

Systematic Review and Meta analysis-A Practical Application

Type: Short Communication

Received: November 7, 2022

Published: November 12, 2022

Citation:

Rebecca Samson. "Systematic Review and Meta analysis-A Practical Application". PriMera Scientific Medicine and Public Health 1.3 (2022): 27-33.

Copyright:

© Rebecca Samson. This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Rebecca Samson*

Director of Nursing & Research, AVMCH-Puducherry, India

***Corresponding Author:** Rebecca Samson, Director of Nursing & Research, AVMCH-Puducherry, India.

Keywords: Systematic literature review; systematic review; Meta analysis, protocols

Introduction

Why Systematic review is needed?

- When faced with any questions.
- Important skill for any researcher to develop.
- Identification of the current literature.
- Will give guidance to plan & suggest the value of novel research.

Terminologies

Systematic literature review

- SLR attempts to identify, appraise and synthesize all the empirical evidence that meets pre - specified eligibility criteria to answer a given research questions.

Systematic review

- A systematic review attempts to collate all empirical evidence that fits pre - specified eligibility criteria to answer a specific research question.

Protocol

- The preparation of a protocol is an essential component of the systematic review process. It ensures that a systematic review is carefully planned and that what is planned is explicitly documented before the review starts, thus promoting consistent conduct by the review team, accountability, research integrity and transparency of the eventual completed review.

Hypothesis

- It is proposed explanation for an observation, one that may be investigated (scientific hypothesis) or may be carried forward (working hypothesis).
- It uses explicit systematic methods that are selected to minimize bias, thus providing reliable findings from which conclusions can be drawn and decision made.

Meta analysis

- It is statistical assessment of the data provided from multiple studies or resources that attempt to ask/answer the same questions.

What is a Protocol?

- A protocol is a set of rules and guidelines for communicating data.
- Protocol is a system of rules about the correct way to act in formal situations.
- Protocols differ various situations E.g Medical, Law, IT, Engineering, Air force, Political powers etc.

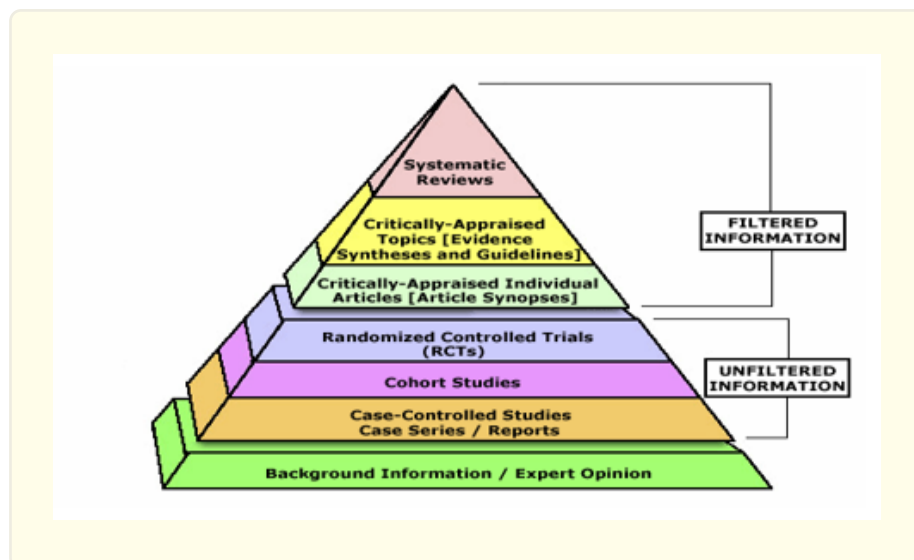
Reviews - related?



Differences-LR, SR, MA

- **LR-Literature Review**
 - ❖ Summarizes a topic that is broad in scope (ex. Cancer treatment).
 - ❖ Qualitative.
- **SR-Systematic Review**
 - ❖ Answers a specific clinical question (e.x.PICO)(e.x. Is Vitamin C or Chemotherapy a better cancer treatment in patients over the age of 40?).
 - ❖ Defines a specific search strategy: lists what will be included and excluded in articles selected.
- **MA-Meta Analysis**
 - ❖ Look at studies from a systemic review.
 - ❖ Purpose: Combines similar studies and pulls data to get a statistically.

Levels of Evidence



Rationale for Systematic Review

- Inform medical decision making.
- Plan future research agendas.
- Establish clinical or health policy.
- Possible use for comparative effectiveness research.

Principles in developing protocol

- Summarizes and synthesizes existing.
- Knowledge.
- Enables research to make an objective assessment of primary research evidence.
- Various decision - making matters.

Types of Systematic Review

Joanna Briggs Institute identifies

- Effectiveness.
- Qualitative Research.
- Economic Evaluations.
- Prevalence/Incidence.
- Etiology/Risk.
- Mixed Methods.
- Umbrellas/Overviews (reviews or reviews).
- Text/Opinion.
- Diagnostic Test Accuracy.
- Scoping (Mapping) Reviews.

Limitation of the Systematic Review

- They encounter the same pitfalls as primary research.
- Repeatability, Bias & Appropriate uses of methodology & Statistics.
- Small effects of interventions may be magnified.
- SRS are difficult to find (or execute) when evidence is scarce.
- Many SRS do not show the protocol used.
- Questionable validity, reproducibility. Considered as being wasteful use to time and resources if poorly done.

Steps in Systematic Review

- Identify a question or a clinical problem.
- Create a review protocol (Inclusion criteria.
- Find studies in the literature.
- Study selection: pick relevant studies based on review protocol.
- Critically appraise the quality of studies.
- Collect data from each selected study.
- Synthesize and summarize findings from include studies.
- Document the method by writing a review, report or article.

How to Develop a Review protocol and its application of systematic review

1. Background/Purpose.
2. Objective/Review Questions.
3. Methods.
4. Search Strategy.
5. Data collection.
6. Displaying Data.

PICO

P-Population/Patient/Problem/Programme

- How would you describe a group of patients similar to yours?

I-Intervention, Prognostic Factor, Exposure

- Which main intervention, Prognostic factor or exposure are you considering.

C-Comparison

- What is the main alternative to compare with the Intervention?.

O-Outcomes

- What can you hope to accomplish measure, improve or affect?

Proposal components

1. Problem identification.
2. Justification of the project.
3. Goal.

4. Study questions/Hypotheses.
5. Study design.
6. Methods.
7. Analysis plan.
8. Plans for interpreting the data.
9. Plans to report study findings.
10. Budget.
11. Timeline.
12. Appendices.

1. **Problem Identification**

- Why problem requires study.
- Discrepancy between the real/observed situation and the desired situation.
- Problem Definition.
- Summary of current research about the problem (Magnitude, time frame, geographic area, population).

2. **Justification of the Project**

- Describe what you want to study and why
- Relevant questions to address might include:
 - Is the problem current/timely?
 - Is it life threatening
 - Does it affect many people/
 - Is it a concern by many different people?
 - Have other studies already addressed this problem?
 - Organize this section into a few concise paragraphs

3. **Goal**

- Broad statement of the public health purpose of the study/project.

Objectives

- Describe the results to be achieved and how you will achieve them.
- Develop SMART objectives.

Proposals Components

4. **Study Questions/Hypotheses**

An explicit statement of what will be investigated.

5. **Study design**

State whether your study is descriptive or analytic.

Describe your study design.

6. **Methods**

- Specify your study population.
- Describe the type of data you will collect.
- Describe your data collection procedures.
- Identify data quality procedures.
- Describe partners you will collaborate with.

7. *Analysis plan*

- Include a few key table shells that show how you want to organize your data.
- 8. Plans for interpreting the data describe the population to which you can generalize the results Identify the limitations of this study.
- 9. Plans to report study findings discuss how you will disseminate your results.
- 10. Budget Provide an overall cost of your study Organize the cost items by: Salaries, Supplies, Equipment, Travel & Miscellaneous costs.
- 11. Timeline: Outline the major steps - and time required - for your study.
- 12. Appendices describe the key items not in the text of your proposal that will be included.

Conclusion

- Systematic review allows rigorous, impartial and literature-wide assessment of study outcomes, quality and design.
- Poorly conducted systematic reviews can mislead just like any other experimental study.
- A vague question is likely to lead to a vague answer.
- On literature searching, care needs to be taken to ensure that all relevant data is obtained.
- A meticulous search must be coupled with meticulous record keeping. Be able to criticise the quality and limitations of the literature in the view to improve future study design.
- Consider what novel finding(s) your review brings to the literature.

References

1. Higgins JPT and Green S. "Cochrane Handbook for Systematic Reviews of Interventions (Version 5.1.0)". The Cochrane Collaboration (2011).
2. Altman DG., et al. "Preferred Reporting Items for Systematic Reviews and Meta-analyses: The PRISMA Statement". *Annals of Internal Medicine* 151.4 (2009): 264-269.
3. "Standards for Systematic Reviews (Report)". The National Academies of Science, Engineering, Medicine (2011).
4. "Systematic Reviews: CRD's guidance for undertaking reviews in health care". Centre for Reviews and Dissemination, University of York. York, UK: York Publishing Services Ltd (2008).
5. Kitchenham B. "Procedures for Performing Systematic Reviews". Keele University, Software Engineering Group, Department of Computer Science, Keele, UK 33 (2004): 1-26.
6. Pai M., et al. "A Roadmap for Systematic Reviews & Meta-analyses". *The National Medical Journal of India* 17.2 (2004): 86-95.
7. Pai M., et al. "Systematic Reviews and Meta-analyses: An Illustrated, Step-By-Step Guide". *The National Medical Journal of India* 17.2 (2004): 86-95.
8. Armstrong R and Waters E. "Systematic Reviews of Health Promotion and Public Health Interventions (Version 2)". on behalf of the Guidelines for Systematic Reviews in Health Promotion and Public Health Taskforce (2007).
9. Hargrove P, Lund B and Griffer M. "A Guideline for Applying Systematic Reviews to Child Language Intervention". *Communication Disorders Quarterly* 26.4 (2005): 226-235.
10. Robey RR and Dalebout SD. "A Tutorial on Conducting Meta-Analyses of Clinical Outcome Research". *Journal of Speech, Language & Hearing Research* 41.6 (1998): 1227-1241.
11. Koricheva J, Gurevitch J and Mengersen K. "Handbook of Meta-analysis in Ecology and Evolution". Princeton University Press. Discusses exploratory and other types of case studies (2013).
12. Felber L. "The Book Review: Scholarly and Editorial Responsibility". *Journal of Scholarly Publishing* 33.3 (2002): 166.
13. Gump SE. "Special Section on the Value of Scholarly Book Reviews". *Journal of Scholarly Publishing* 50.1 (2018): 1-7.
14. Spink A, Robins D and Schamber L. "Use of Scholarly Book Reviews: Implications for Electronic Publishing and Scholarly Communication". *Journal of the American Society for Information Science* 49.4 (1998): 364-374.
15. Schick-Makaroff K., et al. "What Synthesis Methodology Should I Use? A Review and Analysis of Approaches to Research Synthesis". *AIMS Public Health* 3.1 (2016): 172-215.

16. Finfgeld-Connett D. "Use of Content Analysis to Conduct Knowledge-Building and Theory-Generating Qualitative Systematic Reviews". *Qualitative Research* 14.3 (2014): 341-352.
17. Kerr NL. "HARKing: Hypothesizing After the Results are Known". *Personality and Social Psychology Review* 2.3 (1998): 196-217.
18. Simonsohn U, Nelson LD and Simmons JP. "p-Curve and Effect Size: Correcting for Publication Bias Using Only Significant Results". *Perspectives on Psychological Science* 9.6 (2014): 666-681.