The Steps of a Systematic Review

This manual provides some guidance on the practicalities of doing a systematic review. It assumes a good understanding of the general aims and methods of systematic reviews (as set out in say the Cochrane Handbook), but provides advice on the "how to". It is a composite from the different processes used by several reviewers. The table below breaks down the steps used in doing a systematic review, with the person-time suggested – but the calendar time will usually be much longer.

	STEP	Who?	Timeline
1	How to ask a question	Lead + colleagues	
2	Finding previous systematic reviews		½ day
3	Write the protocol	Lead + others	2 days
4	Developing the search strategy	Lead + librarian	2 days
5	Running the searches and deduplication		2 days
6	Initial screening of titles and abstracts	2 reviewers	3 days
7	Finding full text		1 day
8	Screening full text	2 reviewers	1-2 days
9	Reference and citation checks (using Web of Science)		1 day
10	Data extraction from included studies	2 reviewers	3 days
	Disagreements check	+ 3 person	
11	Meta-analysis		2 days
12	Write Up		
	Discussion Template		

Some of the above steps are seen in the PRISMA flow chart of a systematic review report (see Figure). The effort and time for a review depends on the number of screened studies and included studies. The review in the figure is relatively small with only 389 initial articles, and 6 articles finally included. Note that though we show the process as linear, for several steps there is an iteration between steps.

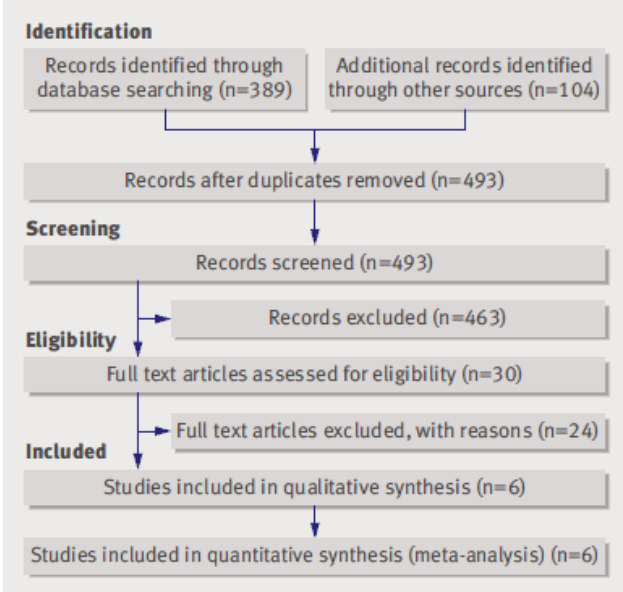


Fig 1 | Search strategy to identify trials of screening for prostate cancer

General Tips

1. The timelines are in person-time not calendar time – the process make take several months or years!
2. Its best to do many of the steps in blocks of time, particularly abstract screening and data extraction.
3. Some face-to-face time is helpful, eg question formulation, resolving disagreements about inclusions.
4. Keep a “decision log”.
5. Keep good track of where you are up to with each step and record numbers at each step.

Step 1: How to ask a question

	STEP
1	**How to ask a question**
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
7	Finding full text
8	Screening full text
9	Reference and citation checks (using Web of Science)
10	Data extraction from included studies
	Disagreements check
11	Meta-analysis
12	Write Up
	Discussion Template

Aim: To scope and refine the review question.

Time lines: Allow time for getting ideas, then time for searching and a couple of meetings.

Step 1: How to ask a question

Tips: This is usually an iterative process of ideas, searching, refinement, more searching, etc.(alternating step 1 & 2). Even though a review exists, you may still proceed because: it is out of date, the methods could be improved, other issues need to be addressed, etc.

IDEA PHASE

1. Sketch out some questions
   Questions should fulfil at least *one* of the following:
   i. is this a clinical problem (is the intervention used; or the diagnostic procedure used etc)? *or*
   ii. is there evidence (trials or diagnostic studies – particularly if conflicting) addressing the question already?
   (If the answer to both is *no*, then you may not be able to offer a useful SR).

REFINEMENT PHASE

2. Establish the team
   It should fulfil the following:
   i. be at least 3 people;
   ii. one should be a clinician (who understands the clinical issues);
   iii. one should be a methodologist (who understands – and has published – a SR)
3. Meet to refine the question (1 or 2 meetings of at least an hour)
   i. bring a preliminary search (just one database) to check
      1. whether a SR has been published (recently)?
      2. what eligible studies you might find
   ii. modify the PICO question accordingly - how broad or narrow for P (age? Treatment or prevention? Single or multiple diseases?) and I (single? Class? Dose range?)

4. Plan the work & timelines
   i. who does what? (see Table)
      searching; screening titles / abstracts; full texts; arbiter; analysis, write-up… etc
   ii. authorship; lead and other order,
   iii. Is anyone in the team away? What happens in the interim?

Step 2: Finding previous systematic reviews

	STEP
1	How to ask a question
2	**Finding previous systematic reviews**
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
7	Finding full text
8	Screening full text
9	Reference and citation checks (using Web of Science)
10	Data extraction from included studies
	Disagreements check
11	Meta-analysis
12	Write Up
	Discussion Template

Aim: To check for current and previous related reviews –the planned review may already be done! But check the search date. Or you may gain ideas and references from previous related reviews.

Requirements: A PICO- formulated question.

Time lines: Should take only a few hours to search, and check potential articles.

Step 2. Finding previous systematic reviews

PROCESS:

Before starting the protocol you should answer 2 questions:

Q1. Are there any **previous** systematic reviews?
Q2. Are there any **planned** systematic reviews?

Q1. *Are there any previous systematic reviews?* The Cochrane Collaboration is the largest producer of systematic reviews in medicine, but their reviews are only around 10% of all reviews. To search for reviews, there are a couple of useful filters (formulated for PubMed – you will need to modify if using other versions of MEDLINE). To search PubMed use one of these two filters:

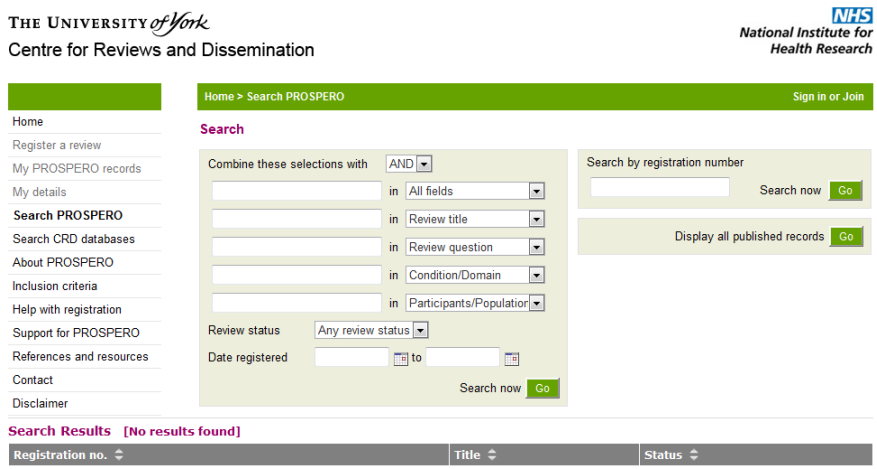
The Montori 2 filter (sensitivity 71% and precision 57%) is:
Medline[tiab] OR (systematic[tiab] AND review[tiab]) OR meta-analysis[ptyp] OR CDSR [so]

The Montori 3 Filter (sensitivity 98% and precision 14%) is:
Meta-analysis[ptyp] OR meta-analysis[tiab] OR meta-analysis[MeSH] OR review[ptyp] OR search[tiab] OR CDSR [so]*

(Note: we have modified these filter to add Cochrane - CDSR – as a source [so], as otherwise some Cochrane reviews are missed).

Q2. *Are there any planned systematic reviews?* To check for ongoing or planned reviews, you should check both the Cochrane library (for Titles or Protocols) and PROSPERO which is a register of over 1,500 planned systematic reviews.

www.crd.york.ac.uk/NIHR_PROSPERO



Step 3: Write the protocol

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	**Write the protocol**
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
7	Finding full text
8	Screening full text
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Aim: To write a protocol for your review that sets out prospectively all the decisions about methods.

Requirements: Word processing software and protocol template (see files on USB).

Time lines: Several hours, plus discussion amongst the team.

Step 3. Write the protocol

PROCESS:

Usually one author drafts the protocol, and then circulates it amongst the author team. Meetings may be helpful to make decisions.

Tips:

1. Write the protocol as if it is the INTRODUCTION and METHODS section of your final paper.
2. Protocols usually begin with a background section that outlines the disease/problem, the intervention(s) being studied and how they might work, and the rationale for doing the review (e.g. conflicting evidence, widely used intervention). This section is usually quite brief.
3. The bulk of the protocol describes the methods to be used in the review. This includes 1) the types of studies to be included (i.e. eligibility criteria for studies), 2) search methods, and 3) data collection and analysis methods.
4. For the types of studies, you will need to define the PICO elements in more detail. That is, the participants, interventions, comparators, and outcomes. One or two outcomes should be defined as primary outcomes (often one benefit, and one harm outcome), and the rest as secondary outcomes.
5. The detailed search methods section will describe both your electronic and other searching methods (see Step 4 of this manual).
6. The data collection and analysis section will describe how many reviewers will extract data, the method for resolution of discrepancies, methods for assessing "risk of bias" of included studies, the measurement of outcomes and the corresponding pooling method for meta-analyses, and will pre-specify any subgroup and sensitivity analyses. (Suggested wording for most sections is given in an accompanying document we have provided for you).
7. When your protocol is fully agreed between the team members, you can register it onto a registry of systematic review protocols (e.g. PROSPERO, located at http://www.crd.york.ac.uk/NIHR_PROSPERO/) .

A file with suggested wording for sections of the protocol is on your USB.

Step 4: Developing the search strategy

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	**Developing the search strategy**
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
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Aim: Balance sensitivity with efficiency - You need to search as comprehensively as possible but you have to have a stopping point.

Requirements: Access to databases; face-to-face or virtual meeting of author(s) and librarian.

Time lines: Half a day to 2 days, but spread over time – it may take some iteration to find the best search.

Step 4. Developing the search strategy

PROCESS:

Develop a search strategy in one database and translate into other resources

Tips:
consult a librarian – systematic reviews require complex, rigorous search strategies
Check the Cochrane Handbook chapter 6 – searching for studies – freely available from
http://www.cochrane.org/training/cochrane-handbook
Develop & test the search in MEDLINE first, then translate to other databases

Sources to search:

Depends on the subject

Electronic databases

General medical – Medline, Embase, CINAHL
Subject specific – PsycInfo, SportsDiscus
General Science – Web of Science, Scopus
Randomised Trials – CENTRAL – The Cochrane Library
Trials registries – WHO ICTRP, ClinicalTrials.gov
Dissertation databases – Proquest Dissertations and Theses
Grey literature – Government departments, Open Sigle/ Greynet (European)

Constructing the search strategy from the PICO:

Question Components	**Your Question**
P – Patient or Population Describe the most important characteristics of the patient. (e.g., age, disease/condition, gender)	
I – Intervention; Prognostic Factor; Exposure Describe the main intervention. (e.g., drug or other treatment, diagnostic/screening test)	
C – Comparison (if appropriate) Describe the main alternative being considered. (e.g., placebo, standard therapy, no treatment, the gold standard)	
O – Outcome Describe what you're trying to accomplish, measure, improve, affect. (e.g., reduced mortality or morbidity, improved memory, accurate and timely diagnosis)	
The well-built clinical question:	

Select 2 or 3 of the main concepts (usually the P and I, sometimes including the C or the O)

- Express each concept in as many ways as possible – aim for high sensitivity

	P		**I**		**C [optional]**		**O [optional]**
Primary search term							
	OR		OR		OR		OR
Synonym		A		A		A	
	OR	N	OR	N	OR	N	OR
Synonym		D		D		D	
	OR		OR		OR		OR
Synonym							
	OR		OR		OR		OR
Synonym							

Combine within concept words with **OR**
Combine between concept words with **AND**

When running the search, it will usually be done as multiple lines which are then ANDed at the end, e.g,

#1 P-term-1 OR p-term-2 OR ….
#2 I-term-1 OR i-term-2 OR …
#3 Methods filter
#1 AND #2 AND #3

In your preferred database construct the search –

For each of your alternate ways of expressing a concept

1. Find subject headings / controlled language (MeSH, Emtree, Cinahl) which may also suggest new textwords.
2. Use textwords (keywords) including abbreviations, American/English spelling.
3. Use the databases features for wildcards (eg * or $ or …), proximity searching for phrases (ADJ or NEAR).

- Use a filter if searching for a specific study design (i.e. randomised trials)
- To avoid bias do not limit by language, dates or publications.

Document your search:

Note the databases searched, the database publisher, the dates covered by the search and the date you ran the search.

Keep a copy of each search strategy.

Notes:

Step 5: Running the searches and deduplication

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
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6	Initial screening of titles and abstracts
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	Discussion Template

Aim: Running searches in each database, saving the search results, compiling the search results and removing the duplicates.

Requirements: Database access; Reference management software (Endnote).

Time lines: Applying the search from the protocol can be time consuming; the deduplication can take several hours or days (allow half a day to 3 days for running searches and deduplication).

Step 5. Running the searches and deduplication

Tips: Develop & test the search in MEDLINE first, then translate to other databases

Search

1. *Run the search* in each chosen database and save the results

2. *When saving the search results* save each in a separate Endnote Library (or other referencing software). The file name should include the date, the database searched, and the dates covered by the search e.g.,

    A108 Medline 01May2011toWk5May2013 07062013
    (ReviewName DataBase Range of Dates DateRun)

Keep a record of searches in one place, e.g. a Word file with the number of search results, date of search and period covered for each database searched as well as the database provider i.e. Ovid, Elsevier, Ebsco, Thomson Reuters etc

TIP: For *multiline search strategies, save in each database* if possible, Medline (Ovid etc), PubMed, Embase, CINAHL, PsycInfo, CENTRAL, Web of Science etc all provide space on the server for saved searches. Name the search strategy with the date in the file name even if it is just June_2013.

Deduplication

3. C*ombine searches and remove duplicates*: Create another Endnote library named as:

    ReviewName DataBase Range of Dates DateCombined

Set duplicate preferences to include all the following fields, Author, Year, Title, Secondary title (Journal), Volume, Issue, Pages using Edit → Preferences → Duplicates.
Import the Medline / PubMed search results library first as these seem to be the most comprehensive and reliable.

Then i*mport each of the search results libraries.* Endnote will identify duplicates on import and discard if you have the *Discard Duplicates* option selected on the *Import File* pop up box.

Repeat deduplication process with less selectivity.

i. Go into duplicates preferences and remove the inclusion checks against: volume, issue, number
ii. Find duplicates again, ie click references, find duplicates
iii. Create a group and call it something like “duplicates”
iv. Highlight the references and right click to add to group
v. From within the “duplicates” group check the duplicates actually are duplicates and remove actual duplicates to trash
vi. Then do a final sweep through all references checking for duplicates that may have been missed by this process.

Deduplication options

4. Automated De-duplication – Set to the most sensitive deduplication option ie in Endnote go into Edit, Preferences, Duplicates and ensure that Author, year, title, secondary title, volume, issue and pages are all ticked - also select “ignore spacing and punctuation”.

   The automatic deduplication will miss lots of duplicates but at least you ensure that you don't remove any records that are very similar.

5. Hand De-duplication - Sort the library by author, year, title, secondary title - scan through the list (I have the Display fields set as Author, Year, Title, Journal name, Volume, Number, pages, label, URL. (To select Display fields in Endnote go into Edit, Preferences, Display fields and select from the drop down menu).

6. To double check that you haven't missed any duplicates you then re-sort the library by Year, then author, title, Journal name and run through the list again.

   If < 500 use 2nd round only; if > 500 use two rounds as below.

   We need to insert this step with a note such as “if you have an especially large number of records ie numbering in the hundreds or thousands it may be more effective to include these step for removing duplicates

ROUND 1 – highly selective version

i. Create a new group i.e. “duplicates – 1st round “
ii. Set the find duplicates option to the most sensitive method ie include author, year, title, journal name, volume, issue, number
iii. Find these close match duplicates i.e Select References → Find Duplicates
iv. Copy all duplicates into the group you created i.e. highlight all, right click on “Add References To” and select to group (eg duplicates – 1st round)
v. In the group skim through the references to double check that they are actually duplicates and remove one copy of those that have true duplicates and add to trash

ROUND 2 – repeat with less selective version

i. 2nd round of duplicates check – go into duplicates preferences and remove the inclusion checks against: volume, issue, number
ii. The find duplicates again, ie click references, find duplicates – (for “Unfiled” again)
iii. Again create a group and call it something like “duplicates – 2nd round”
iv. Highlight the references and right click to add to group
v. Check the duplicates actually are duplicates and remove actual duplicates to trash
vi. Then do a final sweep through all references as per previous step

Notes:

Step 6: Initial screening of titles and abstracts

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	**Initial screening of titles and abstracts**
7	Finding full text
8	Screening full text
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12	Write Up
	Discussion Template

Aim: To determine from Title & Abstract which articles require full text to check for eligibility (includes both definite and possible articles).

Requirements: 2 screeners; search results in a single (Endnote) file.

Time lines: Allow about 50-100 articles / hour (so 1,000 will take 10-20 hours) depending on expertise and complexity.

Step 6. Initial screening of titles and abstracts

Process: each screener checks the search file and classifies as: FULLTEXT, BACKGROUND, or EXCLUDE

Tips: Sort by Author stops Endnote re-ordering; Use "Unfiled" as then classified articles are removed.

Screening process for going through abstracts in Endnote

Set up

1. Pool all searches into a single Endnote file (record the number of entries)
2. De-duplicate (record the new number of entries)
3. In MyGroups create 3 "Groups" - Exclude; FullText; ForReference

    (FullText is the possible inclusions for which you need full text; ForReference are not for inclusion, but useful background).

4. Click to the Preview pane (so the abstract is visible) and sort by Author (and Journal as secondary)

Screener processing (the time consuming bit!)

5. Go to the Unfiled folder (just below All References) and work from there.
6. Read through the Unfiled folder dragging each record to the appropriate MyGroups.
7. When Unfiled is empty you are done! Record the final numbers.

Post-processing

8. Compare results with co-screener (need a good process for this still).

If only a few, then do by hand but if 20+ then

In Tools, do a bulk tag of field for each Reviewer, and export FULLTEXT into a new library

Import both reviewer's files into Endnote and then de-duplicate – the duplicates are highlighted.

Create a "FULLTEXT" My Group – then drag all duplicatess into and delete the 2nd copy;

Then the leftovers in FULLTEXT are the discrepant ones! Drag into a CONFLICT group and work through. (Record the numbers so you can calculate agreement later).

9. Then use a good Uni account (Oxford or UQ or QOUSA) to get EndNote to find the pdfs!

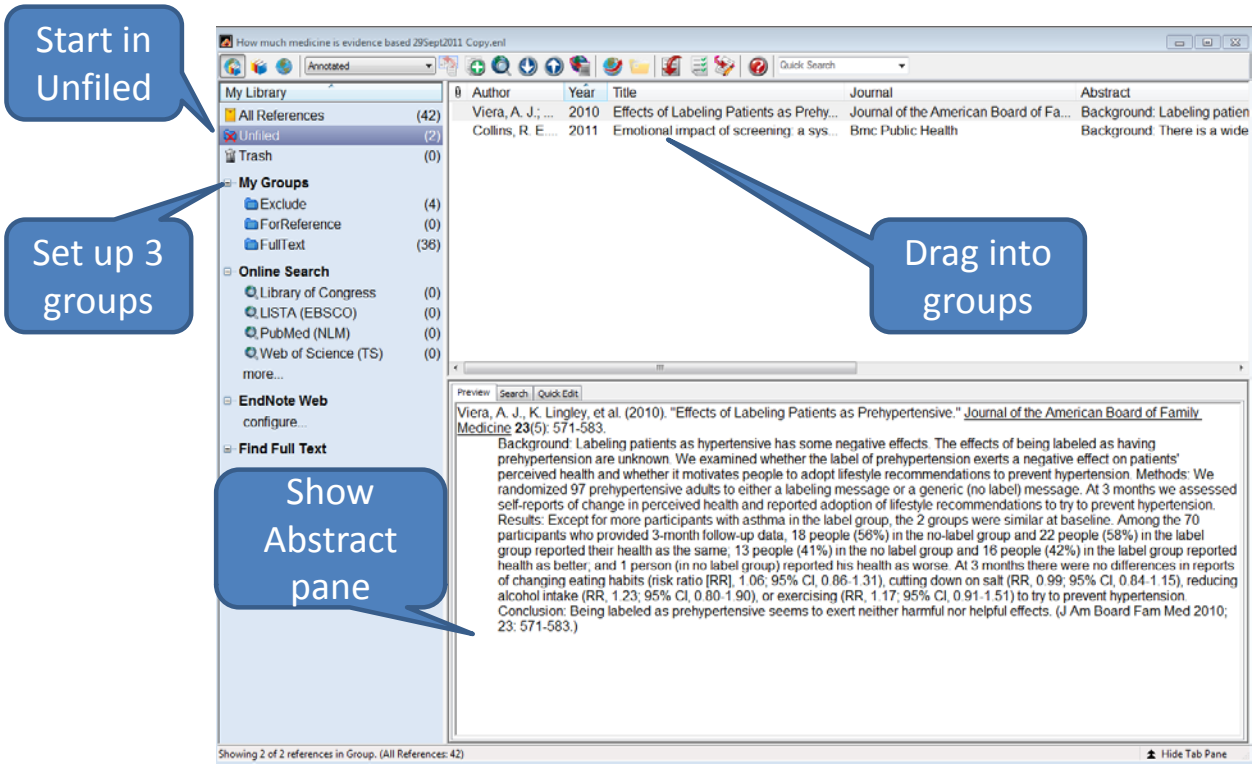

Figure: What the process looks like in Endnote

Notes:

Step 7: Finding full text

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
7	**Finding full text**
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9	Reference and citation checks (using Web of Science)
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	Disagreements check
11	Meta-analysis
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	Discussion Template

Aim: To get full text articles.

Requirements: Internet access, and a university (or similar) library access for articles.

Time lines: This will take several hours or days, but in calendar time will be among the longest steps while waiting for inter-library loans for a handful of articles.

Step 7. Finding full text

Process: Use a cascade process – of Endnote, Google, library, inter-library loan.

Tips: Interlibrary loans will be scanned text which you might get OCR scanned.

To get full text articles, use the following sequence of steps:

1. Use Endnote library's "find full text" feature (works better in Endnote X6 than in previous versions) – looks for the "DOI" but otherwise may not find it.
2. Use Google or Google Scholar
3. Search your library's subscriptions by individual journal title
4. Request via your library's document delivery service (consider cost factor)

Endnote library

N.B you need to be in "integrated library & online search mode" or "local library mode"
Select the references you wish to obtain full text (may select up to 250 at a time)
From the "References" Menu select "Find full text" → Find full text
If you have "show groups" open you can see how it is progressing

Google

To find individual papers i.e. Use the authors name and the first five main words of the title or more if necessary – scroll down the first dozen or so to see if one of the results is a pdf (or else click on Check for Full Text)

Library journal subscriptions

Use your library's ejournal portal to find specific individual titles, then the specific volume, issue, number for the article you are trying to obtain.

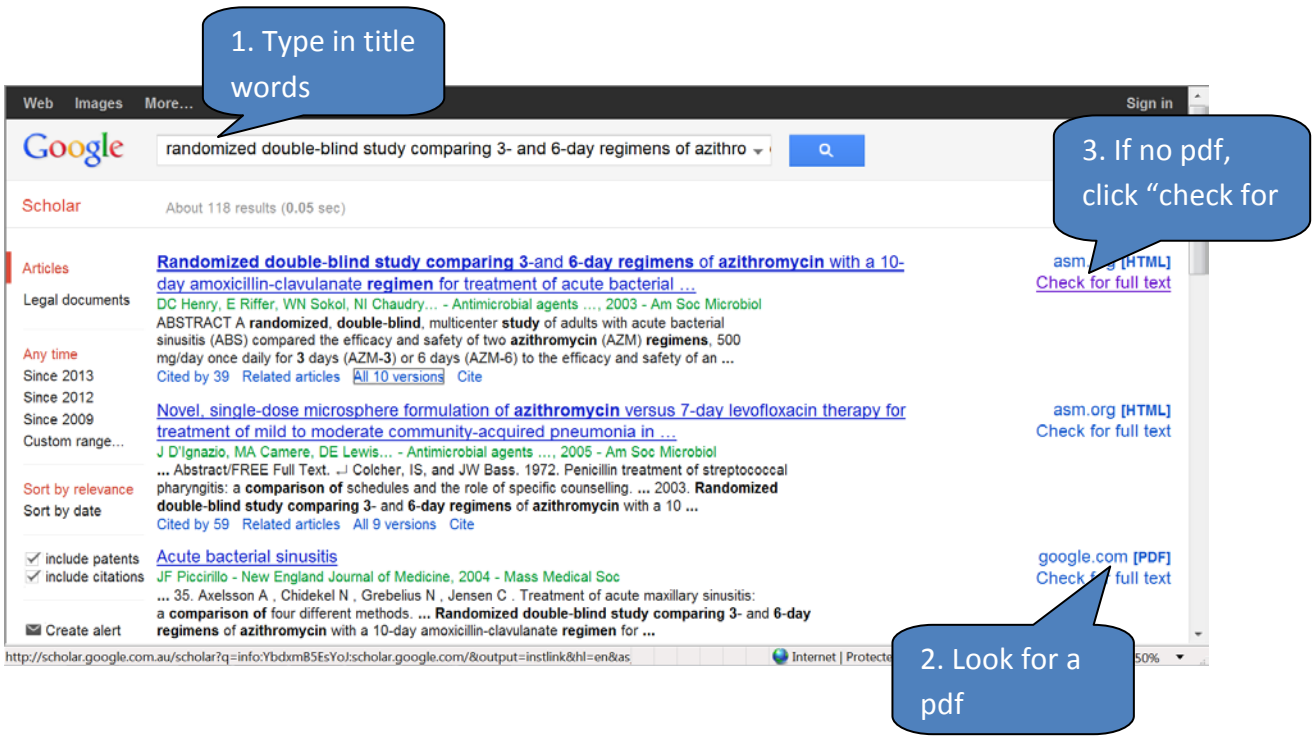
Document Supply

If all this fails you may need to use your library's document supply service. Libraries vary about who and how you can use this service, sometimes the faculty pays, sometimes the individual and sometimes the library meets the cost from within their budget.

At Bond the journal request (web based) form is available from the library home page under the document delivery link.

Please note – your faculty librarian will be very happy to help or advise on any of these steps if you explain what you are doing.

N.B. Keep a record of articles obtained, on order or unobtainable. An easy way to do this is to use the label field in Endnote and add a simple note such as "ft" for full text obtained, "ordered ##/##" for date ordered from document supply (and then add a note when received). Alternatively keep a record using Excel.


1. Type in title words
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randomized double-blind study comparing 3- and 6-day regimens of azithro
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Articles
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Sort by relevance
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Create alert
Randomized double-blind study comparing 3-and 6-day regimens of azithromycin with a 10-day amoxicillin-clavulanate regimen for treatment of acute bacterial ...
DC Henry, E Riffer, WN Sokol, NI Chaudry... - Antimicrobial agents ..., 2003 - Am Soc Microbiol
ABSTRACT A randomized, double-blind, multicenter study of adults with acute bacterial sinusitis (ABS) compared the efficacy and safety of two azithromycin (AZM) regimens, 500 mg/day once daily for 3 days (AZM-3) or 6 days (AZM-6) to the efficacy and safety of an ...
Cited by 39 Related articles All 10 versions Cite
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Novel, single-dose microsphere formulation of azithromycin versus 7-day levofloxacin therapy for treatment of mild to moderate community-acquired pneumonia in ...
J D'Ignazio, MA Camere, DE Lewis... - Antimicrobial agents ..., 2005 - Am Soc Microbiol
... Abstract/FREE Full Text. ↵ Colcher, IS, and JW Bass. 1972. Penicillin treatment of streptococcal pharyngitis: a comparison of schedules and the role of specific counselling. ... 2003. Randomized double-blind study comparing 3- and 6-day regimens of azithromycin with a 10 ...
Cited by 59 Related articles All 9 versions Cite
asm.org [HTML]
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Acute bacterial sinusitis
JF Piccirillo - New England Journal of Medicine, 2004 - Mass Medical Soc
... 35. Axelsson A , Chidekel N , Grebelius N , Jensen C . Treatment of acute maxillary sinusitis: a comparison of four different methods. ... Randomized double-blind study comparing 3- and 6-day regimens of azithromycin with a 10-day amoxicillin-clavulanate regimen for ...
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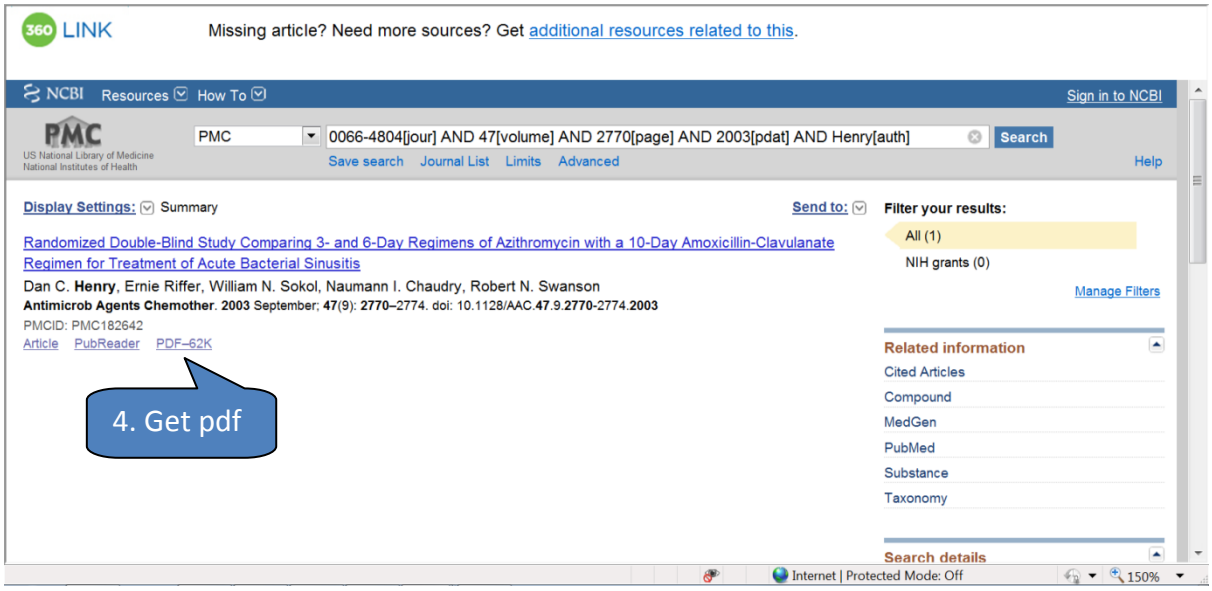
360 LINK
Missing article? Need more sources? Get additional resources related to this.
NCBI
Resources
How To
Sign in to NCBI
PMC
US National Library of Medicine
National Institutes of Health
PMC
0066-4804[jour] AND 47[volume] AND 2770[page] AND 2003[pdat] AND Henry[auth]
Search
Save search
Journal List
Limits
Advanced
Help
Display Settings: Summary
Send to:
Filter your results:
All (1)
NIH grants (0)
Manage Filters
Randomized Double-Blind Study Comparing 3- and 6-Day Regimens of Azithromycin with a 10-Day Amoxicillin-Clavulanate Regimen for Treatment of Acute Bacterial Sinusitis
Dan C. Henry, Ernie Riffer, William N. Sokol, Naumann I. Chaudry, Robert N. Swanson
Antimicrob Agents Chemother. 2003 September; 47(9): 2770–2774. doi: 10.1128/AAC.47.9.2770-2774.2003
PMCID: PMC182642
Article
PubReader
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Related information
Cited Articles
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MedGen
PubMed
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Search details
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Notes:

Step 8: Screening full text

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
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Aim: To check for eligibility of full text articles found in the screening process.

Requirements: 2 screeners; search results in a single (Endnote) file; all pdfs in a folder; spreadheet (or other) data checking program with form with eligibility questions.

Time lines: Allow approximately 15 minutes per article depending on eligibility questions and screener expertise.

Step 8. Screening full text

Process: each reviewer checks & completes, then disagreements discussed

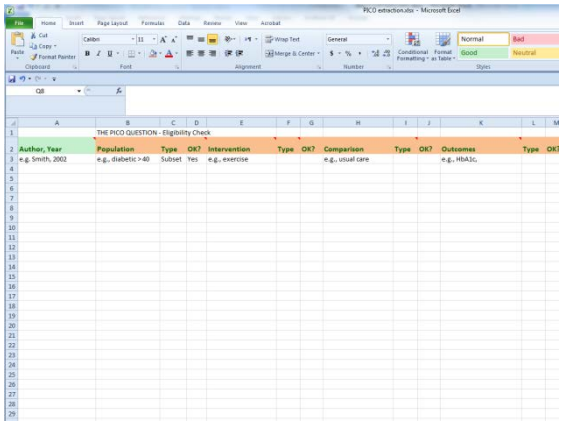
Tips: You don't need to complete all field if the study is clearly ineligible, just complete that and give the reason. It is also helpful to have 2 computer monitors per computer for this process so that one has the excel spreadsheet and the other the FULLTEXT pdf to avoid having to close and open different screens.

1. Find pdfs of FULLTEXT articles (described already as item 9 in Step 4), with pdfs named
    a. Author_year_Jnl naming in 1 folder
2. Export the TitleAbstract of the full text articles from Endnote and import into the FullTextScreen Excel spreadsheet (you need the ExcelExport style sheet for this step*)
3. Insert columns with inclusion criteria (i.e., RCT, has relevant data to extract etc) and final column to indicate whether criteria met or not (i.e., INCLUDE, EXCLUDE, BACKGROUND).
4. Two screeners independently check the FULLTEXT file and classify as: INCLUDE, EXCLUDE, or BACKGROUND with main reason for exclusion.
5. Reviewer 1 then screens (use two screens - spreadsheet on one; pdf on the other) classifying the articles as: INCLUDE, EXCLUDE (with "reason" - for the PRISMA flowchart) and BACKGROUND (also is an EXCLUDE so give reason).
6. Then RightClick & Hide the Reviewer 1 pane, save a backup, and then get Reviewer 2 to screen. Save a backup again.
7. Compare results with co-screener discuss, and resolve discrepancies (which may need a third reviewer). With the spreadsheet, look at the final Consensus worksheet to find disagreements, and work through these - when a reviewer changes his decision, alter on his form and highlight the changed cell.
8. After resolution of discrepancies, file final pdfs into the INCLUDE, EXCLUDE, and BACKGROUND folders. (Count files and record in PRISMA flow sheet: (i) INCLUDE & (ii) EXCLUDE + BACKGROUND)
9. You are ready for data extraction!

* On your USB there are 2 files for doing the export

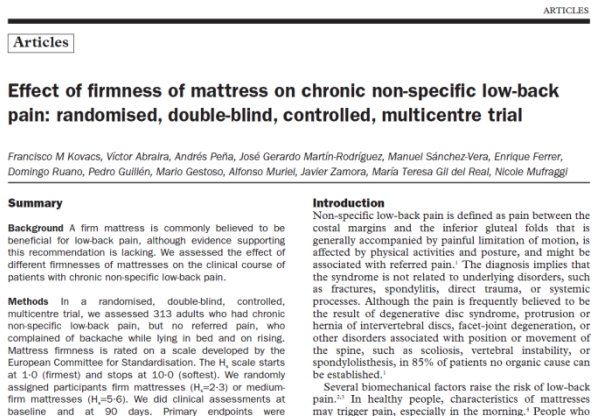
Excel export filter 01Jul2013.ens and

Exporting records from Endnote to Excel.pdf which has instructions on how to do this!



THE PICO QUESTION - Eligibility Check

Author, Year	Population	Type	OK?	Intervention	Type	OK?	Comparison	Type	OK?	Outcomes	Type	OK?
e.g. Smith, 2002	e.g., diabetic >40	Subset	Yes	e.g., exercise			e.g., usual care			e.g., HbA1c,		



ARTICLES

Articles

Effect of firmness of mattress on chronic non-specific low-back pain: randomised, double-blind, controlled, multicentre trial

Francisco M Kovacs, Víctor Abraira, Andrés Peña, José Gerardo Martín-Rodríguez, Manuel Sánchez-Vera, Enrique Ferrer, Domingo Ruano, Pedro Guillén, Mario Gestoso, Alfonso Muriel, Javier Zamora, María Teresa Gil del Real, Nicole Mufraggi

Summary

Background A firm mattress is commonly believed to be beneficial for low-back pain, although evidence supporting this recommendation is lacking. We assessed the effect of different firmnesses of mattresses on the clinical course of patients with chronic non-specific low-back pain.

Methods In a randomised, double-blind, controlled, multicentre trial, we assessed 313 adults who had chronic non-specific low-back pain, but no referred pain, who complained of backache while lying in bed and on rising. Mattress firmness is rated on a scale developed by the European Committee for Standardisation. The H_s scale starts at 1·0 (firmest) and stops at 10·0 (softest). We randomly assigned participants firm mattresses (H_s=2·3) or medium-firm mattresses (H_s=5·6). We did clinical assessments at baseline and at 90 days. Primary endpoints were

Introduction

Non-specific low-back pain is defined as pain between the costal margins and the inferior gluteal folds that is generally accompanied by painful limitation of motion, is affected by physical activities and posture, and might be associated with referred pain.[1] The diagnosis implies that the syndrome is not related to underlying disorders, such as fractures, spondylitis, direct trauma, or systemic processes. Although the pain is frequently believed to be the result of degenerative disc syndrome, protrusion or hernia of intervertebral discs, facet-joint degeneration, or other disorders associated with position or movement of the spine, such as scoliosis, vertebral instability, or spondylolisthesis, in 85% of patients no organic cause can be established.[1]

Several biomechanical factors raise the risk of low-back pain.[2,3] In healthy people, characteristics of mattresses may trigger pain, especially in the morning.[4] People who

Figure: Use 2 screens to process full text articles – the form and the pdf.

Notes:

Step 9: Reference and citation checks (using Web of Science)

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
7	Finding full text
8	Screening full text
9	**Reference and citation checks (using Web of Science)**
10	Data extraction from included studies
	Disagreements check
11	Meta-analysis
12	Write Up
	Discussion Template

Aim: To find additional studies via forward and background citation checks.

Requirements: EndNote library of included studies.

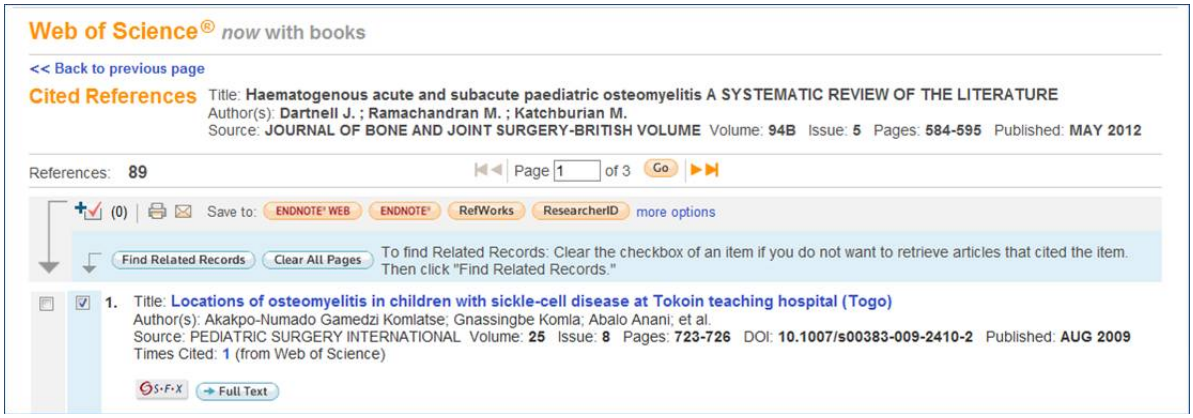
Timelines: Approximately one day.

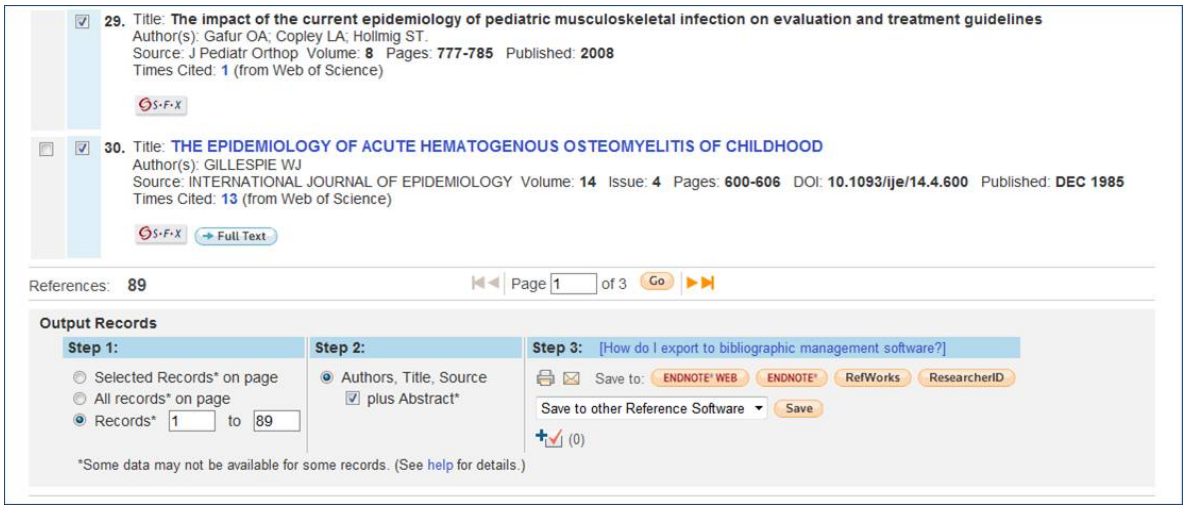
Step 9. Reference & citation checks (using Web of Science)

Tips: You can hand screen the references of included studies, but that is by title only. It is better to get the title and abstract, merge all the references from included studies then filter these and finally screen them (as in previous steps).

To extract cited references of included studies from Web of Science.
To capture the items from their bibliographies , use the Marked List as a interim stage.

1. To find the included study, copy the title into the title search field. Then click on the hyperlinked title to take you to the abstract page which has links to the "cited references" and "times cited".
2. BACKWARDS. Click on the "cited references" hyperlink ….
   To capture the references from each article you are reviewing. For example this article has 89 references and you can capture the references that are available by jumping to the bottom of the screen and add all the records to the marked list then click the  icon to add selected records to your Marked List.
3. FORWARDS. Click on the "times cited" hyperlink … and repeat the above process.
4. From the Marked List page, select the data that you want to print, e-mail, save, or export. This saves you from having to go through page by page and click each box by putting the lot into the Marked List.
5. From there you can download to EndNote or any other reference management software.





You now need to check if any of these are new references. You can do a simple screen, but if there is a large volume you might want to (i) use a sensitive search filter (ii) do a deduplication (iii) screen.

Step 10: Data extraction from included studies

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
7	Finding full text
8	Screening full text
9	Reference and citation checks (using Web of Science)
10	**Data extraction from included studies**
	Disagreements check
11	Meta-analysis
12	Write Up
	Discussion Template

Aim: To extract data for analysis from the full text articles found.

Requirements: 2 reviewers; all pdfs in a folder; spreadsheet (or other) data collection program with form with previously-collected eligibility questions completed, and new columns added (see next page).

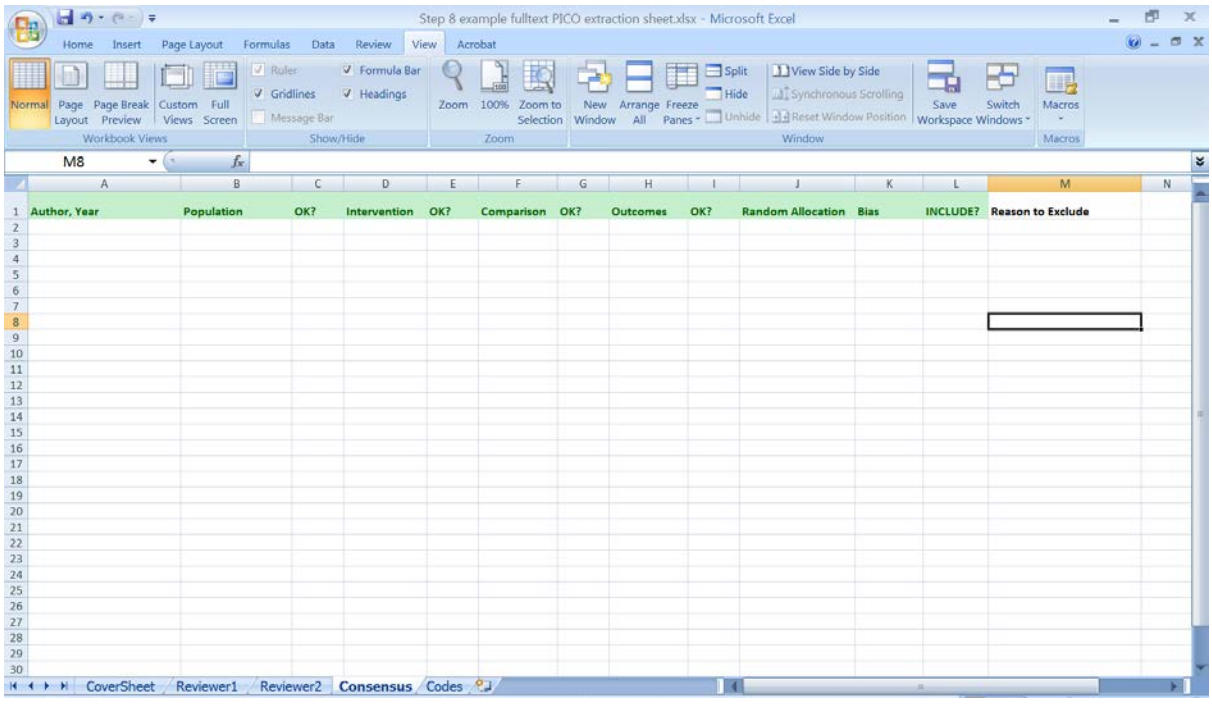
Time lines: Allow approximately an hour per article depending on complexity and data extractor expertise.

Step 10. Data extraction from included studies

Process: each reviewer checks & completes, then disagreements discussed

Tips: It is helpful to have 2 computer monitors per computer for this process so that one has the excel spreadsheet and the other the FULLTEXT pdf to avoid having to switch between windows frequently.

1. Use the set of studies in the final FullTextScreen Excel spreadsheet – save a version with just the included studies in it.
2. Add extra columns for the additional items needed to describe each included study. These include: 1) source of the publication (author, year, journal, author contact details, funding source), 2) study design and methods details (e.g. design, duration, setting, country), 3) extract details of participants (e.g. total number, age, sex), 4) for each intervention and comparator group, the number of participants and details of the intervention, 5) any items related to assessing risk of bias or quality of included studies.
3. In your protocol, you will have decided on the comparisons to be made. Add extra columns for the results from each included study for each comparison and each outcome for that comparison. For each comparison/outcome combination, you will need to extract the number of participants and the outcome result (e.g. number of events, mean and standard deviation).
4. Two reviewers independently use the FULLTEXT file to extract the additional data.
5. Reviewer 1 then extracts data.
6. Then RightClick & Hide the Reviewer 1 pane, save a backup, and then get Reviewer 2 to extract. Save a backup again.
7. Compare results with co-screener by setting up 2 screens side-by-side.
8. Discuss and resolve any discrepancies (which may need a third reviewer) - when a reviewer changes her decision, alter on her form and highlight the changed cell.
9. You are ready for data analysis!



Step 11: Meta-analysis

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
7	Finding full text
8	Screening full text
9	Reference and citation checks (using Web of Science)
10	Data extraction from included studies
	Disagreements check
11	**Meta-analysis**
12	Write Up
	Discussion Template

Aim: To perform meta-analyses of all results.

Requirements: Spreadsheet with data collected from included studies, meta-analysis software*.

* Software:

1. **RevMan** is available for download from http://ims.cochrane.org/revman/download
2. **Meta-analyst** is free (and a copy is included on the USB)

Time lines: Allow approximately half an hour to an hour per meta-analysis.

Step 11. Meta-analysis

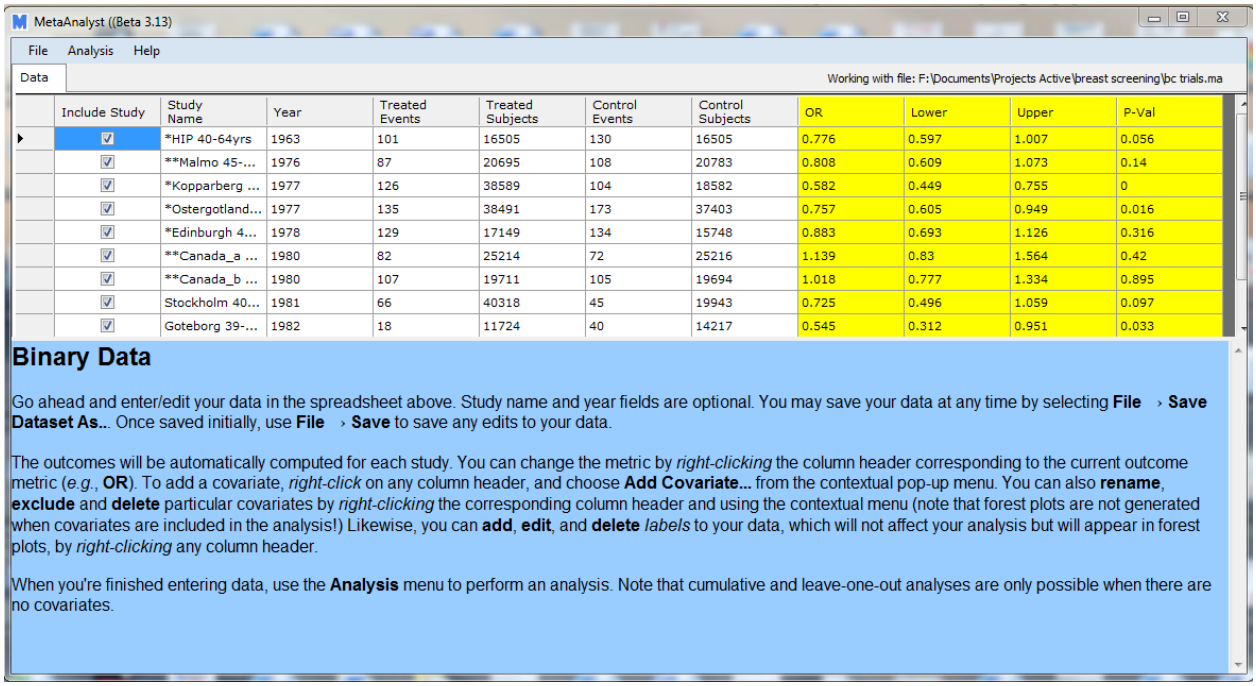
Process: Enter data into meta-analysis software, produce forest plots and copy as figures to final manuscript.

Tips: Free software is available (e.g. RevMan from the Cochrane Collaboration, and Meta-Analyst)

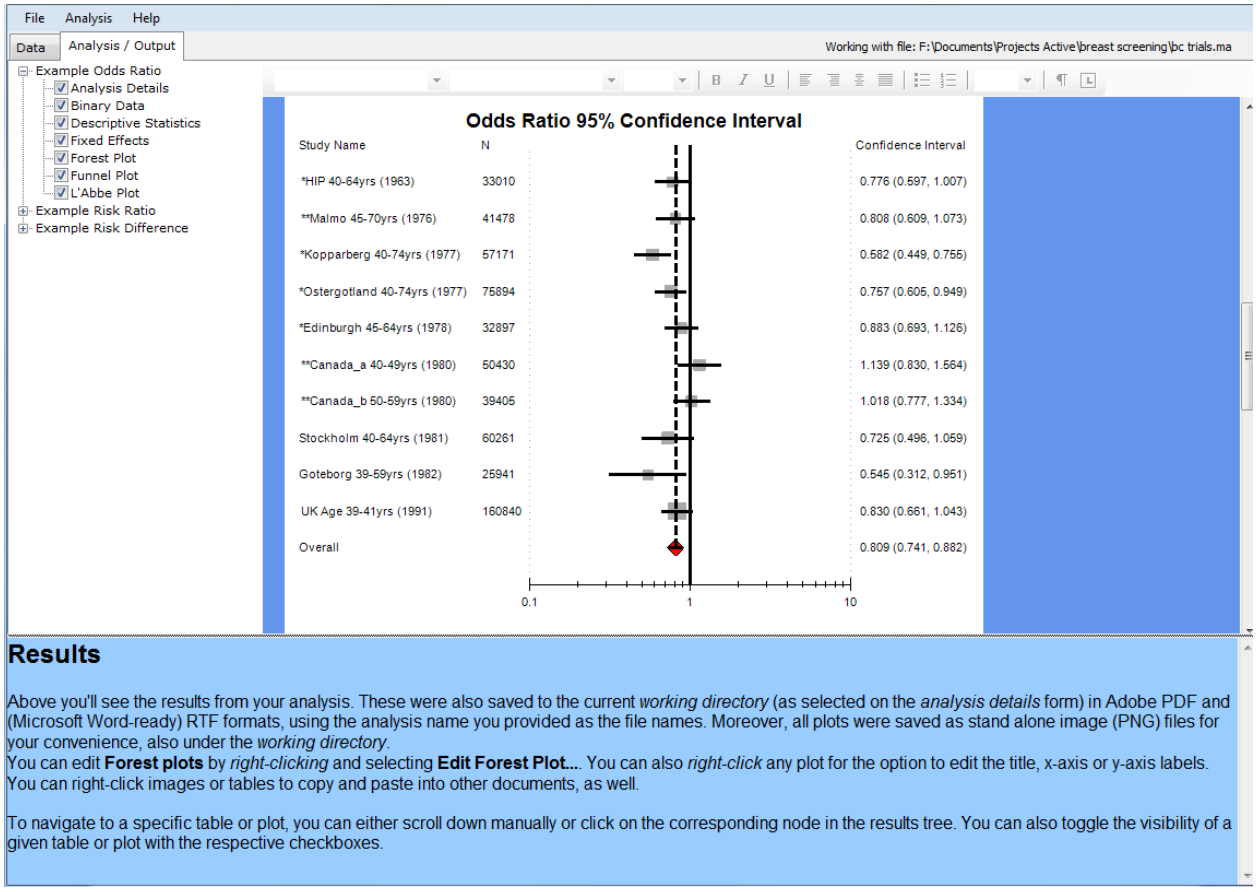
1. Open the spreadsheet where you extracted the data from the studies, and your meta-analysis software.
2. For each comparison/outcome combination, enter the data for each study into the meta-analysis software.
3. Produce the forest plot.
4. Check the heterogeneity result and decide whether it is appropriate to combine studies for that outcome. If so, include the forest plot and the results in your final manuscript.
5. Do any subgroup and sensitivity analyses that you specified in your protocol.

Hints:
In RevMan, you will need to enter the studies as references first, before you can include them in one or more meta-analyses.
You can do sensitivity analyses in RevMan by “deselecting studies” from the table and regenerating the forest plot.
You can do subgroup analyses in RevMan also – it is quicker to order the studies by subgroup as you enter them. You can choose to display the overall effect size as well as the subgroup results, or just the subgroup results.

Meta-Analyst – a free program from http://www.cebm.brown.edu/open_meta (old version)



1. The Analysis process in Meta-analyst: You first need to enter the data into the "spreadsheet"



2. You then need to Run Analysis, and select which analysis you want.

Notes:

Step 12: Write up

	STEP
1	How to ask a question
2	Finding previous systematic reviews
3	Write the protocol
4	Developing the search strategy
5	Running the searches and deduplication
6	Initial screening of titles and abstracts
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12	**Write Up**
	Discussion Template

To be discussed at Workshop.