An Introduction to
Systematic Reviews & Meta-Analysis

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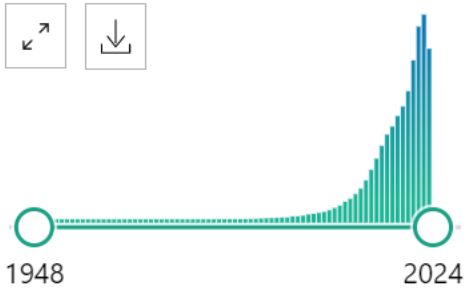

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The relationships between perfectionism and symptoms of depression, anxiety and obsessive-compulsive disorder in adults: a **systematic review** and **meta-analysis**.

Callaghan T, Greene D, Shafran R, Lunn J, Egan SJ.

Cogn Behav Ther. 2023 Nov 13:1-12. doi: 10.1080/16506073.2023.2277121. Online ahead of print.

PMID: 37955236 Review.

Perfectionism is a transdiagnostic process associated with depression, anxiety, and obsessive-compulsive disorder (OCD). The focus of this **systematic review** and **meta-analysis** was to examine evidence for the association between perfectionistic strivings ...

Chat with paper

2 Cite

Effects of mindfulness-based interventions on reducing psychological distress among nurses: A **systematic review** and **meta-analysis** of randomized controlled trials.

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J Nurs Scholarsh. 2023 Nov 13. doi: 10.1111/jnu.12941. Online ahead of print.

Effects of mindfulness-based interventions on reducing psychological distress among nurses: A systematic review and meta-analysis of randomized controlled trials

PREV RESULT
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Mestiana Karo [1], Lindawati Simorangkir [1], Ita Daryanti Saragih [2], Ira Suarilah [3], Huey-Ming Tzeng [4]

Affiliations + expand

PMID: 37955233 DOI: 10.1111/jnu.12941

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Abstract

Purpose: Nurses increasingly use mindfulness as an effective mental health intervention to reduce psychological distress. The effectiveness of mindfulness-based interventions remains inconclusive, which may lead to implementation of interventions in an inefficient or ineffective manner. This study aimed to examine the effects of mindfulness-based interventions on reducing stress, anxiety, and

J Nurs Scholarsh. 2023 Nov 13. doi: 10.1111/jnu.12941. Online ahead of print.

Effects of mindfulness-based interventions on reducing psychological distress among nurses: A

Abstract

Purpose: Nurses increasingly use mindfulness as an effective mental health intervention to reduce psychological distress. The effectiveness of mindfulness-based interventions remains inconclusive, which may lead to implementation of interventions in an inefficient or ineffective manner. This study aimed to examine the effects of mindfulness-based interventions on reducing stress, anxiety, and depression among nurses.

Design: Systematic review and meta-analysis.

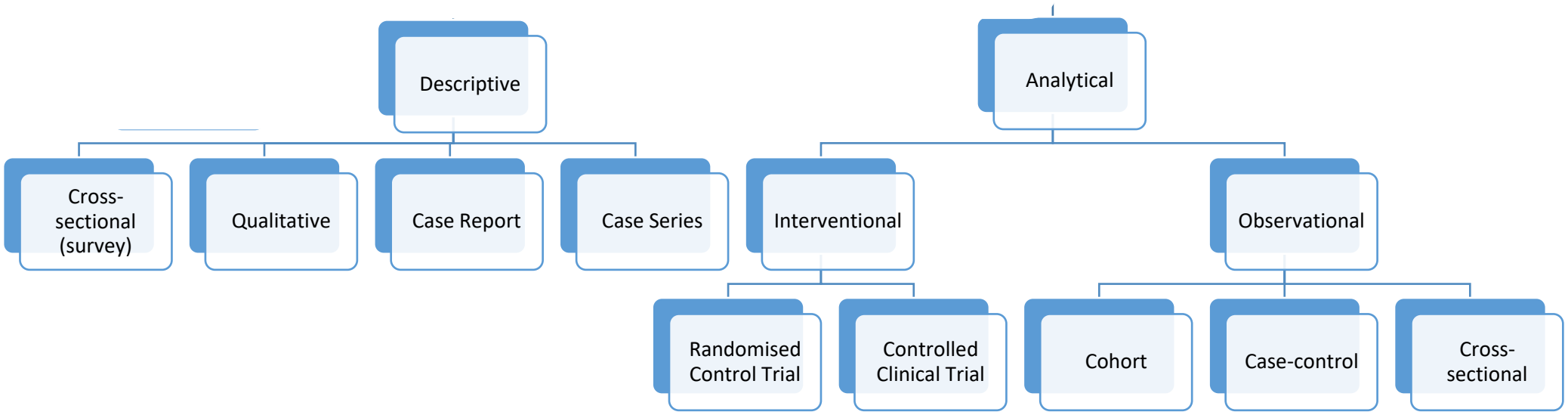
Methods: Randomized controlled trials (RCTs) were searched using six databases published through May 20, 2023, which evaluated the effects of mindfulness-based interventions on reducing psychological distress among nurses. To assess the quality of methodology included in the RCTs, version 2 of the Cochrane risk-of-bias instrument for RCTs with five domains was used. Standardized mean difference (SMD) with 95% confidence interval (CI) were calculated using the random-effects model in the meta-analyses. Publication bias was assessed using Egger's regression test. Further, the robustness effect size of the pooled analysis was assessed using leave-one-out sensitivity analysis.

Findings: A total of 16 RCTs were included in the final analysis. Overall, the modalities appeared to alleviate stress (pooled SMD: -0.50 [95% CI: -0.82 to -0.18]; $p < 0.001$) and depression (pooled SMD: -0.42 [95% CI: -0.78 to -0.06]; $p = 0.02$) among nurses.

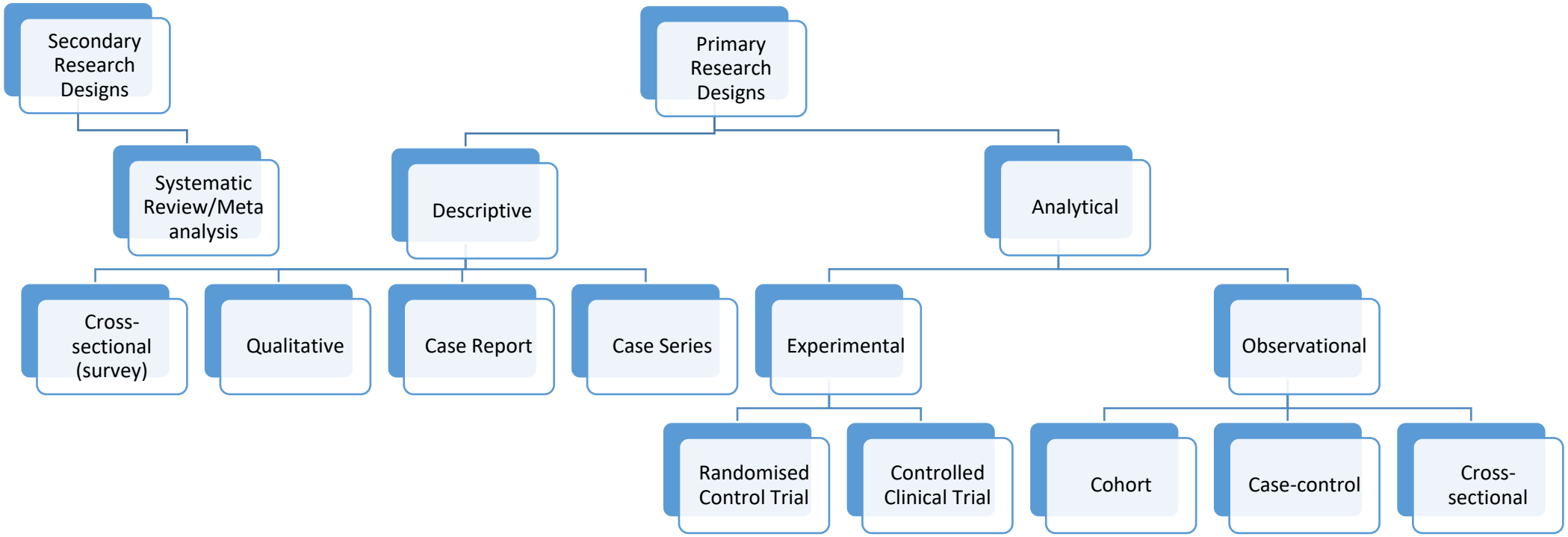
Conclusion: Mindfulness-based interventions appear to alleviate stress and depression in nurses. Future research evaluating mindfulness-based interventions among working nurses with more rigorous methodological and larger sample size.

Clinical relevance: Support for nurses' mental health must be included while implementing personal and professional development plans.

Research designs



Research designs

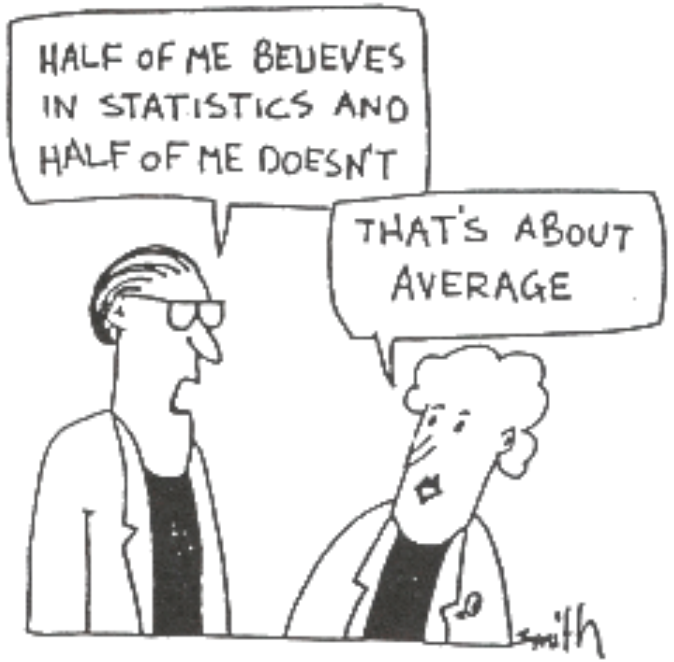


Hierarchy of evidence

Information overload

What do you do?

- For an acutely ill patient, you do a search
- You find several studies: some find that it works; some do not
- What do you do?



Ask somebody to find all studies, select the best, …

History

- James Lind, 18th century
  - Critically reviewed a number of reports on the prevention and treatment of scurvy

What is a systematic review?

- **SYSTEMATIC**: Done or acting according to a fixed plan or system: methodical

- **REVIEW:** A critical appraisal of a book, play or other work

What is a systematic review?

- “A systematic review is a review in which there is a comprehensive search for relevant studies on a specific topic, and those identified are then appraised and synthesized according to a predetermined and explicit method.” (Klassen 1998)

- A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made (Antman 1992, Oxman 1993)

What is a systematic review?

- Use explicit and rigorous methods to:
  - Identify
  - Critically appraise
  - Synthesize
- Look for the whole "truth" (not just a part…a single or few studies)
  - Assemble **all** available evidence (e.g., all controlled studies)

Unique characteristics of a systematic review

- A systematic review must have:
  - *Clear question to answer*
  - *Clear inclusion and exclusion criteria*
  - *Explicit search strategy*
  - *Systematic coding and analysis of included studies*
  - *Meta-analysis (where possible)*

What is Meta Analysis

- Statistical methods may or may not be used to analyze and summarize the results of the included studies.

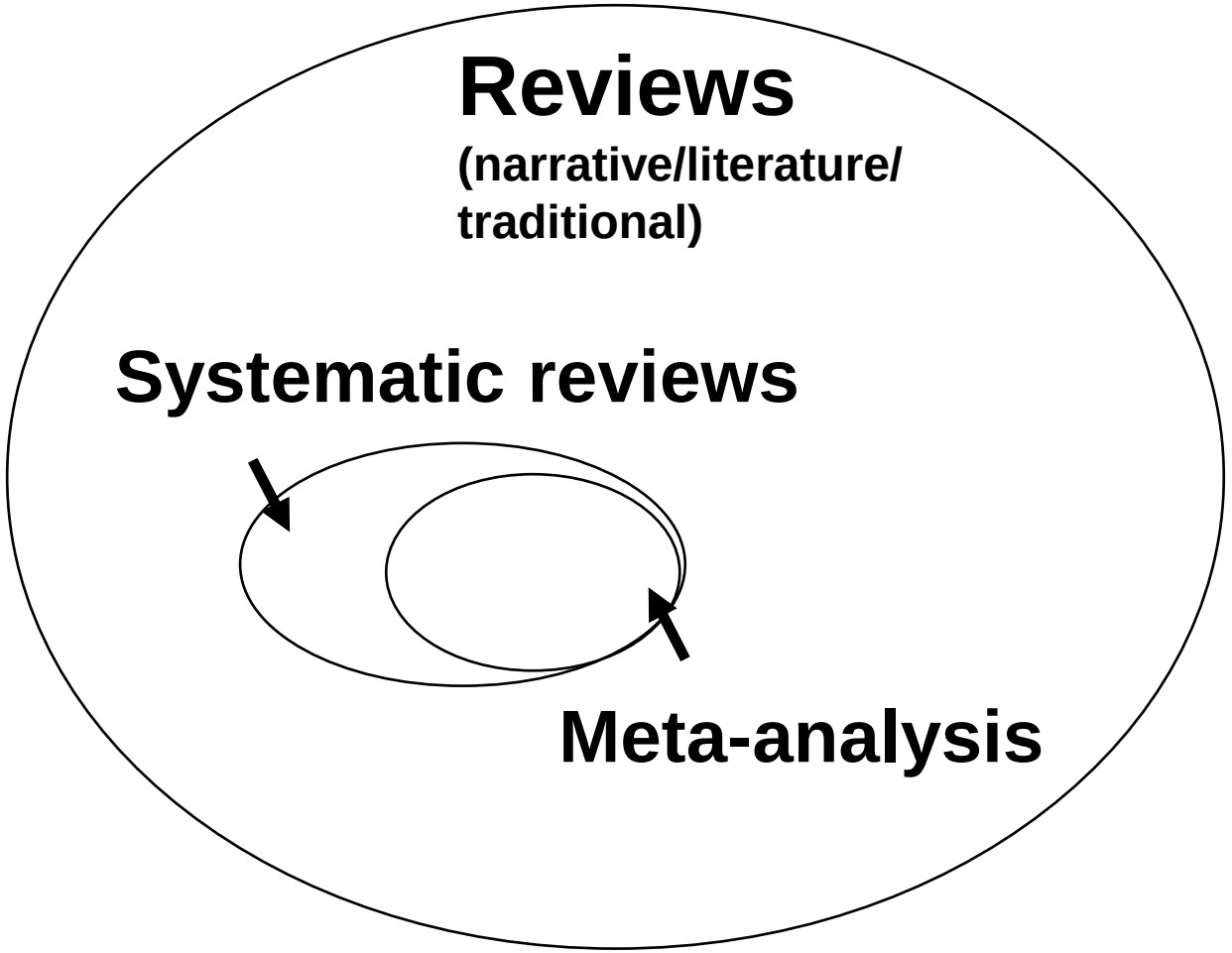
"the use of statistical methods to summarize the results of independent studies "

- i.e. A specific type of systematic review

What is a meta-analysis?

- Optional component of a systematic review
  - *A statistical analysis of results from individual studies*
    - Increase power
    - Improve estimates of the size of the effect

Types of reviews



Narrative/traditional reviews

- Usually written by experts in the field
- Use informal and subjective methods to collect and interpret information
- Usually narrative summaries of the evidence

Read: Klassen et al. Guides for Reading and Interpreting Systematic Reviews. Arch Pediatr Adolesc Med 1998;152:700-704.

Narrative vs systematic review

Narrative

- Many questions
- Unclear how conclusions follow from included studies
  - No search methods
  - No inclusion criteria
  - No combining studies
- Prone to random and systematic error
- May not consider quality of included studies

Systematic

- One question
- Methods transparent and reproducible
  - Explicit search
    - Reproducible
  - Explicit inclusion criteria
  - Combine study results (meta-analysis)
- Standardised critical appraisal across included studies

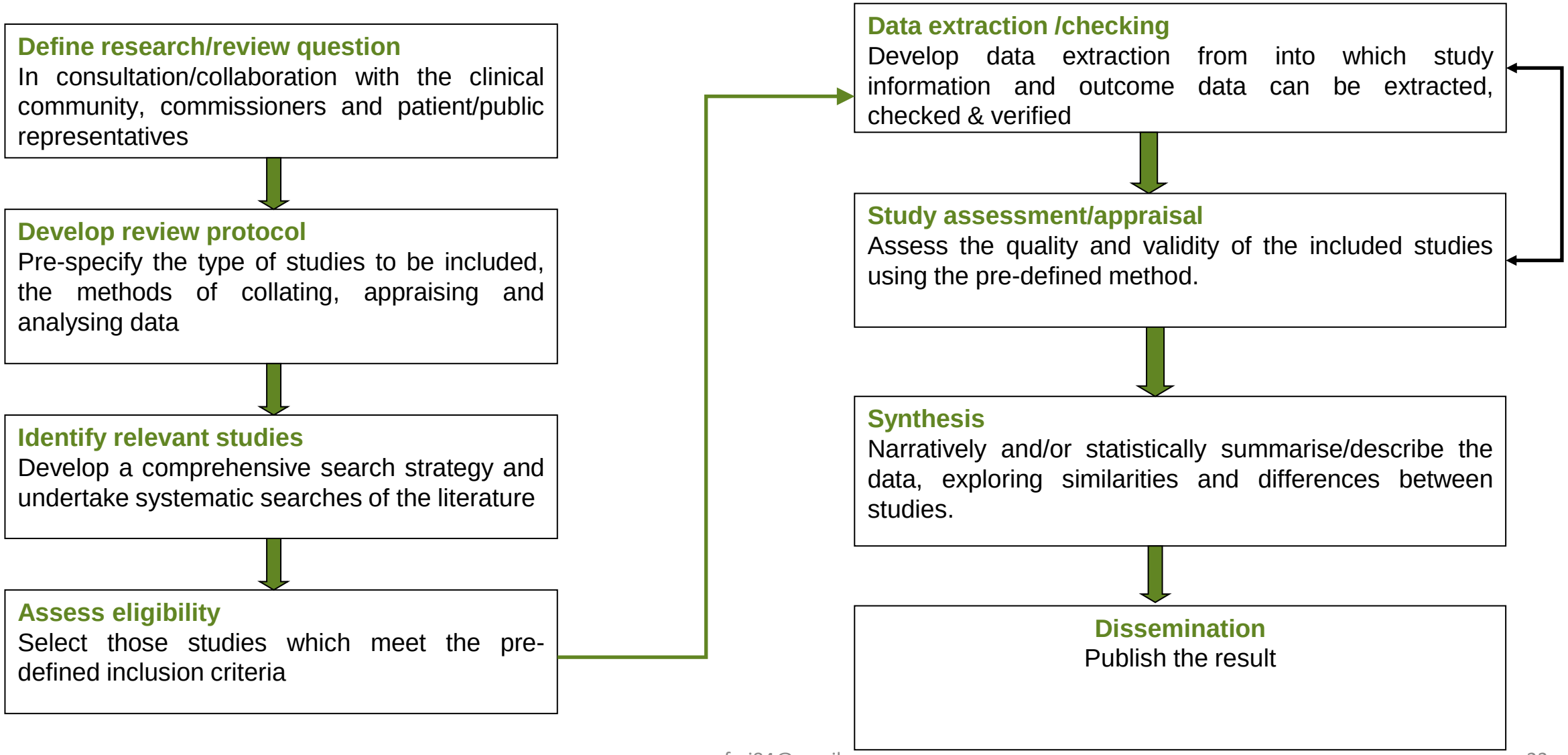
Why use systematic reviews?

- Minimise the impact of bias/errors
- Can help to end confusion
- Highlight where there is not sufficient evidence
- Combining findings from different studies can highlight new findings
- Can mitigate the need for further trials

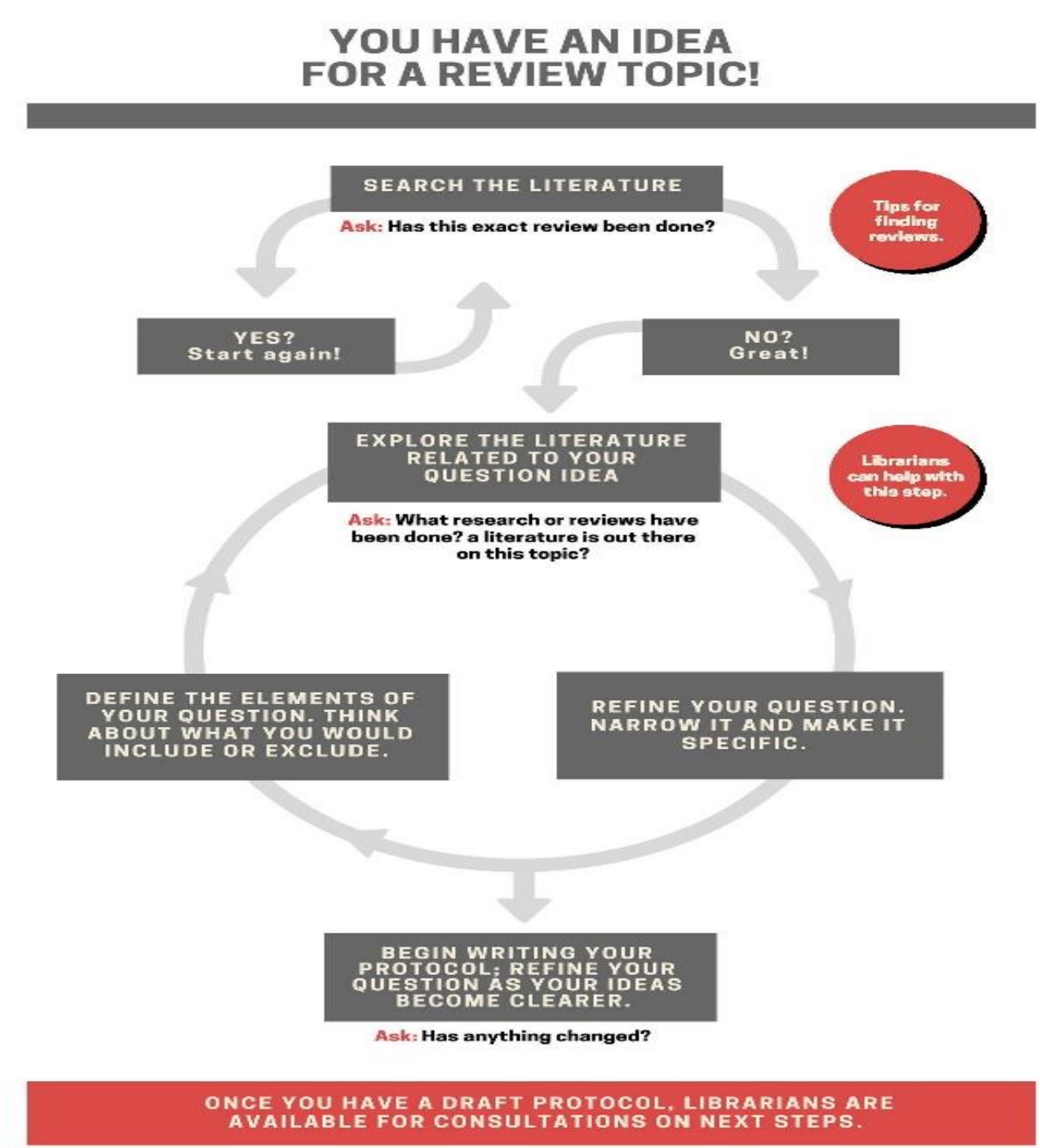
Advantages of systematic reviews

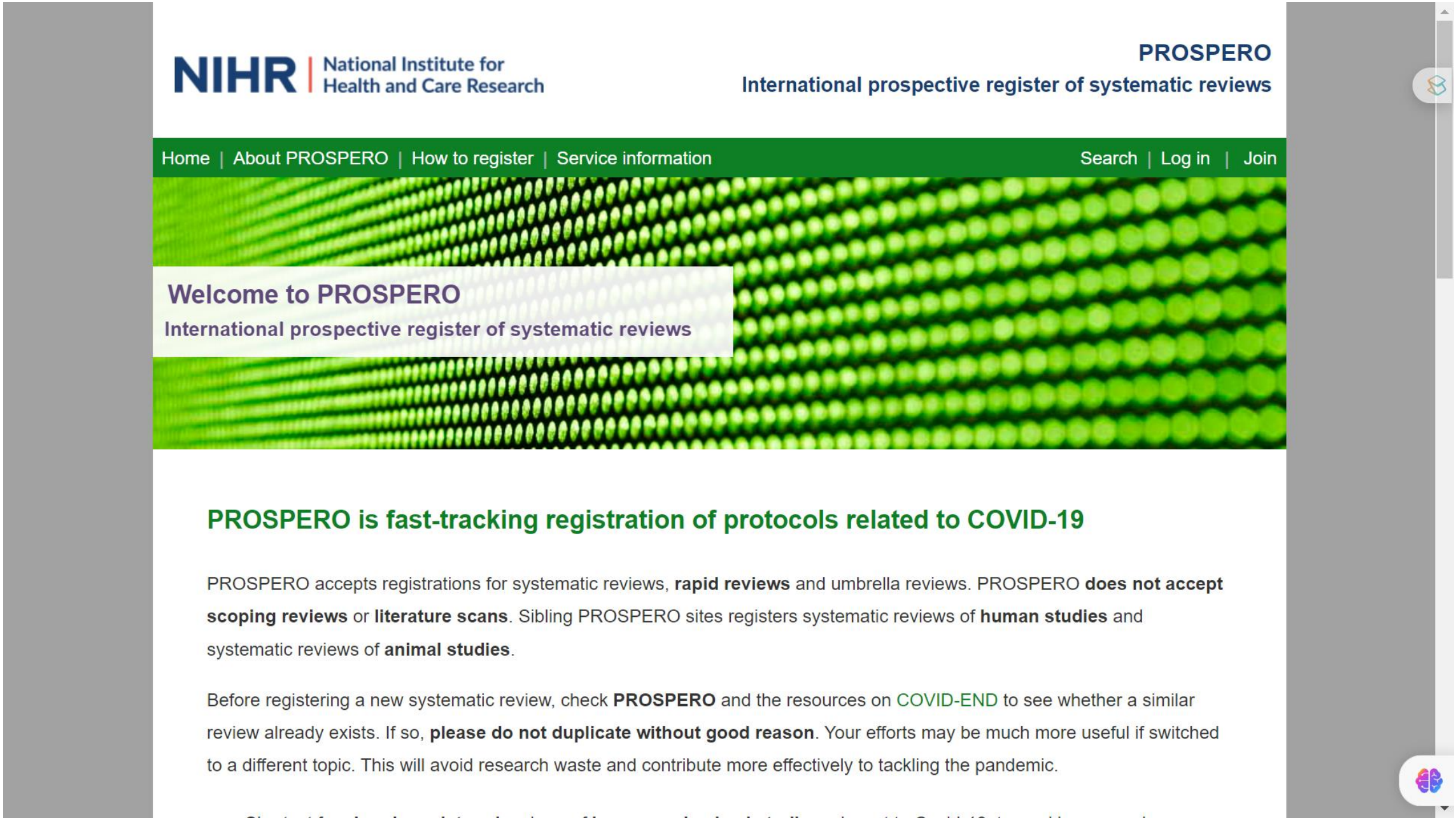
- Reduce bias
- Replicability
- Resolve controversy between conflicting studies
- Identify gaps in current research
- Provide reliable **basis** for decision making

Key elements of a systematic review



Process of formulating a question

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Welcome to PROSPERO
International prospective register of systematic reviews
PROSPERO is fast-tracking registration of protocols related to COVID-19
PROSPERO accepts registrations for systematic reviews, rapid reviews and umbrella reviews. PROSPERO does not accept scoping reviews or literature scans. Sibling PROSPERO sites registers systematic reviews of human studies and systematic reviews of animal studies.
Before registering a new systematic review, check PROSPERO and the resources on COVID-END to see whether a similar review already exists. If so, please do not duplicate without good reason. Your efforts may be much more useful if switched to a different topic. This will avoid research waste and contribute more effectively to tackling the pandemic.

Shortcut for **already registered** reviews of **human and animal studies** relevant to Covid-19, tagged by research area

COVID-19 Studies

We receive many emails enquiring about progress. As answering these takes time away from processing registrations, please email only if absolutely necessary. We are working hard to process registration requests as quickly as possible. **If your enquiry is related to a COVID-19 registration please add #COVID-19 to your subject line.**

If you do not already have a PROSPERO account, you will need to create one to register a review

Register a review

Registering a review is quick and easy. Just follow these simple steps to register your review in PROSPERO

Register your review now

Accessing and completing the registration form

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Search for PROSPERO registrations by entering words in the record or the registration number below

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Important notice

An example study

Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence

Question	Step 1 (Level 1*)	Step 2 (Level 2*)	Step 3 (Level 3*)	Step 4 (Level 4*)	Step 5 (Level 5)
How common is the problem?	Local and current random sample surveys (or censuses)	Systematic review of surveys that allow matching to local circumstances**	Local non-random sample**	Case-series**	n/a
Is this diagnostic or monitoring test accurate? (Diagnosis)	Systematic review of cross sectional studies with consistently applied reference standard and blinding	Individual cross sectional studies with consistently applied reference standard and blinding	Non-consecutive studies, or studies without consistently applied reference standards**	Case-control studies, or "poor or non-independent reference standard**	Mechanism-based reasoning
What will happen if we do not add a therapy? (Prognosis)	Systematic review of inception cohort studies	Inception cohort studies	Cohort study or control arm of randomized trial*	Case-series or case-control studies, or poor quality prognostic cohort study**	n/a
Does this intervention help? (Treatment Benefits)	Systematic review of randomized trials or *n*-of-1 trials	Randomized trial or observational study with dramatic effect	Non-randomized controlled cohort/follow-up study**	Case-series, case-control studies, or historically controlled studies**	Mechanism-based reasoning
What are the COMMON harms? (Treatment Harms)	Systematic review of randomized trials, systematic review of nested case-control studies, *n*-of-1 trial with the patient you are raising the question about, or observational study with dramatic effect	Individual randomized trial or (exceptionally) observational study with dramatic effect	Non-randomized controlled cohort/follow-up study (post-marketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning
What are the RARE harms? (Treatment Harms)	Systematic review of randomized trials or *n*-of-1 trial	Randomized trial or (exceptionally) observational study with dramatic effect			
Is this (early detection) test worthwhile? (Screening)	Systematic review of randomized trials	Randomized trial	Non -randomized controlled cohort/follow-up study**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning

*** Level may be graded down on the basis of study quality, imprecision, indirectness (study PICO does not match questions PICO), because of inconsistency between studies, or because the absolute effect size is very small; Level may be graded up if there is a large or very large effect size.**

**** As always, a systematic review is generally better than an individual study.**

How to cite the Levels of Evidence Table

OCEBM Levels of Evidence Working Group*. "The Oxford 2011 Levels of Evidence".

Oxford Centre for Evidence-Based Medicine. http://www.cebm.net/index.aspx?o=5653

** OCEBM Table of Evidence Working Group = Jeremy Howick, Iain Chalmers (James Lind Library), Paul Glasziou, Trish Greenhalgh, Carl Heneghan, Alessandro Liberati, Ivan Moschetti, Bob Phillips, Hazel Thornton, Olive Goddard and Mary Hodgkinson*

Levels of Evidence

Level of Evidence	Type of Study
1a	Systematic reviews of randomized clinical trials (RCTs)
1b	Individual RCTs
2a	Systematic reviews of cohort studies
2b	Individual cohort studies and low-quality RCTs
3a	Systematic reviews of case-controlled studies
3b	Individual case-controlled studies
4	Case series and poor-quality cohort and case-control studies
5	Expert opinion based on clinical experience

Adapted from: Sackett DL et al. *Evidence-Based Medicine: How to Practice and Teach EBM*. 2nd ed. Churchill Livingstone; 2000.

Who undertakes systematic reviews?

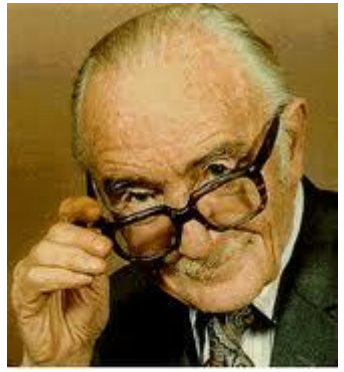
- Cochrane
- Campbell Collaboration
- EPPI-Centre
- PROSPERO
- EQUATOR
- Joana Bridges Institute

Introduction to Cochrane

- Archie Cochrane (1909-88)
  - British epidemiologist
  - Advocated RCTs to inform healthcare practice

- Cochrane collaboration
  - Cochrane Reviews (>4,000) registered
  - Identify, appraise and synthesise research-based evidence and present it in accessible format; regularly updated
  - Focus on interventions
  - Outstanding general resource

History



The School of Medicine, Cardiff University and the Cochrane Archive

- Archie Cochrane, an epidemiologist, published an influential book in 1972 (Effectiveness and Efficiency)
  - criticized our collective ignorance about the effects of health-care.

"It is surely a great criticism of our profession that we have not organized a critical summary, by specialty or subspecialty, updated periodically, of all relevant randomized controlled trials"

History

- In 1987 Cochrane referred to a systematic review of corticosteroid treatment in pre-term births
  - showed that a short-inexpensive course of corticosteroid treatment substantially reduced the risk of premature deaths due to complications
  - evidence showed that had a systematic review been done 10 years earlier we could have prevented many premature deaths

Introduction to Campbell Collaboration

- Systematic reviews of the effects of social interventions
- Prepare, maintain and disseminate systematic reviews in education, crime and justice, and social welfare
- Register relevant reviews
- Links to useful methodology sites
  - Effect sizes
  - Campbell Collaboration Resource Centre

Introduction to EPPI-Centre

- Evidence for Policy and Practice Information and Co-ordinating Centre
- Systematic reviews of public policy
  - Education, health promotion, employment, social care, criminal justice
- Online evidence library
- Methods, tools and databases (quantitative and qualitative)
- EPPI-Centre (March 2007) EPPI-Centre methods for conducting systematic reviews. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

Introduction to PROSPERO

- Centre for Reviews and Dissemination, York
- Evaluate the effects of health and social care interventions and the delivery and organisation of health care
- Guidance on systematic reviews
- PROSPERO
  - International prospective register of SRs

Introduction to EQUATOR

- Enhancing the QUAlity and Transparency Of health Research
- Started March 2006
- Grew from guideline development groups (including CONSORT)
- Aim to:
  - provide resources and education enabling the improvement of health research reporting
  - monitor progress in the improvement of health research reporting

Introduction to EQUATOR

- Detailed reporting guidelines
  - CONSORT Statement (reporting of randomized controlled trials)
  - STARD (reporting of diagnostic accuracy studies)
  - STROBE (reporting of observational studies in epidemiology)
  - PRISMA (reporting of systematic reviews), which replaced QUOROM
  - MOOSE (reporting of meta-analyses of observational studies)

- Minimum Information for Biological and Biomedical Investigation (MIBBI) portal
  - e.g. minimum dataset for fMRI studies

Joanna Bridges Institute

"For over 20 years the Joanna Briggs Institute has supported health professionals to improve health outcomes globally and create ripples of change by providing the best available evidence to inform clinical decision making."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