(2):413-26. doi: 10.1148/radiol.13130273. PubMed PMID: 23824992.

8. Willis BH, Quigley M. The assessment of the quality of reporting of meta-analyses in diagnostic research: a systematic review. BMC Med Res Methodol. 2011; 11:163. doi: 10.1186/1471-2288-11-163. PubMed PMID: 22151233; PubMed Central PMCID: PMCPMC3258221.

9. Plint AC, Moher D, Morrison A, Schulz K, Altman DG, Hill C, et al. Does the CONSORT checklist improve the quality of reports of randomised controlled trials? A systematic review. Med J Aust. 2006; 185(5): 263-7. PubMed PMID: 16948622

10. McInnes MD, Bossuyt PM. Pitfalls of Systematic Reviews and Meta-Analyses in Imaging Research. Radiology. 2015; 277(1):13-21. doi: 10.1148/radiol.2015142779. PubMed PMID: 26402491.

11. Macaskill P GC, Deeks JJ, Harbord RM, Takwoingi Y. Chapter 10: Analysing and Presenting Results. In: Deeks JJ, Bossuyt PM, Gatsonis C (editors), Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy The Cochrane Collaboration; 2010.

12. Whiting PF, Rutjes AW, Westwood ME, Mallett S, Deeks JJ, Reitsma JB, et al. QUADAS-2: a revised tool for the quality assessment of diagnostic accuracy studies. Ann Intern Med. 2011; 155(8):529-36. doi: 10.7326/0003-4819-155-8-201110180-00009. PubMed PMID: 22007046.

13. Beller EM, Glasziou PP, Altman DG, Hopewell S, Bastian H, Chalmers I, et al. PRISMA for Abstracts: reporting systematic reviews in journal and conference abstracts. PLoS Med. 2013; 10(4):e1001419. doi: 10.1371/journal.pmed.1001419. PubMed PMID: 23585737; PubMed Central PMCID: PMCPMC3621753.

14. Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015; 349:g7647. PubMed PMID: 25555855.

15. Stewart LA, Clarke M, Rovers M, Riley RD, Simmonds M, Stewart G, et al. Preferred Reporting Items for Systematic Review and Meta-Analyses of individual participant data: the PRISMA-IPD Statement. JAMA. 2015; 313(16):1657-65. doi: 10.1001/jama.2015.3656. PubMed PMID: 25919529.

16. Welch V, Petticrew M, Tugwell P, Moher D, O'Neill J, Waters E, et al. PRISMA-Equity 2012 extension: reporting guidelines for systematic reviews with a focus on health equity. PLoS Med. 2012; 9(10):e1001333. doi: 10.1371/journal.pmed.1001333. PubMed PMID: 23222917; PubMed Central PMCID: PMCPMC3484052.

17. Hutton B, Salanti G, Caldwell DM, Chaimani A, Schmid CH, Cameron C, 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. doi: 10.7326/M14-2385. PubMed PMID: 26030634.

18. Diamond IR, Grant RC, Feldman BM, et al. Defining consensus: a systematic review recommends methodologic criteria for reporting of Delphi studies. JCE 2014; 67(4):401-409.

19. http://www.cdc.gov/healthyyouth/evaluation/pdf/brief7.pdf