Critical appraisal

Systematic review and meta-analysis

Different tools

- AMSTAR checklist: A Measurement Tool to Assess the Methodological Quality of Systematic Reviews
- CASP Appraisal Tools
- Center for Evidence Based Medicine (CEBM)

AMSTAR2

- AMSTAR 2 is an appraisal tool for systematic reviews of randomized and non-randomized studies of health care intervention
- Has 16 items in total
- The overall rating is based on weakness in critical domains
- No overall score

AMSTAR 2
Rating overall confidence in the results

- High - zero or non-critical weakness: an accurate and comprehensive summary of the results
- Moderate - More than one non-critical weakness: may provide an accurate summary of the results
- Low – one critical flaw with or without non-critical weakness: may not provide an accurate and comprehensive summary of the results
- Critically low – More than one critical flaw with or without non-critical weakness: it should not be relied on to provide an accurate and comprehensive summary of results

CASP

- 10 questions to help you make sense of a systematic review
- Three broad issues are investigated
  - Are the results of the study valid (section A)
  - What are the results? (Section B)
  - Will the results help locally? (Section C)

SYSTEMATIC REVIEW

CEBM

UNIVERSITY OF OXFORD

Are the results of the review valid?

What question (PICO) did the systematic review address?

What is best?

The main question being addressed should be clearly stated. The exposure, such as a therapy or diagnostic test, and the outcome(s) of interest will often be expressed in terms of a simple relationship.

Where do I find the information?

The Title, Abstract or final paragraph of the Introduction should clearly state the question. If you still cannot ascertain what the focused question is after reading these sections, search for another paper!

In this paper

Yes ☐ No ☐ Unclear ☐

Comment:

F - Is it unlikely that important, relevant studies were missed?

What is best?

The starting point for a comprehensive search for all relevant studies is the major bibliographic databases (eg Medline, Cochrane, EMBASE, etc) but should also include a search of reference lists from relevant studies and contact with experts, particularly to inquire about unpublished studies. The search should not be limited to English language only. The search strategy should include both MESH terms and text words.

Where do I find the information?

The Methods section should describe the search strategy, including the terms used, in some detail. The Results section will outline the number of titles and abstracts reviewed, the number of full-text studies retrieved, and the number of studies

In this paper

Yes	No	Unclear
☐	☐	☐

Comment:

A – Were the criteria used to select articles for inclusion appropriate?

What is best?

The inclusion or exclusion of studies in a systematic review should be clearly defined *a priori*. The eligibility criteria used should specify the patients, interventions or exposures and outcomes of interest. In many cases the type of study design will also be a key component of the eligibility criteria.

Where do I find the information?

The Methods section should describe in detail the inclusion and exclusion criteria. Normally, this will include the study design.

In this paper

Yes ☐ No ☐ Unclear ☐

Comment:

A – Were the included studies sufficiently valid for the type of question asked?

What is best?	Where do I find the information?
The article should describe how the quality of each study was assessed using predetermined quality criteria appropriate to the type of clinical question (e.g., randomization, blinding and completeness of follow-up)	The Methods section should describe the assessment of quality and the criteria used. The Results section should provide information on the quality of the individual studies.

In this paper

Yes ☐ No ☐ Unclear ☐

Comment:

T – Were the results similar from study to study?

What is best?

Ideally, the results of the different studies should be similar or homogeneous. If heterogeneity exists the authors may estimate whether the differences are significant (chi-square test). Possible reasons for the heterogeneity should be explored.

Where do I find the information?

The Results section should state whether the results are heterogeneous and discuss possible reasons. The forest plot should show the results of the chi-square test for heterogeneity and discuss reasons for heterogeneity, if present.

In this paper

Yes ☐ No ☐ Unclear ☐

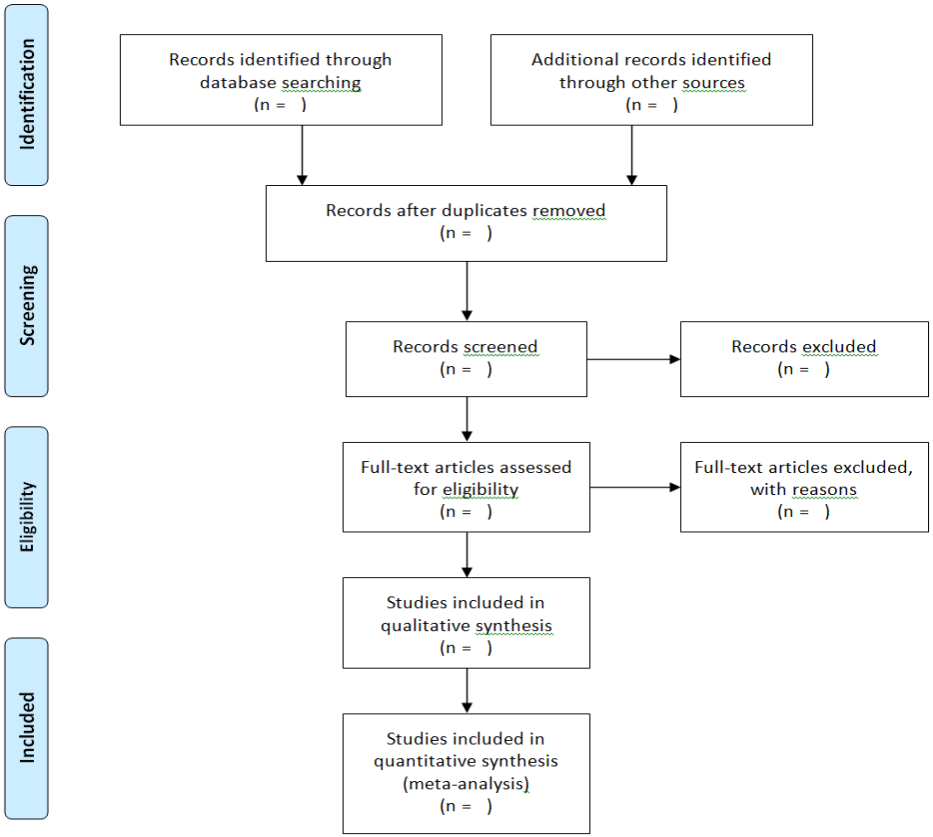
Comment:

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

PRISMA 2009 Flow Diagram



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