

SWAR 24: Time and resource implications of a systematic review with network meta-analysis

Objective of this SWAR

Systematic reviews with network meta-analyses (NMA) are often considered to be more time-consuming and resource intensive than those with standard, pairwise meta-analyses.[1, 2] However, there is a lack of direct estimates of how much time is required to complete specific review activities within NMA. This SWAR will identify the resource implications and length of time it takes to carry out reviewing activities associated with a systematic review and NMA of intervention effectiveness.

Our findings can inform planning of future systematic reviews with NMA, and more accurate estimation of time and resources required to complete such reviews (e.g. number of person days). This will help review teams preparing funding applications and planning reviews, as well funding agencies who are evaluating the feasibility of reviews. Results of the SWAR will identify candidate tasks for investigation in a future SWAR, to assess where the greatest efficiencies could be achieved via use of automation tools, or other technology-based time-saving strategies.

Study area: Study Identification, Statistical Analysis, Data Extraction

Sample type: Reviewers

Estimated funding level needed: Very Low

Background

Unlike pairwise meta-analysis, a NMA allows the estimation of relative effectiveness between multiple competing interventions, as long as they form a connected network. NMA may provide more precise estimates of intervention effect and allow effect sizes to be estimated for interventions that have not been directly compared to each other. However, these benefits may be offset by the greater workload associated with a NMA, compared with a pairwise meta-analysis. This might arise from a higher number of included studies, additional data collection of study characteristics and outcomes to allow for the creation of a 'decision set' and a 'supplementary set' of interventions, more complex statistical analysis methods, and assessment of additional assumptions, such as consistency/ coherence across the network.

In the first instance, this SWAR will be conducted alongside a systematic review and NMA of non-pharmacological interventions for managing hypertension and pre-hypertension (PROSPERO: CRD42023469128). For comparison, we assessed four recent NMAs [3-6] and five pairwise meta-analyses [7-11] of this topic. For the NMAs, the median number of included studies was 38 (range 19 to 120) and we estimated that 6 to 36 months (median 24 months) had passed from the initial search date or registration of the review protocol (whichever was first) to final submission to a journal. The five pairwise meta-analyses were of comparable size to the NMAs (range 29 to 35 included studies, median 34) and their duration was estimated to range from 6 to 31 months (median 16 months). While the overall duration of systematic reviews with NMA appears to be slightly longer than for those with pairwise meta-analysis, it is unclear how much time and resources are required for each stage of the review and any activities specific to NMA.

This SWAR might also be implemented in other reviews with NMAs and we welcome its conduct by other review teams. A collaborative database could then be used to generate more precise estimates (and measures of their uncertainty) for time and resource implications of NMA.

Interventions and comparators

Intervention 1: Each team member will use automated software to record the type of activity and time taken on each task. The free desktop version of Clockify (clockify.me) will be used to record time spent using different software or applications (e.g. how long a PDF document has been active) and different webpages (specific URLs). These will then be manually assigned to specific reviewing activities (e.g. full text screening or risk of bias assessment). For tasks completed offline or on paper, team members will be asked to manually record time spent (in minutes) on that task.

Index Type: Full Review

Method for allocating to intervention or comparator

No comparator

Outcome measures

Primary: Time taken on each activity summed across all review team members, and number of person working-days per activity.

Secondary:

Analysis plans

Data will be recorded as hours and minutes spent on each activity by each member of the review team, and the time period during which these activities were undertaken. Time will be recorded from the beginning of literature searching until the final draft of the review has been prepared.

The following activities will be recorded:

Literature searching:

- Development of search strategy
- Conduct of database searches
- Deduplication
- Search updates

Screening and article retrieval:

- Screening of titles and abstracts (including conflict resolution where required)
- Retrieval of full text articles
- Screening of full text articles (including conflict resolution where required)
- Identification of additional studies from reference lists

Data extraction and risk of bias assessment:

- Development and piloting of data extraction forms
- Extraction of study characteristics and quantitative outcome data (including conflict resolution where required)
- Obtaining missing information from study authors
- Coding characteristics/PICO of included studies
- Assessment of risk of bias (including conflict resolution where required)

Statistical analysis:

- Development of data processing and analysis plan
- Pairwise meta-analyses for all specified outcomes, including assessment of heterogeneity
- NMA for all specified outcomes, including assessment of model assumptions and fit and inconsistency checks as required
- Additional analyses, e.g. extending the network to include supplemental interventions, sensitivity analyses, and subgroup analyses

Certainty in evidence:

- Assessment of certainty of the evidence (e.g. Confidence in Network Meta-Analysis, CINeMA) [12] (including conflict resolution where required)

Writing:

- Preparation of draft manuscript, including summary of outcomes not included in statistical analyses

Other:

- Project administration, including general review team meetings (not specific to one of the above tasks)

Results will also be expressed in person working-days per activity and for the entire review.

We will report additional characteristics of the review (e.g. number of (a) deduplicated search records, (b) screened and included full texts, and (c) intervention nodes in the network and unique direct comparisons per outcome). We will report any review software or automation tools used

throughout the review, how many team members were involved in each review activity, their level of experience, and extent of involvement where readily available (e.g. proportion of records screened). These data will help future review teams to compare the anticipated volume of work for their review to reviews used for this SWAR, and to calculate appropriate proportions of time and resources.

Possible problems in implementing this SWAR

Members of review teams will need to download Clockify and may experience set up difficulties. The time tracking software may be susceptible to small errors or imprecision if users are frequently switching between different programs or webpages, but automatic tracking rather than manual time entry minimizes potential for human errors.

References

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6. Yang H, Wu X, Wang M. The effect of three different meditation exercises on hypertension: a network meta-analysis. *Evidence-Based Complementary and Alternative Medicine* 2017;2017:9784271.
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11. Dickinson H, Campbell F, Beyer F, et al. Relaxation therapies for the management of primary hypertension in adults: a Cochrane review. *Journal of Human Hypertension* 2008;22(12):809-20.
12. Nikolakopoulou A, Higgins JPT, Papakonstantinou T, et al. CINeMA: An approach for assessing confidence in the results of a network meta-analysis. *PLOS Medicine* 2020;17(4):e1003082.

Publications or presentations of this SWAR design

Halicka M. Time and resource implications of a systematic review with network meta-analysis. ESG SWAR Webinar. 24/JAN/2024.

Examples of the implementation of this SWAR

Webster K, Halicka M, Bowater RJ, Parkhouse TL, Stanescu D, Punniyakotty AV, Savović J, Huntley A, Dawson S, Clark CE, Johnson R, Higgins JPT, Caldwell CM. Effectiveness of stress management and relaxation interventions for the management of hypertension and pre-hypertension: a systematic review and network meta-analysis. (manuscript under review). PROSPERO 2023 CRD42023469128 Available from:

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023469128

Paterson C, Palmer J, Wilson R, Scott J, Savovic J, Spiga F, Dawson S, Caldwell D, Higgins J. Effectiveness and safety of pharmacological interventions for the treatment of cocaine use

disorder. PROSPERO 2024 CRD42024596434 Available from:
https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42024596434 (ongoing)

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