

DECIDE

Introduction to Health Interventions, Policy and Services

Coordinator:

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DECIDE

Introduction to Health Interventions, Policy and Services

Methods in Evidence Synthesis – Part I

Authors

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Summary

- Background on evidence synthesis studies
- Research question
- Primary studies search and selection
- Data extraction and processing
- Quality assessment

Methods for health technology assessment

- Methods for evidence synthesis
 - Non-systematic bibliographic reviews (e.g., narrative reviews);
 - Systematic reviews
 - Meta-analysis
 - Consensus methods
 - Decision analysis, modelling and simulation methods

Evidence synthesis

- Background
- Research question
- Primary studies search and selection
- Data extraction and processing
- Quality assessment
- Data analysis, heterogeneity and publication biases
- Protocol and dissemination of results

Background

- Problems:
 - Exponential growth of scientific evidence
 - Controversies and heterogeneity in scientific evidence
 - Lack of time
 - Limited resources
- Solution:
 - Evidence synthesis

Background

- Definitions
 - Narrative literature review
 - Systematic review
 - Meta-analysis

Table 1 Key features of the common types of healthcare review

Type of review	Key features
Systematic review ⁶	<p>Evaluates and summarises the findings of all relevant individual studies, and if appropriate, combines the results of several studies to provide more reliable results.</p> <p>The 'gold standard' of reviews because the review is based on explicit, prespecified and reproducible methods used to systematically search all sources of evidence and critically appraise, summarise and synthesise research findings to address a highly focused clinical question.</p> <p>Funded reviews typically involve a team of reviewers, and are often registered with a review centre such as the Cochrane Collaboration (http://www.cochrane.org), the Joanna Briggs Institute (http://www.joannabriggs.edu.au/about/home.php) and the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) (http://eppi.ioe.ac.uk/cms/) and advisory support will be available.</p> <p>Example: Bariatric surgery: a systematic review and meta-analysis. https://jamanetwork.com/journals/jama/article-abstract/199587?redirect=true⁸</p>
Rapid evidence assessment ⁶	<p>Summarises and synthesises research findings within the constraints of time and resources. The review needs to be as comprehensive as possible within the given constraints and undertaken in a systematic manner.</p> <p>Differs from a systematic review in relation to the extensiveness of the search strategies and methods used to undertake the analysis. However, the search should be comprehensive as possible and methods to evaluate and synthesise the evidence clearly outlined and rigorously applied.</p> <p>May fail to identify potentially relevant studies.</p> <p>Example: Basically... porn is everywhere: a rapid evidence assessment on the effects that access and exposure to pornography has on children and young people. http://eprints.mdx.ac.uk/10692/1/BasicallyporniseverywhereReport.pdf⁹</p>

Table 1 Key features of the common types of healthcare review

Type of review	Key features
Scoping review ⁶	<p>Identifies the size and nature of the evidence base for a particular topic area. The literature search should be as extensive as possible, including a range of relevant databases, hand-searching and attempts to identify unpublished literature. Differs from a systematic review in that a synthesis of the literature is not usually undertaken.</p> <p>Useful to map the literature in a broad context prior to undertaking a more comprehensive review. Helps identify the nature of the evidence particularly in an emerging health area, or to assess the feasibility of undertaking a full systematic review.</p> <p>Not appropriate to answer a clinical question.</p> <p>Example:</p> <p>Patient and system factors of time to surgery after hip fracture: a scoping review. http://bmjopen.bmjjournals.org/content/7/8/e016939¹⁰</p>
Integrative ¹¹ review	<p>Uses a non-experimental design, systematic approach and detailed search strategy to identify relevant evidence that answers a targeted clinical question. Researchers objectively critique, summarise and make inferences about a subject area and include thematic analysis of selected qualitative and quantitative research studies on the subject.</p> <p>Evidence can arise from a range of studies including randomised controlled trials (RCT), observational studies, qualitative research, clinical experts and any other relevant evidence¹² in which the researchers objectively critique, summarise and make conclusions about a topic. They include systematic categorisation and thematic analysis of selected qualitative and quantitative research studies. Integrative review methodology is sophisticated and requires insight and adherence to detail.</p> <p>Example:</p> <p>An integrative review of facilitators and barriers influencing collaboration and teamwork between general practitioners and nurses working in general practice. http://onlinelibrary.wiley.com/doi/10.1111/jan.12647/full¹³</p>

Noble H, Smith J. Reviewing the literature: choosing a review design. *Evidence-Based Nursing* 2018;21:39-41.

Table 1 Key features of the common types of healthcare review

Type of review	Key features
Realist review ¹⁴	<p>Focuses on understanding mechanisms by which an intervention works (or not). It involves identifying mechanisms that impact an intervention and exploring how they work and under what conditions. This review type includes defining the scope of the review with a clear aim: identifying relevant evidence; extracting and synthesising the evidence and explaining.</p> <p>Stakeholder involvement in the process is high as the realist review is derived following negotiation between stakeholders and reviewers.¹⁵</p> <p>Example:</p> <p>Beneficial effects of ketogenic diets for cancer patients: a realist review with focus on evidence and confirmation. https://link.springer.com/article/10.1007%2Fs12032-017-0991-5.¹⁶</p>
Narrative review ^{17 18}	<p>Narrative overviews are also known as unsystematic narrative reviews and are a comprehensive narrative synthesis of evidence.</p> <p>Typically, narrative reviews describe and appraise published articles although the methods for selection of articles may not be described. Consequently, narrative reviews are not usually reproducible.</p> <p>Narrative overviews may be as they synthesise information into a user-friendly format and present a broad perspective on a subject, its development and management. They can also offer practitioners up-to-date clinical protocols.</p> <p>Example:</p> <p>Epidemiology of eating disorders, eating disordered behaviour, and body image disturbance in males: a narrative review. https://jeatdisord.biomedcentral.com/articles/10.1186/s40337-015-0058-y¹⁸</p>

Noble H, Smith J. Reviewing the literature: choosing a review design. *Evidence-Based Nursing* 2018;21:39-41.

Table 1 Key features of the common types of healthcare review

Type of review	Key features
Review of reviews/umbrella review ¹⁹	A review of the literature, undertaken systematically, and sometimes referred to as an 'umbrella review'. Compiles evidence from multiple research syntheses in order to summarise existing evidence and like systematic reviews follow clear methods. Useful when a review question is very broad and a number of systematic reviews have already been conducted in the topic area. However, the different inclusion criteria adopted by the reviews included can make interpretation problematic. Example: A systematic review of reviews on the prevalence of anxiety disorders in adult populations. http://onlinelibrary.wiley.com/doi/10.1002/brb3.497/full²⁰

Meta-synthesis

The term meta-synthesis embraces methods of synthesizing the findings of qualitative research studies. Meta-synthesis may also be used to integrate the findings from quantitative and qualitative studies. There are many approaches to meta-synthesis (Barnett-Page & Thomas 2009). Some examples of different approaches are: meta-summary (Sandelowski & Barroso 2003); meta-ethnography (McCormick et al. 2003); and grounded formal theory (Thorne et al. 2004). There continues to be disagreement about whether a meta-synthesis is actually a form of systematic review (Sandelowski & Barroso 2003) or not (Fingeld 2003).

Noble H, Smith J. Reviewing the literature: choosing a review design. *Evidence-Based Nursing* 2018;21:39-41.



Background

- Advantages of systematic reviews
 - Systematic, comprehensive, explicit and reproducible approach for searching, selection, assessment, presentation, analysis and synthesis of scientific evidence
 - Considered the type of study with the highest level of scientific evidence
 - The general aims are both:
 - Scientific evidence analysis
 - Scientific evidence synthesis

Background

- Historical background
 - Probabilities aggregation or synthesis (p-values) and Z-scores
Cochran (1937), Fisher (1932), Pearson (1933) and Tippett (1931)
 - Cohen (1977) creates the Cohen' d (standardized mean difference)
 - Glass et al (1976) used the expression “meta-analysis” for the first time
 - Foundation of *Cochrane Collaboration* (1993)

Background

- Historical background
 - Glass et al used the expression “meta-analysis” for the first time (1976)

Meta-analysis refers to the analysis of analyses . . . the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings. It connotes a rigorous alternative to the casual, narrative discussions of research studies which typify our attempts to make sense of the rapidly expanding research literature.

Glass, G. (1976). Primary, secondary and meta-analysis of research.
Educational Researcher, 5, 3-8.

Interventions on Prevention of Postoperative Atrial Fibrillation in Patients Undergoing Heart Surgery

A Meta-Analysis

Eugene Crystal, MD; Stuart J. Connolly, MD; Khaled Sleik, MD;
Tracy J. Ginger, MD; Salim Yusuf, MBBS, DPhil

Background—Postoperative atrial fibrillation (AF) is a common complication of cardiac surgery and has been associated with increased incidence of other complications and increased hospital length of stay (LOS). Prevention of AF is a reasonable clinical goal, and, consequently, many randomized trials have evaluated the effectiveness of pharmacological and nonpharmacological interventions for prevention of AF. To better understand the role of various prophylactic therapies against postoperative AF, a systematic review of evidence from randomized trials was performed.

Methods and Results—Fifty-two randomized trials (controlled by placebo or routine treatment) of β -blockers, sotalol, amiodarone, or pacing were identified by systematic literature search. The 3 drug treatments each prevented AF with the following odds ratios (ORs): β -blockers, 0.39 (95% CI, 0.28 to 0.52); sotalol, 0.35 (95% CI, 0.26 to 0.49); and amiodarone, 0.48 (95% CI, 0.37 to 0.61). Pacing was also effective; for biatrial pacing, the OR was 0.46 (95% CI, 0.30 to 0.71). The influence of pharmacological interventions on LOS was as follows: -0.66 day (95% CI, 2.04 to 0.72) for β -blockers; -0.40 day (95% CI, 0.87 to 0.08) for sotalol; and -0.91 day (95% CI, 1.59 to -0.23) for amiodarone. The influence for biatrial pacing was -1.54 day (95% CI, -2.85 to -0.24). The incidence of stroke was 1.2% in all the treatment groups combined and 1.4% in controls (OR, 0.90; 95% CI, 0.46 to 1.74).

Conclusions— β -Blockers, sotalol, and amiodarone all reduce risk of postoperative AF with no marked difference between them. There is evidence that use of these drugs will reduce LOS. Biatrial pacing is a promising new treatment opportunity. There was no evidence that reducing postoperative AF reduces stroke; however, data on stroke are incomplete. (*Circulation*. 2002;106:75-80.)

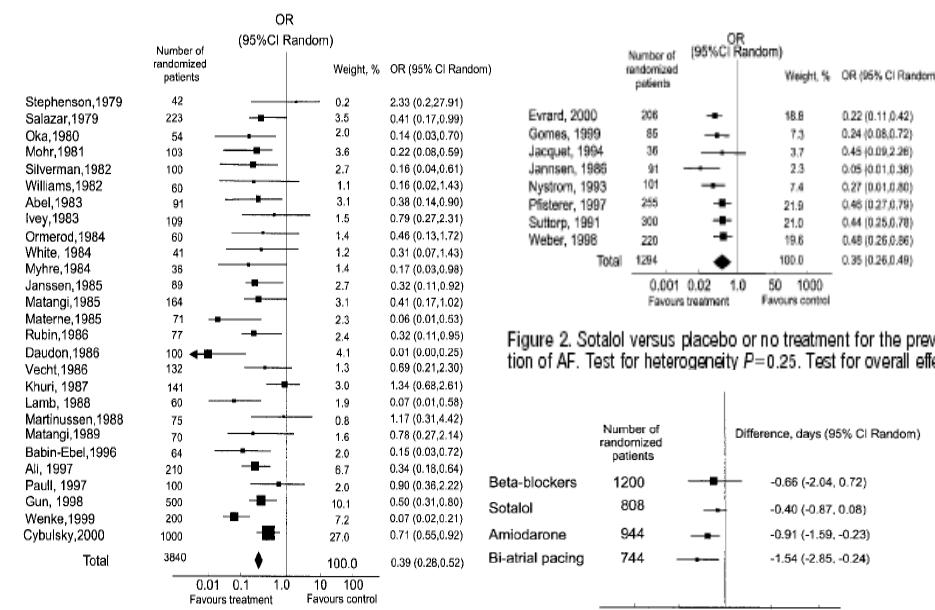


Figure 1. β -Blockers versus placebo or no treatment for the prevention of AF. Test for heterogeneity $P=0.00001$. Test for overall effect $P<0.00001$.

Figure 2. Sotalol versus placebo or no treatment for the prevention of AF. Test for heterogeneity $P=0.25$. Test for overall effect

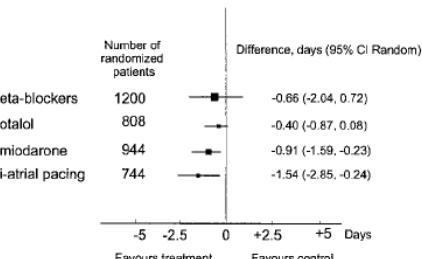


Figure 2. Sotalol versus placebo or no treatment for the prevention of AF. Test for heterogeneity $P=0.25$. Test for overall effect

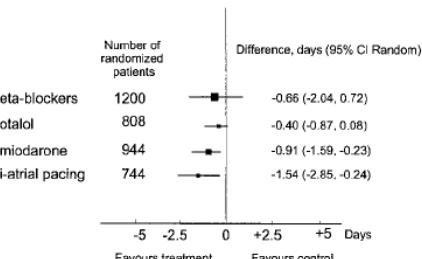


Figure 5. Effect of treatment on hospital LOS.

Introdução

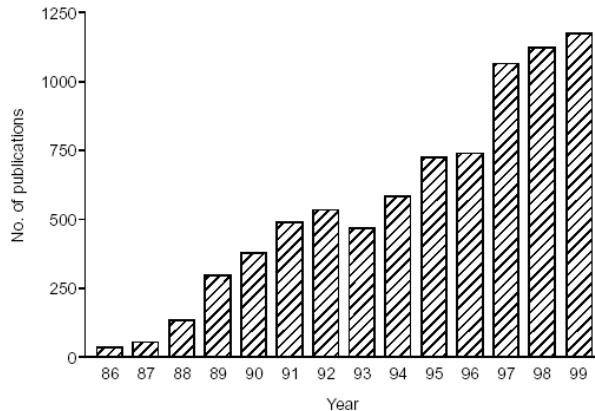
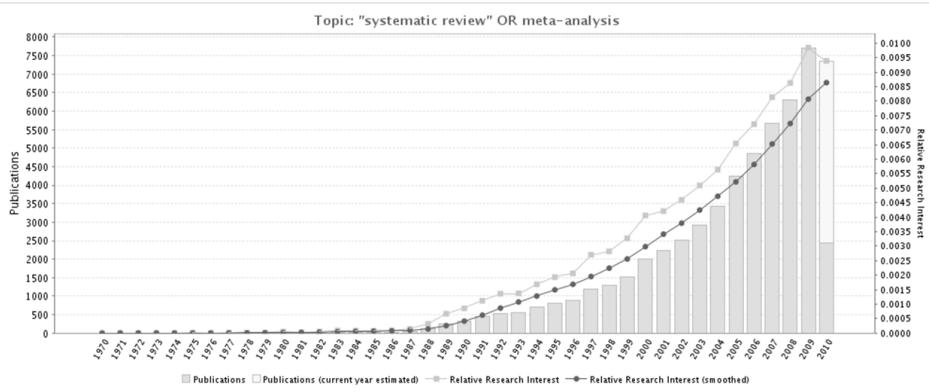


Figure 1.1 Number of publications concerning meta-analysis, 1986–1999.
Results from MEDLINE search using text word and medical subject (MESH) heading “meta-analysis” and text word “systematic review”.

Background



Original Investigation

The Mass Production of Redundant, Misleading, and Conflicted Systematic Reviews and Meta-analyses

JOHN P.A. IOANNIDIS

Stanford University School of Medicine; Stanford University School of Humanities and Sciences; Meta-Research Innovation Center at Stanford (METRICS), Stanford University

Policy Points:

- Currently, there is massive production of unnecessary, misleading, and conflicted systematic reviews and meta-analyses. Instead of promoting evidence-based medicine and health care, these instruments often serve mostly as easily produced publishable units or marketing tools.
- Suboptimal systematic reviews and meta-analyses can be harmful given the major prestige and influence these types of studies have acquired.
- The publication of systematic reviews and meta-analyses should be realigned to remove biases and vested interests and to integrate them better with the primary production of evidence.

Context: Currently, most systematic reviews and meta-analyses are done retrospectively with fragmented published information. This article aims to explore the growth of published systematic reviews and meta-analyses and to estimate how often they are redundant, misleading, or serving conflicted interests.

Methods: Data included information from PubMed surveys and from empirical evaluations of meta-analyses.

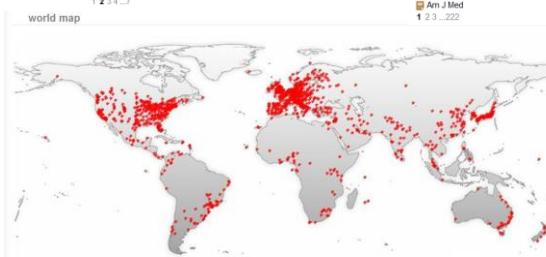
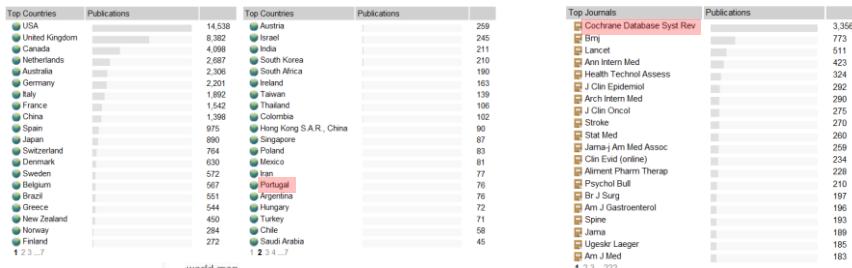
Findings: Publication of systematic reviews and meta-analyses has increased rapidly. In the period January 1, 1986, to December 4, 2015, PubMed tags 266,782 items as "systematic reviews" and 58,611 as "meta-analyses." Annual publications between 1991 and 2014 increased 2,728% for systematic reviews and 2,635% for meta-analyses versus only 153% for all PubMed-indexed items. Currently, probably more systematic reviews of trials than new

randomized trials are published annually. Most topics addressed by meta-analyses of randomized trials have overlapping, redundant meta-analyses; same-topic meta-analyses may exceed 20 sometimes. Some fields produce massive numbers of meta-analyses; for example, 185 meta-analyses of antidepressants for depression were published between 2007 and 2014. These meta-analyses are often produced either by industry employees or by authors with industry ties and results are aligned with sponsor interests. China has rapidly become the most prolific producer of English-language, PubMed-indexed meta-analyses. The most massive presence of Chinese meta-analyses is on genetic associations (63% of global production in 2014), where almost all results are misleading since they combine fragmented information from mostly abandoned era of candidate genes. Furthermore, many contracting companies working on evidence synthesis receive industry contracts to produce meta-analyses, many of which probably remain unpublished. Many other meta-analyses have serious flaws. Of the remaining, most have weak or insufficient evidence to inform decision making. Few systematic reviews and meta-analyses are both non-misleading and useful.

Conclusions: The production of systematic reviews and meta-analyses has reached epidemic proportions. Possibly, the large majority of produced systematic reviews and meta-analyses are unnecessary, misleading, and/or conflicted.

Keywords: systematic reviews, meta-analyses, bias, conflicts of interest, China, evidence-based medicine, industry.

Introdução



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Background

- Limitations of systematic reviews
 - Secondary data
 - Group data
 - Heterogeneous study quality
 - Data aggregation is not always possible/desirable
 - Methods for data aggregation are still evolving

Background

- **Operational phases and tasks to conduct a systematic review:**
 - Definition of the research question
 - Definition of the selection criteria
 - Definition of the search strategy
 - Study selection
 - Assessment of studies' quality
 - Data extraction
 - Data analysis and processing
 - Results dissemination

Evidence synthesis

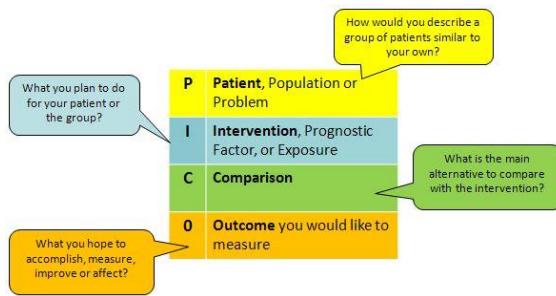
- Background
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- Protocol and dissemination of results

Defining the research question

Research question

- Key elements of a research question

- Population / participants
- Interventions
- Comparisons
- Outcomes
- Study design



Research question

- Key elements of a research question

PICO

Population, Intervention, Comparison and Outcome

PICOS

Population, Intervention, Comparison, Outcome and Study Design

Or

Population, Intervention, Comparison, Outcome and Setting

PICOTS

Population, Intervention, Comparison, Outcome, Timing and Setting

Or

Population, Intervention, Comparison, Outcome, Timing and Study Design

PICOTSS

Population, Intervention, Comparison, Outcome, Timing, Setting and Study Design

Interventions on Prevention of Postoperative Atrial Fibrillation in Patients Undergoing Heart Surgery

A Meta-Analysis

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Methods and Results—Fifty-two randomized trials (controlled by placebo or routine treatment) of β -blockers, sotalol, amiodarone, or pacing were identified by systematic literature search. The 3 drug treatments each prevented AF with the following odds ratios (ORs): β -blockers, 0.39 (95% CI, 0.28 to 0.52); sotalol, 0.35 (95% CI, 0.26 to 0.49); and amiodarone, 0.48 (95% CI, 0.37 to 0.61). Pacing was also effective; for biatrial pacing, the OR was 0.46 (95% CI, 0.30 to 0.71). The influence of pharmacological interventions on LOS was as follows: -0.66 day (95% CI, 2.04 to 0.72) for β -blockers; -0.40 day (95% CI, 0.87 to 0.08) for sotalol; and -0.91 day (95% CI, 1.59 to -0.23) for amiodarone. The influence for biatrial pacing was -1.54 day (95% CI, -2.85 to -0.24). The incidence of stroke was 1.2% in all the treatment groups combined and 1.4% in controls (OR, 0.90; 95% CI, 0.46 to 1.74).

Conclusions— β -Blockers, sotalol, and amiodarone all reduce risk of postoperative AF with no marked difference between them. There is evidence that use of these drugs will reduce LOS. Biatrial pacing is a promising new treatment opportunity. There was no evidence that reducing postoperative AF reduces stroke; however, data on stroke are incomplete. (*Circulation*. 2002;106:75-80.)



Research question

- Defining a structured research question (PICO/PICOS acronyms) helps to complete several other tasks when conducting a systematic review:
 - Optimization of study search
 - Study selection
 - Study quality assessment
 - Data extraction
 - Data analysis and presentation

Research question

- Changes to the initial research questions
 - Changes to the initial research questions might occur if required to achieve the aims of the systematic review. Nevertheless, authors should report on:
 - The reasons for changing the question
 - Whether changes occurred before or after data analysis
 - The adequacy, after changing the research question, of the methods used for evidence search and quality assessment
 - Authors may present a sensitivity analysis demonstrating the results that would be obtained if the research question had not been changed.

Evidence synthesis

- Background
- Research question
- Studies search and selection
- Data extraction and processing
- Quality assessment
- Data analysis, heterogeneity and publication biases
- Protocol and dissemination of results

Searching for evidence



Searching for studies

- In a systematic review, **search strategies and methods** are of the utmost importance
- Need for **systematic** search strategies and methods that are both **reproducible** and **comprehensive**

Searching for studies

- Search methods

- 1 – Bibliographic databases
 - MEDLINE; EMBASE; CENTRAL

- 2 – Manual search
 - Relevant journals; Conference/meeting abstract books

- 3 – References of included studies

- 4 – Other systematic reviews

- 5 – Contact with specialists

- 6 – Databases of recruiting and active trials (*e.g.*: TrialsCentral™; Current Controlled Trials), or of completed clinical trials (*e.g.*: ClinicalTrials.gov; EU Clinical Trials Register)

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Methods

Literature Search

The search was performed in accordance with the recommendations of the Cochrane collaboration using Cochrane CENTRAL database, Medline, Embase, and Cinahl from earliest achievable date until April 2001. The initial search terms were *atrial fibrillation* and *surgery*. A hand search of references from reports and earlier reviews was also performed. Abstract books and CD-ROMs from several annual scientific meetings (American College of Cardiology, American Heart Association, North American Society of Pacing and Electrophysiology, and European Heart Organization) between 1997 and March 2001 were searched for relevant abstracts. No language restrictions were applied.

RESEARCH



OPEN ACCESS

Impact of searching clinical trial registries in systematic reviews of pharmaceutical treatments: methodological systematic review and reanalysis of meta-analyses

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<http://dx.doi.org/10.1136/bmjjournals/bmjopen-2017-019448>

Accepted: 18 January 2017



ABSTRACT

OBJECTIVE

To evaluate the impact of searching clinical trial registries in systematic reviews.

DESIGN

Methodological systematic review and reanalyses of meta-analyses.

DATA SOURCES

Medline was searched to identify systematic reviews of randomised controlled trials (RCTs) assessing pharmaceutical treatments published between June 2014 and January 2015. For all systematic reviews that did not report a trial registry search but reported the information to perform it, the World Health Organization International Trials Registry Platform (WHO ICTRP search portal) was searched for completed or terminated RCTs not originally included in the systematic review.

DATA EXTRACTION

For each systematic review, two researchers independently extracted the outcomes analysed, the number of patients included, and the treatment effect estimated. For each RCT identified, two researchers independently determined whether the results were available (ie, posted, published, or available on the additional RCTs and the change in summary statistics by comparison with the original meta-analysis).

RESULTS

Among 223 selected systematic reviews, 116 (52%) did not report a search of trial registries; 21 of these did not report the information to perform the search (key words, search date). A search was performed for 95 systematic reviews; for 54 (57%), no additional RCTs were found and for 41 (43%) 122 additional RCTs were identified. The search allowed for increasing the number of patients by more than 10% in 19 systematic reviews, 20% in 10, 30% in seven, and 50% in four.

Moreover, 63 RCTs had results available; the results for 45 could be included in a meta-analysis. 14 systematic reviews including 45 RCTs were reanalysed. The weight of the additional RCTs in the recalculated meta-analyses ranged from 0% to 58% and was greater than 10% in five of 14 systematic reviews, 20% in three, and 50% in one. The change in summary statistics ranged from 0% to 29% and was greater than 10% for five of 14 systematic reviews and greater than 20% for two. However, none of the changes to summary effect estimates led to a qualitative change in the interpretation of the results once the new trials were added.

CONCLUSIONS

Trial registries are an important source for identifying additional RCTs. The additional number of RCTs and patients included if a search were performed varied across systematic reviews.

Searching for studies

- Bibliographic databases
 - MEDLINE
 - SCOPUS
 - EMBASE
 - CENTRAL – The Cochrane Central Register of Controlled Trials
 - Web of Science
 - CDSR – Cochrane Database of Systematic Reviews
 - DARE – Database of Abstracts of Reviews of Effects
 - CINHAL
 - PsycARTICLES
 - PsycINFO

IMPORTANT: We should always search on, at least, two general and one field-specific database!



General databases	
Database	Access
PubMed (Medline), a database with over 14 million citations	Free access via: http://www.ncbi.nlm.nih.gov/pubmed
Embase, Excerpta Medica, a database with over 9 million citations	Requires subscription; URL: www.embase.com
Cochrane Controlled Trials Register (CENTRAL), a source of >400 000 trials	Requires subscription URL: www.cochranelibrary.com/enter/ (selected developing countries have free access)
NLM Gateway, includes databases such as Medline, AIDSLINE, AIDS conference abstracts, etc.	Free access via: http://gateway.nlm.nih.gov/gw/Cmd
DARE, Database of Abstracts of Reviews of Effects, is a source of systematic reviews	Free access via: www.york.ac.uk/inst/crd/darehp.htm

Subject-specific databases	
Database	Access
CANCERLIT, a cancer database from the National Cancer Institute, USA	Free access via: www.ncbi.nlm.nih.gov/search/cancer_literature/
PsycINFO, a database on psychological and mental health literature	Requires subscription: http://www.apa.org/psycinfo/
AIDSLINE, a database on HIV and AIDS literature	Free access via NLM Gateway: http://gateway.nlm.nih.gov/gw/Cmd
CINAHL: database for nursing, occupational therapy, physical therapy and other allied health fields	Requires subscription URL: http://www.cinahl.com/
LILACS: a medical database on Latin American and Caribbean literature	Free access via: http://www.bireme.br/bvs/Libd.htm

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PubMed Advanced Search Builder

Use the builder below to create your search

[Edit](#) [Clear](#)

Builder

All Fields AND All Fields Show index list
All Fields Show index list

[Search](#) or [Add to history](#)

[History](#) [Download history](#) [Clear history](#)

Search	Add to builder	Query	Items found	Time
#12	Add	Search (dyspepsia AND ("Helicobacter pylori" OR "H Pylori") AND eradication) AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials[MeSH Terms] OR clinical trial[Publication Type] OR random[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) Sort by: Relevance	862	03:41:14
#7	Add	Search (((Dyspepsia[MeSH Terms]) AND Helicobacter pylori[MeSH Terms]) AND ((eradication OR therapy))) Sort by: Relevance Filters: Clinical Trial; Publication date from 2005/01/01 to 2010/12/31	58	03:38:51
#6	Add	Search (((Dyspepsia[MeSH Terms]) AND Helicobacter pylori[MeSH Terms]) AND ((eradication OR therapy))) Sort by: Relevance Filters: Clinical Trial	284	03:38:27
#5	Add	Search (((Dyspepsia[MeSH Terms]) AND Helicobacter pylori[MeSH Terms]) AND ((eradication OR therapy))) Sort by: Relevance	1178	03:38:16
#4	Add	Search ((Dyspepsia[MeSH Terms]) AND Helicobacter pylori[MeSH Terms]) AND ((eradication OR therapy))	1199	03:37:48
#3	Add	Search (Dyspepsia[MeSH Terms]) AND Helicobacter pylori[MeSH Terms]	2174	03:37:19
#2	Add	Search (Dyspepsia) AND Helicobacter pylori	3640	03:36:45
#1	Add	Search Dyspepsia	12737	03:36:30

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MEDCIS DEPARTAMENTO DE MEDICINA DA COMUNIDADE, INFORMAÇÃO E DECISÃO EM SAÚDE

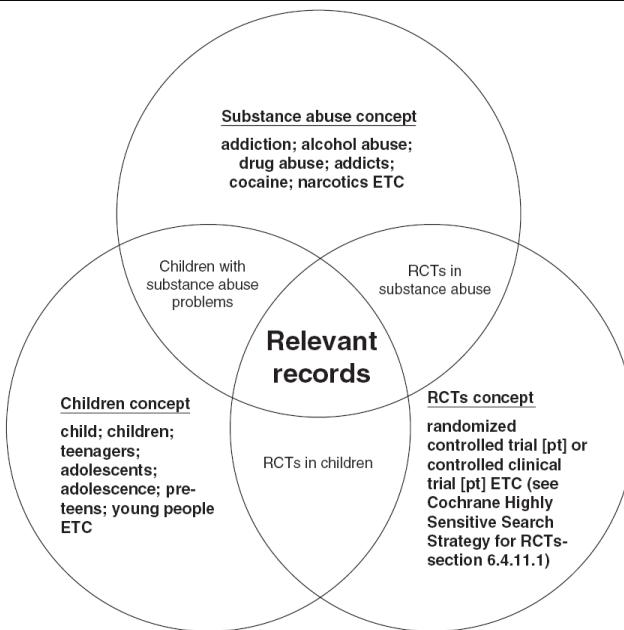


Figure 6.4.a Combining concepts as search sets



Searching for studies

- **Search strategy**

- Adequately planning and building the search query based on key elements/expressions
 - Queries should be presented in the Methods section of a systematic review, so as to ensure the reproducibility of searching methods
- Use of search strategies that had been assessed in regard to their sensitivity and specificity
- InterTASC Information Specialists' Sub-Group (ISSG) search filters
 - Methodological filters of Pubmed Clinical Queries, and filters recommended by Cochrane Collaboration
 - Other published strategies (cf. "further reading")
 - Haynes RB, Wilczynski N, McKibbon KA, Walker CJ, Sinclair JC. Developing optimal search strategies for detecting clinically sound studies in MEDLINE. *J Am Med Inform Assoc* 1994;1:447-58.
 - Robinson KA, Dickersin K. Development of a highly sensitive search strategy for the retrieval of reports of controlled trials using PubMed. *Int J Epidemiol* 2002;31:150-3.

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PubMed Clinical Queries

This page provides the following specialized PubMed searches for clinicians:

- Search by Clinical Study Category
- Find Systematic Reviews
- Medical Genetics Searches

Results of searches on these pages are limited to specific clinical research areas. For comprehensive searches, use [PubMed](#) directly.

Search by Clinical Study Category

This search finds citations that correspond to a specific clinical study category. The search may be either broad and sensitive or narrow and specific. The search filters are based on the work of [Haynes RB et al.](#). See the [filter table](#) for details.

Search Go

Category	Scope
<input checked="" type="radio"/> etiology	<input checked="" type="radio"/> narrow, specific search
<input type="radio"/> diagnosis	<input type="radio"/> broad, sensitive search
<input checked="" type="radio"/> therapy	
<input type="radio"/> prognosis	
<input type="radio"/> clinical prediction guides	

Find Systematic Reviews

For your topic(s) of interest, this search finds citations for systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine, consensus development conferences, and guidelines.

For more information, see [Help](#). See also [related sources](#) for systematic review searching.

Search Go

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Clinical Queries using Research Methodology Filters

Category	Optimized For	Sensitive/ Specific	PubMed Equivalent
therapy	sensitive/broad	99%/70%	((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials[MeSH Terms] OR clinical trial[Publication Type] OR random*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])
	specific/narrow	93%/97%	(randomized controlled trial[Publication Type] OR (randomized[Title/Abstract] AND controlled[Title/Abstract] AND trial[Title/Abstract]))
diagnosis	sensitive/broad	98%/74%	(sensitivity*[Title/Abstract] OR sensitivity and specificity[MeSH Terms] OR diagnosis*[Title/Abstract] OR diagnosis[MeSH:noexp] OR diagnostic * [MeSH:noexp] OR diagnosis,differential[MeSH:noexp] OR diagnosis[Subheading:noexp])
	specific/narrow	64%/98%	(specificity[Title/Abstract])
etiology	sensitive/broad	93%/63%	(risk*[Title/Abstract] OR risk*[MeSH:noexp] OR risk *[MeSH:noexp] OR cohort studies[MeSH Terms] OR group*[Text Word])
	specific/narrow	51%/95%	((relative[Title/Abstract] AND risk*[Title/Abstract]) OR (relative risk[Text Word]) OR risks[Text Word] OR cohort studies[MeSH:noexp] OR (cohort[Title/Abstract] AND stud*[Title/Abstract]))
prognosis	sensitive/broad	90%/80%	(incidence[MeSH:noexp] OR mortality[MeSH Terms] OR follow up studies[MeSH:noexp] OR prognosis*[Text Word] OR predict*[Text Word] OR course*[Text Word])
	specific/narrow	52%/94%	(prognos*[Title/Abstract] OR (first[Title/Abstract] AND episode[Title/Abstract]) OR cohort[Title/Abstract])
clinical prediction guides	sensitive/broad	96%/79%	(predict*[tiab] OR predictive value of tests[mh] OR scor*[tiab] OR observ*[tiab] OR observer variation[mh])
	specific/narrow	54%/99%	(validation[tiab] OR validate[tiab])

The Clinical Queries search filters are based on the work of [Haynes RB et al.](#).

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The InterTASC Information Specialists' Sub-Group

Search Filter Resource

The InterTASC Information Specialists' Sub-Group (ISSG) is the group of information professionals supporting research groups within England and Scotland providing technology assessments to the National Institute for Health and Clinical Excellence (NICE).

The InterTASC Information Specialists' Sub-Group Search Filter Resource is a collaborative venture to identify, assess and test search filters designed to retrieve research by study design. The Search Filters Resource aims to provide easy access to published and unpublished search filters. It also provides information and guidance on how to critically appraise search filters, study design filters in progress and information on the development and use of search filters.

The editorial team comprises Julie Glanville (York Health Economics Consortium), Carol Lefebvre (UK Cochrane Centre) and Kath Wright (Centre for Reviews and Dissemination).

The Search Filter Resource is hosted on behalf of the InterTASC Information Specialists' Sub-Group by the Centre for Reviews and Dissemination. Regular update searches to identify search filters for the Resource are undertaken by Anne Eisinga (UK Cochrane Centre).

The search filters are grouped by study design or focus:

- Adverse events
- Diagnostic studies
- Economic evaluations
- Etiology
- Observational studies
- Outcome studies
- Prognosis
- Public views
- Qualitative research
- Quality of life
- RCTs and other trials
- Systematic reviews
- Therapy studies
- Trials other than RCTs
- Other filters

Information on issues relating to search filters can be found at the following pages:

- Critical appraisal of search filters
- Filter methods
- Surveys of filter performance

Observational studies

Database	Filter
CINAHL	SIGN strategy [undated] [Ovid]
EMBASE	Fraser C, Murray A, Burr J. Identifying observational studies of surgical interventions in MEDLINE and EMBASE. <i>BMC Medical Research Methodology</i> 2006;6(41). [Ovid]
	BMJ Clinical Evidence - EMBASE cohort study filter [undated] [Ovid]
	BMJ Clinical Evidence - EMBASE cohort and case-control filter [undated] [Ovid]
	BMJ Clinical Evidence - EMBASE cohort, case-control and case series filter [undated] [Ovid]
	BMJ Clinical Evidence - EMBASE cohort, case-control, case series and case study filter [undated] [Ovid]
	SIGN strategy [undated] [Ovid]
MEDLINE	Grady EBM strategy [2007] [Ovid]
	Fraser C, Murray A, Burr J. Identifying observational studies of surgical interventions in MEDLINE and EMBASE. <i>BMC Medical Research Methodology</i> 2006;6(41). [Ovid]
	BMJ Clinical Evidence - MEDLINE cohort study filter [undated] [Ovid]
	BMJ Clinical Evidence - MEDLINE cohort and case-control filter [undated] [Ovid]
	BMJ Clinical Evidence - MEDLINE cohort, case-control and case series filter [undated] [Ovid]
	BMJ Clinical Evidence - MEDLINE cohort, case-control, case series and case study filter [undated] [Ovid]
	SIGN strategy [undated] [Ovid]

Studies on diagnostic tests

Database	Filter
CINAHL	SIGN strategy [undated] [Ovid]
EMBASE	Wilczynski NL, Haynes, RB for the HEDGES team. EMBASE search strategies for identifying methodologically sound diagnostic studies for use by clinicians and researchers. <i>BMC Medicine</i> 2005; 3:7.
	Bachmann LM, Estermann P, Kronenberg C, ter Riet G. Identifying diagnostic accuracy studies in EMBASE. <i>Journal of the Medical Library Association</i> 2003;91(3):341-6.
	ISSG structured abstract (pdf)
	ISSG search filter appraisal (pdf)
	SIGN strategy [undated] [Ovid]
MEDLINE	Astin MP, Brazzelli MG, Fraser CM, Counsell CE, Needham G, Grimshaw JM. Developing a sensitive search strategy in MEDLINE to retrieve studies on assessment of the diagnostic performance of imaging techniques. <i>Radiology</i> 2004; 247(2):365-73.
	Grady EBM strategy [2007] [Ovid]
	Berg A, Fleischer S, Behrens J. Development of two search strategies for literature in MEDLINE-PubMed: nursing diagnoses in the context of evidence-based nursing. <i>International Journal of Nursing Terminologies and Classifications</i> 2005;16(2):26-32. [PubMed]
	Haynes RB, Wilczynski NL. Optimal search strategies for retrieving scientifically strong studies of diagnosis from Medline: analytical survey. <i>BMJ</i> 2004; 328(7447):1040. Epub 2004 Apr 08.
	Vincent S, Greenley S, Beaven O. Clinical evidence diagnosis: developing a sensitive search strategy to retrieve diagnostic studies on deep vein thrombosis: a pragmatic approach. <i>Health Information and Libraries Journal</i> 2003;20(3):150-9. [Ovid]
	ISSG structured abstract (pdf)
	ISSG search filter appraisal (pdf)
	Bachmann LM, Coray R, Estermann P, Ter Riet G. Identifying diagnostic studies in MEDLINE: reducing the number needed to read. <i>JAMA</i> 2002;288(6):653-8. ISSG structured abstract (pdf)

Box 6.4.a Cochrane Highly Sensitive Search Strategy for identifying randomized trials in MEDLINE: sensitivity-maximizing version (2008 revision); PubMed format

- #1 randomized controlled trial [pt]
- #2 controlled clinical trial [pt]
- #3 randomized [tiab]
- #4 placebo [tiab]
- #5 drug therapy [sh]
- #6 randomly [tiab]
- #7 trial [tiab]
- #8 groups [tiab]
- #9 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8
- #10 animals [mh] not (humans [mh] and animals [mh])
- #11 #9 not #10

PubMed search syntax

[pt] denotes a Publication Type term;
 [tiab] denotes a word in the title or abstract;
 [sh] denotes a subheading;
 [mh] denotes a Medical Subject Heading (MeSH) term ('exploded');
 [mesh: noexp] denotes a Medical Subject Heading (MeSH) term (not 'exploded');
 [ti] denotes a word in the title.

Box 6.4.e Demonstration search strategy for CENTRAL, for the topic 'Tamoxifen for breast cancer'

- #1 MeSH descriptor Breast Neoplasms explode all trees
- #2 breast near cancer*
- #3 breast near neoplasm*
- #4 breast near carcinoma*
- #5 breast near tumour*
- #6 breast near tumor*
- #7 #1 OR #2 OR #3 OR #4 OR #5 OR #6
- #8 MeSH descriptor Tamoxifen explode all trees
- #9 tamoxifen
- #10 #8 OR #9
- #11 #7 AND #10

The 'near' operator defaults to within six words;
 '*' indicates truncation.

Box 6.4.f Demonstration search strategy for MEDLINE (Ovid format), for the topic 'Tamoxifen for breast cancer'

- 1 randomized controlled trial.pt.
- 2 controlled clinical trial.pt.
- 3 randomized.ab.
- 4 placebo.ab.
- 5 drug therapy.fs.
- 6 randomly.ab.
- 7 trial.ab.
- 8 groups.ab.
- 9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
- 10 animals.sh. not (humans.sh. and animals.sh.)
11. 9 not 10
12. exp Breast Neoplasms/
13. (breast adj6 cancer\$).mp.
14. (breast adj6 neoplasm\$).mp.
15. (breast adj6 carcinoma\$).mp.
16. (breast adj6 tumour\$).mp.
17. (breast adj6 tumor\$).mp.
18. 12 or 13 or 14 or 15 or 16 or 17
19. exp Tamoxifen/
20. tamoxifen.mp.
21. 19 or 20
22. 11 and 18 and 21

The 'adj6' operator indicates within six words;

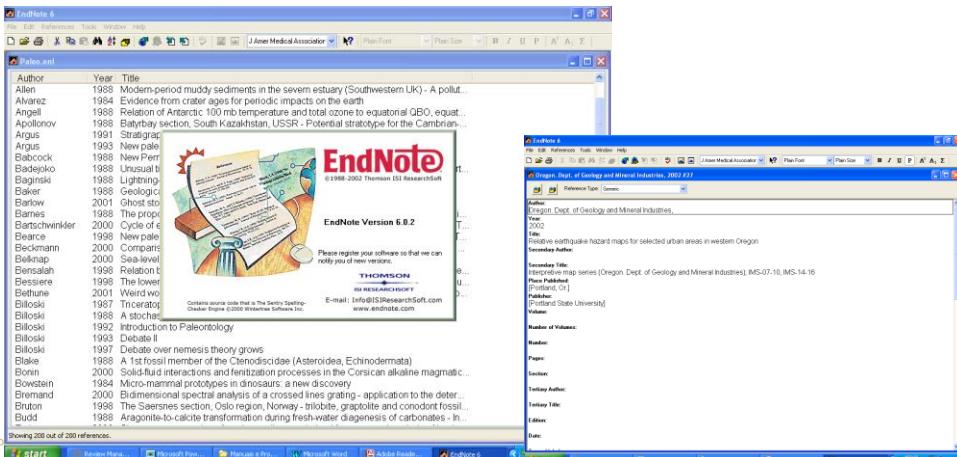
'\$' indicates truncation;

.mp. indicates a search of title, original title, abstract, name of substance word and subject heading word.



Searching for studies

- Software for reference managing
(Ex: Reference manager; EndNote; etc)



Selecting studies

Selecting studies

- Definition of selection criteria
 - Definition of inclusion criteria
 - Definition of exclusion criteria
- Selection criteria based on:
 - Methodological criteria
 - Population/participants
 - Intervention/Comparisons
 - Outcomes
 - Study type
 - Clinical criteria
 - Specific according to the defined clinical question



Interventions on Prevention of Postoperative Atrial Fibrillation in Patients Undergoing Heart Surgery

A Meta-Analysis

Eugene Crystal, MD; Stuart J. Connolly, MD; Khaled Sleik, MD;
Tracy J. Ginger, MD; Salim Yusuf, MBBS, DPhil

Inclusion Criteria for Studies

Because the antiarrhythmic activity and side-effect profile of sotalol differs from that of other β -blockers, sotalol trials were analyzed separately from other β -blockers trials. Studies were only included if they met all of the following criteria: (1) randomized control trials versus placebo or usual care; (2) primary prevention of postoperative AF in postcoronary artery bypass graft surgery or combined coronary graft and valvular surgery; (3) treatment started immediately before the operation, during the operation, or within postoperative intensive care unit (ICU) stay; (4) well-described protocol of intervention; and (5) adequate data on treatment efficacy (supraventricular arrhythmia incidence).

Double-blind and nonblinded studies were included. The primary outcome measure was incidence of postoperative AF or atrial flutter, except where total incidence of supraventricular arrhythmia was documented.



Selecting studies

- Selecting studies

- 1 – Initial assessment of all records obtained through searching – screening phase

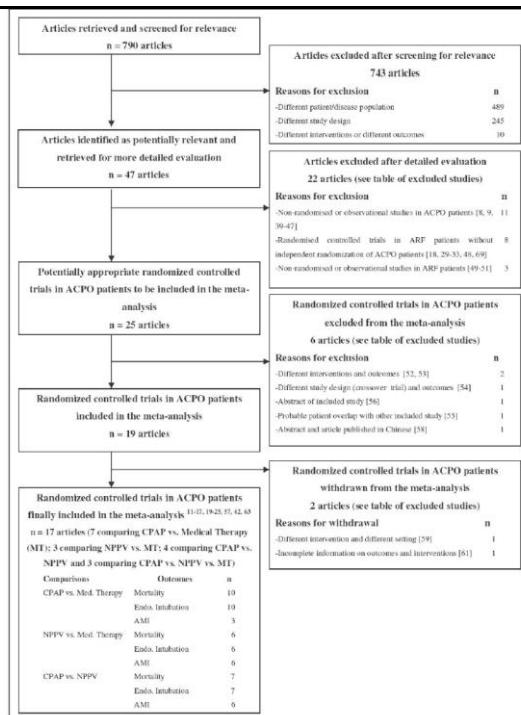
- Selection based on **title and abstract reading** of all records obtained through searching
- At least **two researchers** acting independently
- Definition of methods for **solving disagreements** (e.g., consensus or third researcher decision)
- Brief/general justification for **records exclusion**

Selecting studies

- Selecting studies

2 – Detailed assessment of potential candidates – inclusion phase

- Selection based on **full text reading** of all records that have passed through the screening phase (“potential candidates”)
- At least **two researchers** acting independently
- Decision based on **inclusion and exclusion criteria**
- **Blinding** of primary studies’ authors (?)
- Definition of methods for **solving disagreements** and agreement quantification (e.g., kappa coefficient)
- Registration of the **reasons for excluding records**
- Final list of **included primary studies**



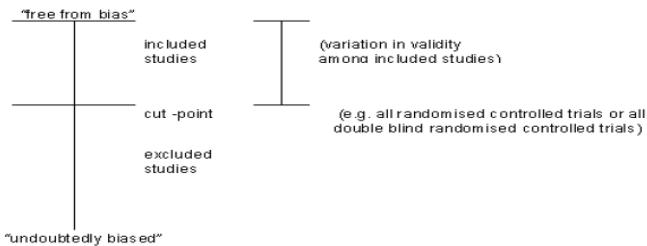
Evidence synthesis

- Background
- Research question
- Studies search and selection
- Data extraction and processing
- Quality assessment
- Data analysis, heterogeneity and publication biases
- Protocol and dissemination of results

Quality assessment

Quality assessment

- In the course of a systematic review, assessing studies' quality may serve several purposes:
 - Determining whether primary studies are to be included or excluded



Quality assessment

- In the course of a systematic review, assessing studies' quality may serve several purposes:
 - Explaining differences in results across studies (which may be subsequently explored when analysing data)
 - Descriptive/graphical analysis
 - Subgroup analysis
 - Cumulative meta-analysis
 - Pooled analysis (quality index???)
 - Sensitivity analysis
 - Meta-regression analysis

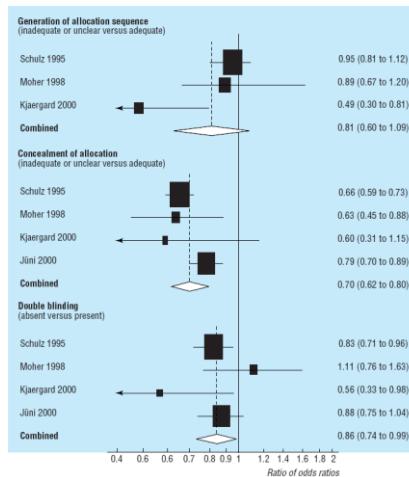
Quality assessment

- In the course of a systematic review, assessing studies' quality may serve several purposes:
 - Performing a pooled analysis according to studies' quality
 - Guiding the interpretation of results and the identification of recommendations for future research

Quality assessment

Systematic reviews in health care
Assessing the quality of controlled clinical trials
 Peter Jüni, Douglas G. Altman, Matthias Egger

BMJ VOLUME 323 7 JULY 2001 bmj.com



Meta-analysis of four empirical studies relating key aspects of methodological quality of controlled trials to their effect estimates. Meta-analysis was by random effects model. Size of squares is proportional to inverse of variance of estimate

Quality assessment

- Define quality **criteria** and create a classification **scale** (e.g., met, unmet, unclear)
- If there are several criteria, create a **global classification scale**

Risk of bias	Interpretation	Relationship to individual criteria
A. Low risk of bias	Plausible bias unlikely to seriously alter the results	All of the criteria met
B. Moderate risk of bias	Plausible bias that raises some doubt about the results	One or more criteria partly met
C. High risk of bias	Plausible bias that seriously weakens confidence in the results	One or more criteria not met

- Checklists and quality scales
 - According to Moher et al., there are more than 25 scales and 9 checklists aiming to assess studies' quality and validity

Table 8.7.a Possible approach for summary assessments of the risk of bias for each important outcome (across domains) within and across studies

Risk of bias	Interpretation	Within a study	Across studies
Low risk of bias.	Plausible bias unlikely to seriously alter the results.	Low risk of bias for all key domains.	Most information is from studies at low risk of bias.
Unclear risk of bias.	Plausible bias that raises some doubt about the results.	Unclear risk of bias for one or more key domains.	Most information is from studies at low or unclear risk of bias.
High risk of bias.	Plausible bias that seriously weakens confidence in the results.	High risk of bias for one or more key domains.	The proportion of information from studies at high risk of bias is sufficient to affect the interpretation of results.

Quality assessment

- At least two researchers should independently assess studies' quality
 - Use of specific form (after application of an initial pilot assessment)
 - Ideally, the origin of each study should be blinded
 - Reporting on the reproducibility of the assessment is recommended

Quality assessment

- Research questions
 - Description
 - Association, causality
- General aims
 - Validity (minimizing systematic errors – biases)
 - Precision (minimizing random errors)

Quality assessment

- Main general criteria

- Study design;
- Methods and criteria for participant selection;
- Assessed variables and tools for data collection;
- Methods of data collection;
- Data processing;
- Statistical analysis.

Table 8.5.a The Cochrane Collaboration's tool for assessing risk of bias

Domain	Description	Review authors' judgement
Sequence generation. <i>Assessments should be made for each main outcome (or class of outcomes).</i>	Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.	Was the allocation sequence adequately generated?
Allocation concealment. <i>Assessments should be made for each main outcome (or class of outcomes).</i>	Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen in advance of, or during, enrolment.	Was allocation adequately concealed?
Blinding of participants, personnel and outcome assessors. <i>Assessments should be made for each main outcome (or class of outcomes).</i>	Describe all measures used, if any, to blind study participants and personnel from knowledge of which intervention a participant received. Provide any information relating to whether the intended blinding was effective.	Was knowledge of the allocated intervention adequately prevented during the study?
Incomplete outcome data. <i>Assessments should be made for each main outcome (or class of outcomes).</i>	Describe the completeness of outcome data for each main outcome, including attrition and exclusions from the analysis. State whether attrition and exclusions were reported, the numbers in each intervention group (compared with total randomized participants), reason for attrition/exclusions where reported, and any re-inclusions in analyses performed by the review authors.	Were incomplete outcome data adequately addressed?
Selective outcome reporting.	State how the possibility of selective outcome reporting was examined by the review authors, and what was found.	Are reports of the study free of suggestion of selective outcome reporting?
Other sources of bias.	State any important concerns about bias not addressed in the other domains in the tool. If particular questions/entries were pre-specified in the review's protocol, responses should be provided for each question/entry.	Was the study apparently free of other problems that could put it at a high risk of bias?

Table 1. Calculation of Jadad score to assess study quality¹

Criterion	Score
If study was described as randomized (this includes words such as randomly, random, and randomization)	0/1
If the method used to generate the sequence of randomization was described and was appropriate (table of random numbers, computer-generated, etc.)	0/1
Deduct one point if the method used to generate the sequence of randomization was described and it was inappropriate (patients were allocated alternately, or according to date of birth, hospital number, etc.)	0/-1
If the study was described as double blind	0/1
If the method of double blinding was described and was appropriate (identical placebo, active placebo, dummy, etc.)	0/1
Deduct one point if the study was described as double blind but the method of blinding was inappropriate (e.g., comparison of tablet versus. injection with no double dummy).	0/-1
If there was a description of withdrawals and dropouts	0/1

¹Adapted from Jadad et al.

Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJM, Gavaghan DJ, McQuay HJ. Assessing the quality of reports of randomized clinical trials: Is blinding necessary? *Controlled Clin Trials* 1996;17:1–12.

The Revised CONSORT Statement for Reporting Randomized Trials

Methods	
Participants	3 Eligibility criteria for participants and the settings and locations where the data were collected.
Interventions	4 Precise details of the interventions intended for each group and how and when they were actually administered.
Objectives	5 Specific objectives and hypotheses.
Outcomes	6 Clearly defined primary and secondary outcome measures and, when applicable, any methods used to enhance the quality of measurements (e.g., multiple observations, training of assessors).
Sample size	7 How sample size was determined and, when applicable, explanation of any interim analyses and stopping rules.
Randomization	
Sequence generation	8 Method used to generate the random allocation sequence, including details of any restriction (e.g., blocking, stratification).
Allocation concealment	9 Method used to implement the random allocation sequence (e.g., numbered containers or central telephone), clarifying whether the sequence was concealed until interventions were assigned.
Implementation	10 Who generated the allocation sequence, who enrolled participants, and who assigned participants to their groups.
Blinding (masking)	11 Whether or not participants, those administering the interventions, and those assessing the outcomes were blinded to group assignment. If done, how the success of blinding was evaluated.
Statistical methods	12 Statistical methods used to compare groups for primary outcome(s); methods for additional analyses, such as subgroup analyses and adjusted analyses.

Table 1**General and specific quality criteria****General quality criteria**

Sample size (total number of participants)

Randomization allocation concealment (adequate, inadequate or uncertain)

Objective selection criteria for participants:

Yes: if inclusion and exclusion criteria for participants are adequately reported

No: if selection criteria are not reported

Blinding:

Yes: for articles that implemented blinding at any level

No: for articles reporting not being able to implement blinding of interventions at any level

Not reported: for articles that did not make any mention of blinding

Standardization of co-interventions:

Yes: if there was an attempt to standardize treatment and care besides the assigned interventions

No: if no attempt to standardize was applied

Uncertain: if this was not clearly reported

Intention-to-treat analysis (adequate, inadequate or uncertain)

Complete follow-up details (yes, no, not reported)

Outcome definition:

Adequate: if objective criteria for endotracheal intubation were defined

Inadequate: if the criteria were not defined

Uncertain: if application of criteria was unclear

Specific quality criteria

Patient selection criteria (inclusion and exclusion)

Type of patients (presence of baseline co-morbidity; AMI or chronic obstructive pulmonary disease)

Description of baseline criteria for severity of illness

Report of interventions (technical description of CPAP and NPPV methods)

Report of objective criteria for endotracheal intubation (adequate, inadequate or uncertain)

CPAP, continuous positive airway pressure ventilation; NPPV, non-invasive positive pressure ventilation.



Quality assessment

- Limitations of quality assessment
 - Inadequate description of the methods used in primary studies
 - Solution: Guidelines for reporting of clinical trials
 - Absence of empirical evidence of the existence of several potential sources of systematic errors
 - Exception: allocation concealment and blinding
 - Solution: research

It is not recommended to use quality indices, due to lack of validation and difficulties in their practical use

Evidence synthesis

- Background
- Research question
- Studies search and selection
- Data extraction and processing
- Quality assessment
- Data analysis, heterogeneity and publication biases
- Protocol and dissemination of results

Data extraction and processing

Data extraction

- Data extraction
 - Identification of the **characteristics and measures** to retrieve (taking into account the selection criteria, quality assessment and data analysis)
 - Development of a **specific form** for data extraction
 - **Pilot study** to assess the methods and form for data extraction
 - Data extraction by at least **two reviewers**
 - Definition of methods for **solving disagreements**
 - **Reproducibility** assessment (Ex: *kappa* coefficient)

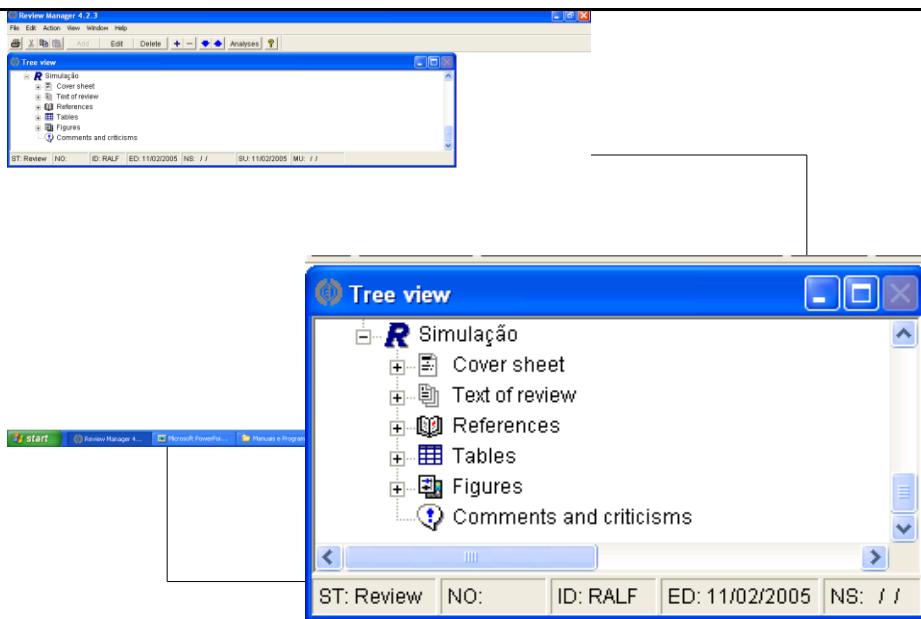
Interventions on Prevention of Postoperative Atrial Fibrillation in Patients Undergoing Heart Surgery A Meta-Analysis

Eugene Crystal, MD; Stuart J. Connolly, MD; Khaled Sleik, MD;
Tracy J. Ginger, MD; Salim Yusuf, MBBS, DPhil

Three reviewers (E.C., K.S., T.J.G.) independently extracted the data from published sources on the number of patients included, type and route of intervention, incidence of AF or supraventricular tachyarrhythmia, LOS, and stroke. The attempt to contact corresponding authors was made when key information was not available from the index publication. Mailing and e-mail addresses provided by publishers were used. We attempted to obtain missing information on LOS or in-hospital stroke from 23 authors of trials published since 1991. We received 9 responses, including missing information about LOS for 1 study and missing information about stroke for 3 studies.

Data Processing

- Data processing
 - Data introduction in appropriate software
 - RevMan
 - SPSS
 - STATA
 - SAS
 - Errors and inconsistencies checking in data processing



HEADS
PRO PROGRAMME IN HEALTH DATA SCIENCE

The three windows show the following tree structures:

- Left Window:**
 - Simulação
 - Cover sheet
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 - References
 - References to studies
 - Included studies
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 - Kline
 - Excluded studies
 - Studies awaiting assessment
 - Ongoing studies
 - Other references
 - Additional references
 - Other published versions of this review
 - Tables
 - Figures
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 - References
 - Tables
 - Characteristics of included studies
 - Characteristics of excluded studies
 - Characteristics of ongoing studies
 - Comparisons and data
 - 01 CPAP vs Medical Therapy
 - Forest
 - Kline
 - Additional tables
 - 01 Características dos estudos
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 - Comments and criticisms
 - Right Window:**
 - Simulação
 - Cover sheet
 - Text of review
 - References
 - Tables
 - Figures
 - Analyses
 - Additional figures
 - Comments and criticisms

ST: Review NO: ID: RALF ED: 29/05/2005 NS: /

HEADS
PRO PROGRAMME IN HEALTH DATA SCIENCE

The three windows show the following data entry forms:

- Left Window:** Dichotomous data (Noninvasive Ventilation in the Treatment of Acute Pulmonary Edema - A Meta-analysis)

Study ID	CPAP:		Medical Therapy:		Order
	n	N	n	N	
Bersten et al, 1991	0		19	7	20
Crane et al, 2004	4		20	1	20
Kelly et al, 2002	0				13
L'Her et al, 2004	4				
Lin et al, 1995	8				
Park et al, 2001	3				
Park et al, 2004	2				
Rasanen et al, 1998	6				
Takeda et al, 1997	1				
Takeda et al, 1998	2				

Double data entry | Save | Close |
- Middle Window:** Continuous data (Simulação)

Study ID	CPAP:			Medical Therapy:			Order
	N	Mean	SD	N	Mean	SD	
Forest	40	46.00	5.25	40	51.20	6.48	2
Kline	50	39.34	6.90	50	49.43	4.56	1

Double data entry | Save | Close |
- Right Window:** Generic inverse variance data (Simulação)

Study ID	CPAP:			Medical Therapy:			Order
	Estimate	SE		N	Mean	SD	
Forest	0.0000	0.0000		40	51.20	6.48	2
Kline	0.0000	0.0000		50	49.43	4.56	1

Double data entry | Save | Close | Add study |

ST: Review NO: ID: RALF ED: 29/05/2005 NS: /

Evidence synthesis

- Background
- Research question
- Studies search and selection
- Data extraction and processing
- Quality assessment
- Data analysis, heterogeneity and publication biases
- Protocol and dissemination of results

Bibliography

- Higgins J, Thomas J, Ed. **Cochrane handbook for systematic reviews of interventions. 2019.**
 - Core methods – Chapters 1-5 and 7-8.
- Recommended articles
 - As available in *moodle*