Search filters – what are they good for?

Julie Glanville
York Health Economics Consortium (YHEC), University of York, UK
julie.glanville@york.ac.uk

EAHIL
European Association for Health Information and Libraries
http://eahil.eu/

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Julie Glanville
Associate Director

Providing Consultancy &
Research in Health Economics

UNIVERSITY of York INVESTORS IN PEOPLE

YHEC
York Health Economics Consortium

Declaration of Interests

- Member of Cochrane (since 1994)
- Previously Associate Director of (NHS) Centre for Reviews and Dissemination (1994-2008)
- Consultant (YHEC) managing reviews and other research for wide range of public and private sector clients
- Co-Convenor of Cochrane Information Retrieval Methods Group
- Co-author of the searching chapter of the Cochrane Handbook
- Co-organiser of the SuRe Info resource
- Author of search filters
- Co-manager of the ISSG Search Filter Resource

Agenda

- What is a search filter?
- How to find them?
- How to assess their quality?
- When do you use them?

What is a search filter?

- Search filters are collections of search terms designed to retrieve selections of records
- Search filters may be designed to retrieve records of
  - Specific study design e.g. randomised controlled trial
  - Topic e.g. kidney disease
  - Population e.g. children
  - Some other feature or theme
- Rationale: to save us time, to provide tools which offer a consistent performance
- Different from a database limit such as year or language

SYSTEMATIC REVIEWS

The search filter used by SIGN to retrieve systematic reviews is an adaptation of the systematic reviews filter designed by the Health Information Research Unit of the McMaster University, Ontario. The systematic reviews filter emphasises specificity rather than sensitivity.

Medline

1. Meta-Analysis as Topic/
2. meta analy$.tw.
3. metaanaly$.tw.
4. Meta-Analysis/
5. (systematic adj (review$1 or overview$1)).tw.
6. exp Review Literature as Topic/
7. or/1-6
8. cochrane.ab.
9. embase.ab.
10. (psychlit or psyclit).ab.
11. (psychinfo or psycinfo).ab.
12. (cinahl or cinhal).ab.
13. science citation index.ab.
14. bids.ab.
15. cancerlit.ab.
16. or/8-15
17. reference list$.ab.
18. bibliograph$.ab.
19. hand-search$.ab.
20. relevant journals.ab.
21. manual search$.ab.
22. or/17-21
23. selection criteria.ab.
24. data extraction.ab.
25. 23 or 24
26. Review/
27. 25 and 26
28. Comment/
29. Letter/
30. Editorial/
31. animal/
32. human/
33. 31 not (31 and 32)
34. or/28-30,33
35. 7 or 16 or 22 or 27
36. 35 not 34

SIGN filter for systematic reviews

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How do we use filters?

- We usually bolt them onto another search e.g.
- To find breast cancer RCTs
  1. Breast cancer search terms
  2. RCTs filter
  3. 1 AND 2
- To find Systematic reviews (SR) of physiotherapy for low back pain
  1. Physiotherapy search terms
  2. Low back pain search terms
  3. SR filter
  4. 1 AND 2 AND 3

How can I find filters?

- Within database interfaces e.g.
  - PubMed Clinical Queries
  - Ovid
- Via the ISSG Search Filters Resource
  - https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/home
- Also ‘search blocks’ site
  - https://sites.google.com/site/eahilblocks/a-c

ISSG Search Filters Resource

ISSG Search Filters Resource

Search this site

Other pages

- Home page
- What is the ISSG Search Filter Resource?
- Search Filters by Study Design
- Critical Appraisal of Search Filters
- Investigating the Impact of Search Filters
- Methods of Developing Search Filters
- Surveys of Search Filter Performance
- Search Strategy Blogs and Discussion Lists
- Built in filters
- Recently added filters
- Conferences and Workshops
- Sitemap
- Recent site activity

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 Care Excellence (NICE) and other associated Information Specialists.

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 or focus. 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. Inclusion of a search filter is not an endorsement of its validity or a recommendation.

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

Monthly update searches are undertaken to identify search filters for the Resource.

The search filters are grouped by study design or focus:

- Adverse effects
- Aetiology
- Diagnostic studies
- Economic evaluations
- Epidemiological studies
- Guidelines
- Health services research
- Health state utility values
- Mixed methods studies
- Non-randomized studies
- Observational studies
- Outcome studies
- Prognosis
- Public Views & Patient Issues
- Qualitative research
- Quality of life
- RCTs and other trials
- Systematic reviews
- Therapy studies
- 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
- Impact of search filters
- Collections of filters
- Search strategy blogs and discussion lists
- Training

Update date: New filters added 7th November 2016; latest scan for new filters 20th February 2017

Qualitative research

Check for overviews first

Filters to Identify Qualitative Research

This page shows publications that have reviewed search filter performance and individual search filters.

Publications that review search filter performance

DeJean D, Giacomini M, Simeonov D, Smith A. Finding qualitative research evidence for health technology assessment. *Qual Health Res.* 2016 Aug;26(10):1307-17

Individual search filters

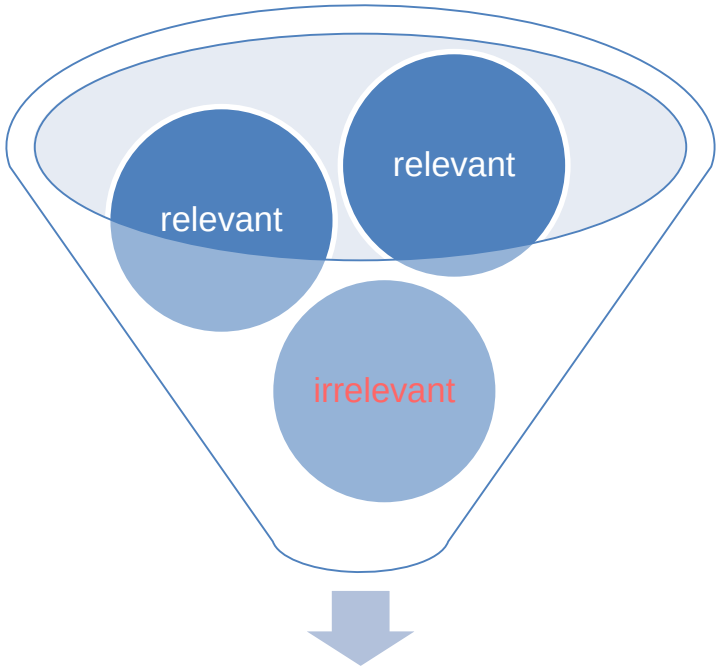
Database	Filter
CINAHL	Wilczynski NL, Marks S, Haynes RB. Search strategies for identifying qualitative studies in CINAHL. *Qualitative Health Research* 2007;17(5):705-10. University of Alberta. After McKibbon A, Eady A and Marks S. PDQ Evidence-based principles and practice. Hamilton, Ontario: BC Decker; 1999 and Evans DJ. Database searches for qualitative research. *Journal of the Medical Library Association* 2002;90:290-3. [Ovid] Marks S. Qualitative studies. In: McKibbon A, Eady A, Marks S. *PDQ evidence-based principles and practice*. Hamilton, Canada: BC Decker Inc., 1999. Edward G Miner Library, University of Rochester Medical Center filter [undated] [Ovid]
EMBASE	Walters LA, Wilczynski NL, Haynes RB; Hedges Team. Developing optimal search strategies for retrieving clinically relevant qualitative studies in EMBASE. *Qualitative Health Research* 2006 Jan;16(1):162-8. [Ovid] Also at http://hiru.mcmaster.ca/hiru/HIRU_Hedges_EMBASE_Strategies.aspx
MEDLINE	DeJean D, Giacomini M, Simeonov D, Smith A. Finding qualitative research evidence for health technology assessment. *Qualitative Health Research 2016*, Vol. 26(10) 1307–1317 University of Texas School of Public Health. Search filters for qualitative studies. Accessed 06 Dec 2013. [Ovid] Important note: All of the MEDLINE strategies presented below were developed before the MeSH Heading 'Qualitative Research' was introduced – Year of Entry: 2003. This should be taken into account when using these strategies. As new strategies are developed which include and/or evaluate the performance of this heading they will be added to this section. Wong SS, Wilczynski NL, Haynes RB. Developing optimal search strategies for detecting clinically relevant qualitative studies in MEDLINE. *Medinfo* 2004;11(1):311-6. Also at http://hiru.mcmaster.ca/hiru/HIRU_Hedges_MEDLINE_Strategies.aspx ◦ ISSG structured abstract (pdf) ◦ ISSG search filter appraisal (pdf) University of Alberta. After McKibbon A, Eady A and Marks S. PDQ Evidence-based principles and practice. Hamilton, Ontario: BC Decker; 1999 and Evans DJ. Database searches for qualitative research. *Journal of the Medical Library Association* 2002;90:290-3. [Ovid & PubMed] Grant MJ. Searching for qualitative research studies on the Medline database [oral presentation]. *Qualitative Evidence Based Practice Conference; 2000 May 14-16; Coventry University, UK.* Grant MJ. Development of an optimal search strategy for qualitative research methodologies [oral presentation]. *Qualitative Evidence Based Practice Conference; 2000 May 15-17; Coventry University, UK.* Marks S. Qualitative studies. In: McKibbon A, Eady A, Marks S. *PDQ evidence-based principles and practice*. Hamilton, Canada: BC Decker Inc., 1999. Health Information Research Unit, McMaster University strategy [undated] [Ovid & PubMed translation]

Search filter design

- Not all search filters are (equally) effective
- Design matters
  - Jenkins M. Evaluation of methodological search filters--a review. Health Info Libr J. 2004;21: 148–163.
  - 1st generation - pragmatic
  - 2nd generation - ‘gold-standard-tested’
  - 3rd generation - ‘gold-standard-derived and -tested’
  - Was the filter developed in an appropriate way?
  - Was the filter tested in an appropriate way?

Search filter design

- Focus matters: Sensitivity versus precision?
  - **Sensitivity** – does it find as many of the known relevant studies as possible?
  - **Precision** – does it exclude irrelevant studies, that we don't want?
- Is the filter relevant to our question – does it look for the same thing in which we are interested?
- Bottom line:
  - you want to identify and use filters that are effective and also suitable for your context



How to choose a search filter?

- Look for performance reviews (next slide)
- Unstructured assessments of single studies
- Structured assessments of one or more studies
  - Critical appraisal instruments or quality assessment tools or checklists
  - Formalise assessment
  - Minimise risk of missing comparison elements
  - Standardise analysis of all items being compared
  - Draw out the key elements of a study

Reviews of search filter performance

Cochrane Library

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Search title, abstract, keyword

Browse | Advanced Search

Cochrane Reviews | Trials | More Resources | About | Help

Go to old article view

PDF

Info

Comment

Cochrane Database of Systematic Reviews

Search strategies to identify diagnostic accuracy studies in MEDLINE and EMBASE

Review | Methodology

Rebecca Beynon, Mariska M.G. Leeflang, Steve McDonald, Anne Eisinga, Ruth L Mitchell, Penny Whiting, Julie M Glanville

First published: 11 September 2013

Editorial Group: Cochrane Methodology Review Group

DOI: 10.1002/14651858.MR000022.pub3 View/save citation

Cited by: 0 articles Citation tools

Abstract

Background

A systematic and extensive search for as many eligible studies as possible is essential in any systematic review. When searching for diagnostic test accuracy (DTA) studies in bibliographic databases, it is recommended that terms for disease (target condition) are combined with terms for the diagnostic test (index test). Researchers have developed methodological filters to try to increase the precision of these searches. These consist of text words and database indexing terms and would be added to the target condition and index test searches.

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Checklists

- Jenkins M. Evaluation of methodological search filters — a review. Health Info Libr J 2004;21:148-163.
- Glanville J, Bayliss S, Booth A, Dundar Y, Fernandes H, Fleeman N D, Foster L, Fraser C, Fry-Smith A, Golder S, Lefebvre C, Miller C, Paisley S, Payne L, Price A, Welch K. So many filters, so little time: the development of a search filter appraisal checklist. J Med Libr Assoc 2008;96(4):356-61. (ISSG critical appraisal checklist)
- Bak G, Mierzwinski-Urban M, Fitzsimmons H, Morrison A, Maden-Jenkins M. A pragmatic critical appraisal instrument for search filters: introducing the CADTH CAI. Health Info Libr J 2009;26(3):211-9.

Appraisal elements (overview)

- Context
  - Objectives of the filter
- Design
  - Development of the filter
  - Gold standards
  - Search terms
  - Search strategies
- Testing
  - Does it find the records (gold standard) I know about?
  - Does it perform well on other sets of records (other gold standards)?
- Limitations and comparisons with other filters' performance

Context – Objectives of the filter

- What is the filter trying to find?
  - RCTs?
  - Economic studies?
- What is the focus of the filter?
  - Sensitivity – finding as many relevant studies as possible, but may be finding lots of irrelevant studies
  - Precision – finding as few irrelevant studies as possible, but might miss some relevant studies
  - A balance of sensitivity and precision – quite sensitive and quite precise, but might miss some relevant studies
  - Specificity – successfully not retrieving irrelevant studies
- What database/interface is it designed for?
- When was the filter developed?

Context: objective example

- …intended to retrieve citations identified as systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine, consensus development conferences, guidelines, and citations to articles from journals specializing in review studies of value to clinicians.
- (systematic review [ti] OR meta-analysis [pt] OR meta-analysis [ti] OR systematic literature review [ti] OR this systematic review [tw] OR pooling project [tw] OR (systematic review [tiab] AND review [pt]) OR meta synthesis [ti] OR meta-analy*[ti] OR integrative review [tw] OR integrative research review [tw] OR rapid review [tw] OR umbrella review [tw] OR consensus development conference [pt] OR practice guideline [pt] OR drug class reviews [ti] OR cochrane database syst rev [ta] OR acp journal club [ta] OR health technol assess [ta] OR evid rep technol assess summ [ta] OR jbi database system rev implement rep [ta]) OR (clinical guideline [tw] AND management [tw]) OR ((evidence based[ti] OR evidence-based medicine [mh] OR best practice* [ti] OR evidence synthesis [tiab]) AND (review [pt] OR diseases category[mh] OR behavior and behavior mechanisms [mh] OR therapeutics [mh] OR evaluation studies[pt] OR validation studies[pt] OR guideline [pt] OR pmcbook)) OR ((systematic [tw] OR systematically [tw] OR critical [tiab] OR (study selection [tw]) OR (predetermined [tw] OR inclusion [tw] AND criteri* [tw]) OR exclusion criteri* [tw] OR main outcome measures [tw] OR standard of care [tw] OR standards of care [tw]) AND (survey [tiab] OR surveys [tiab] OR overview* [tw] OR review [tiab] OR reviews [tiab] OR search* [tw] OR handsearch [tw] OR analysis [ti] OR critique [tiab] OR appraisal [tw] OR (reduction [tw] AND (risk [mh] OR risk [tw]) AND (death OR recurrence))) AND (literature [tiab] OR articles [tiab] OR publications [tiab] OR publication [tiab] OR bibliography [tiab] OR bibliographies [tiab] OR published [tiab] OR pooled data [tw] OR unpublished [tw] OR citation [tw] OR citations [tw] OR database [tiab] OR internet [tiab] OR textbooks [tiab] OR references [tw] OR scales [tw] OR papers [tw] OR datasets [tw] OR trials [tiab] OR meta-analy* [tw] OR (clinical [tiab] AND studies [tiab]) OR treatment outcome [mh] OR treatment outcome [tw] OR pmcbook)) NOT (letter [pt] OR newspaper article [pt])
- https://www.nlm.nih.gov/bsd/pubmed_subsets/sysreviews_strategy.html
- Last modified Feb 2017

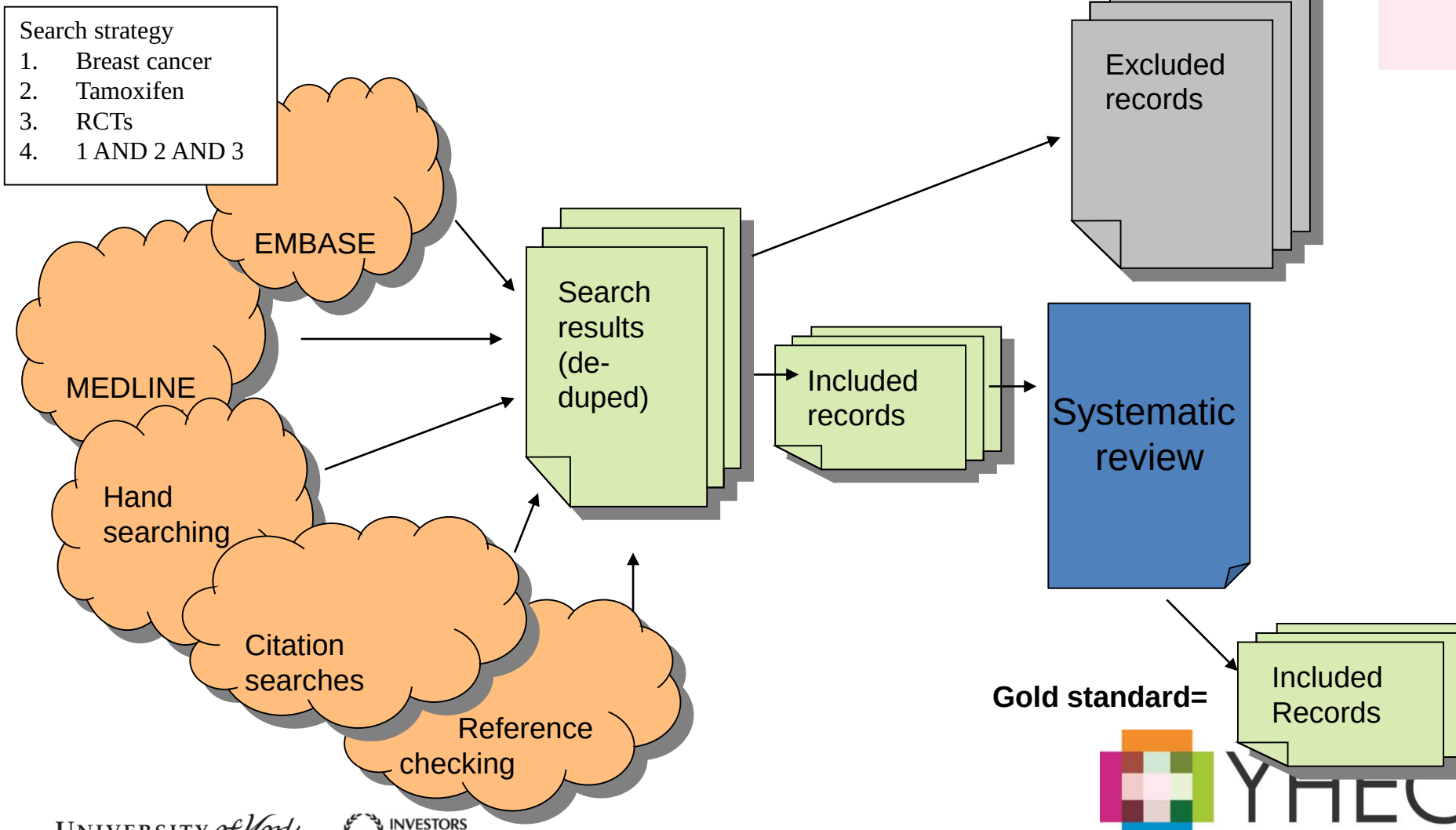
Design: identifying a gold standard, 1

- Gold standards are collections of known relevant records
- Used for
  - developing strategies
  - testing strategies
- Did the authors identify a gold standard?
  - If yes how?
    - Handsearching
    - Relative recall
    - Some other method
- Was it large enough?
- Are there limitations to the gold standard?

Design: identifying a gold standard, 2

- Handsearching journals
  - Select a number of relevant journals
  - Selection criteria?
  - Cover to cover assessment, online or hard copy
  - Double independent assessment or sample checked by second handsearcher
  - Benefits: High sensitivity
- Handsearching database records
  - Select batch of records
    - Year
    - Topic
    - Journals
  - Handsearch and select most relevant studies
  - Benefits: can reflect prevalence of specific study designs within databases
- Relative recall

Identifying a gold standard using relative recall



Relative recall gold standard

- Makes use of a SR's extensive searching undertaken in several databases and using different methods
- Try to avoid SRs that have used a methods filter within the searches
- Ideally they just have a subject strategy (e.g. tamoxifen and breast cancer)

Design: identifying search terms for the filter

How did the authors identify the individual candidate search terms – one or more of the following?

- Adapt published strategy
- Asked experts for suggestions
- Used a database thesaurus
- Extracted terms from some relevant records
- Extracted terms from the gold standard set of records
- Statistical analysis of terms in gold standard records

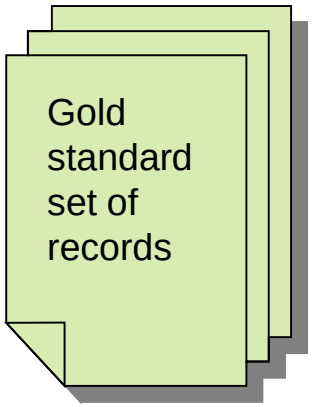
Design: creating strategies

- How did the authors combine the many single terms and phrases to arrive at strategies?
  - Frequency analysis e.g.
    - Most frequently occurring words across records
    - Frequently occurring words within records
    - Cut-offs
  - Terms meeting specific levels of sensitivity/precision
    - Choice of cut-offs
    - Choice of number of terms
  - Analysis of phrases or terms in close proximity
  - How did the authors decide on truncation?
- Were the search terms collected into strategies in ways which seem sensible?
  - Are the concepts combined in a reasonable way

Testing the performance of strategies

- Ideally performance should be tested on more than one set of gold standard records
- First testing is likely to be on a set of records called a test set
  - To make sure that strategy performs reasonably well
  - To identify best performing strategies
- Subsequent testing should be on one or more different set(s) of records – sometimes called a validation set
  - To see if performance holds up
  - Generalisability in similar records
  - Generalisability in different records
  - Generalisability in the real world e.g. MEDLINE Ovid

Testing performance (1)

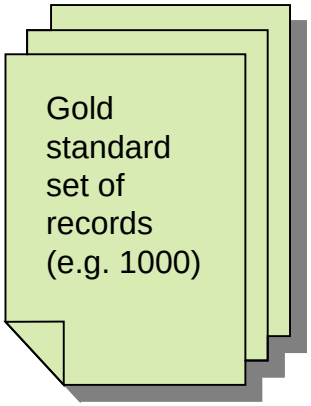


Derive search
filter from gold standard

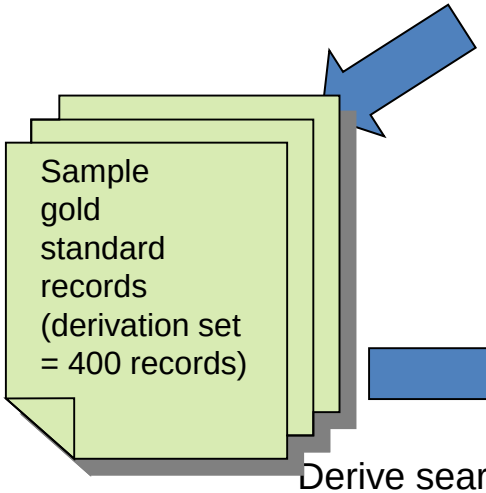
1. meta.ab.
2. synthesis.ab.
3. literature.ab.
4. randomized.hw.
5. published.ab.
6. meta-analysis.pt.
7. extraction.ab.

Test out performance
on gold standard set

Testing performance (2)



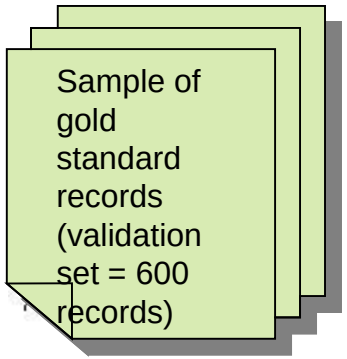
Split gold standard into 2 sets of records



Derive search filter

Test out performance on derivation set

Test out performance on validation set



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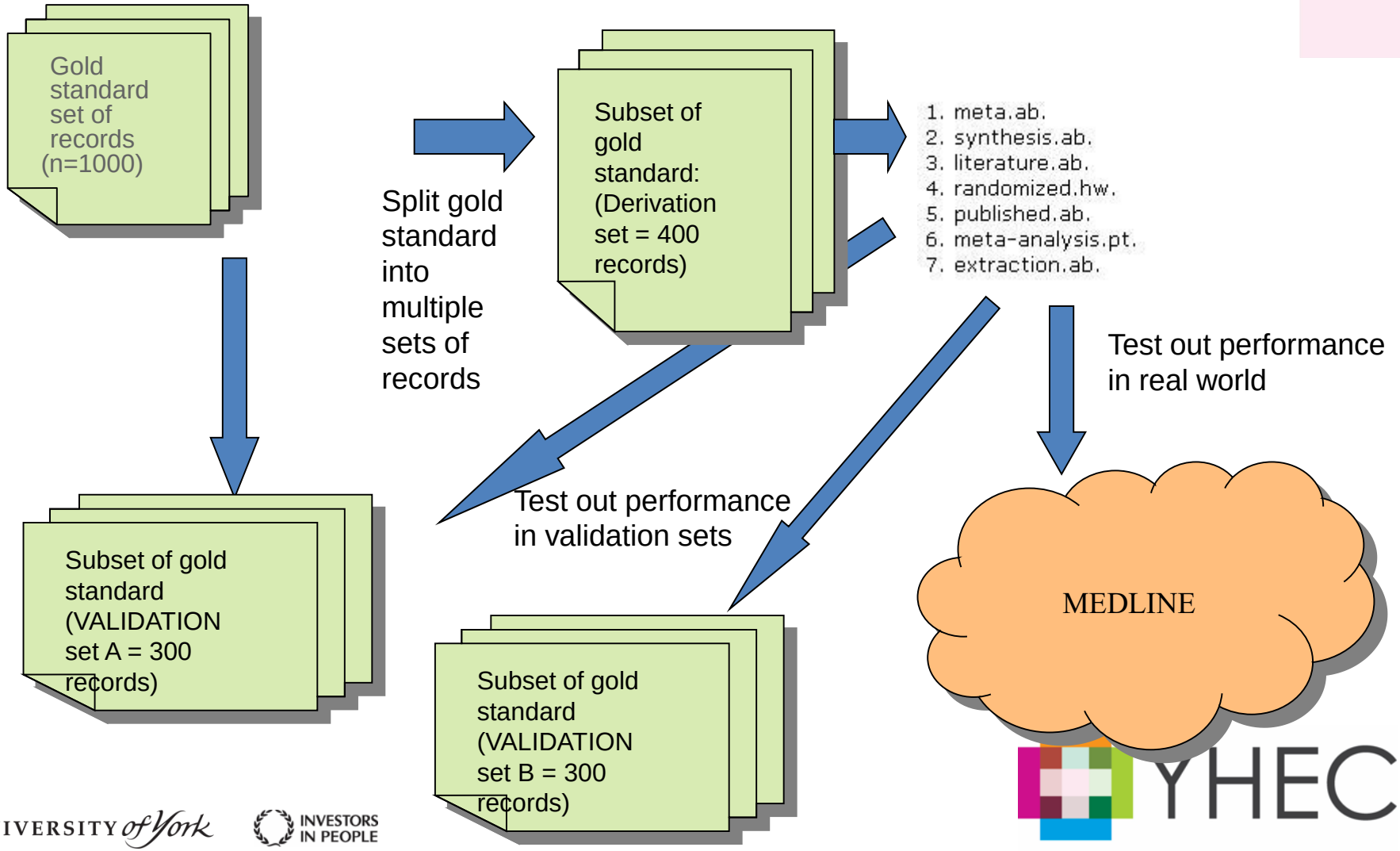
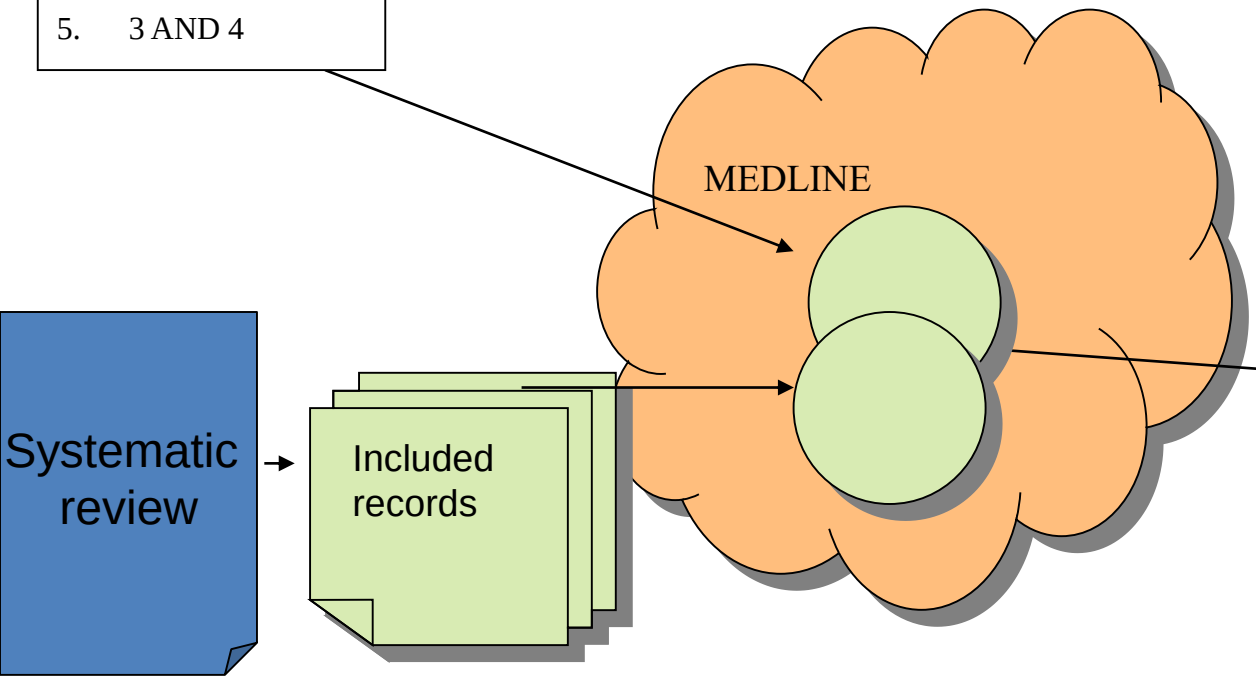
Testing performance (3)



Testing using a relative recall gold standard

Search strategy
1. Breast cancer
2. Tamoxifen
3. 1 AND 2
4. SEARCH FILTER
5. 3 AND 4



Performance measures

- Authors should report how well their filter performs and may offer sensitivity, specificity and/or precision
- Example:
- Gold standard (GS) = 100 records
- Non gold standard records (non-GS) = 900 records
- All records (GS and non-GS) =1000 records

- Search filter X retrieves 90 GS and 600 non-GS records
- Performance measures
  - Sensitivity is 90/100 = 0.9 or may be presented at 90%. This is high sensitivity – which is usually desirable.
  - Precision is 90/690 = 0.13 or 13%. You need to judge whether this suits your resources.
  - Number needed to read = 1/precision = 7.7 records need to be read to find a relevant one
  - Specificity
    - number irrelevant not retrieved/total number of irrelevant records
    - (900-600)/900= 0.33 or 33%

Limitations and comparisons with performance of other filters

- Did the authors discuss any limitations to their research?
- Have the authors compared the performance of their filter(s) to the performance of other relevant published filters?
  - To contextualise the filters
  - To compare performance

Other issues

- Are there:
  - any proofreading errors in the document that impact on reliability or usability of the filter?
  - any significant published errata we should note?
  - any useful information in the pre-publication history and/or correspondence?
  - further data available on a linked site or from the authors?
- Has anyone else assessed the performance of this filter
  - e.g. another paper
  - InterTASC ISSG Search Filter Resource

Other considerations

- Evaluation/appraisal takes time
- What are the relative weights of the different factors in overall evaluation?
  - Bak instrument offers weighting scheme
- Search filters are not quality filters
  - Assessment of the quality of the studies retrieved remains with the reviewer
- Filter adaptations/changes
  - If you adapt or change a filter it probably no longer performs as it did in the author's paper
  - Without specific performance data the adapted filter is just a search strategy
  - So the filter paper cannot be used to justify the choice of the adapted filter in a search unless the adaptations can be well argued

Limitations of filters

- Precision improvements may not be as high as we would like
- Some filters, e.g. DTA filters, just don't perform consistently and well enough to be used in certain contexts such as SRs
- Search filters are major pieces of research and resourcing is often problematic
  - Can date rapidly
  - Resources required hamper updating
- Papers reporting on filters can suffer from poor clarity

Summary

- Identifying filters is relatively easy
- Choosing filters is more challenging because we all have different needs
  - We have to map our topic and focus onto the available filters
- Filter development methods need to be clearly reported to help us with choosing filters
- We have to assess whether the design methods appear to be fit for purpose
- Filter papers need to provide adequate performance data to help us choose between them

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Questions

Thank You

julie.glanville@york.ac.uk

Telephone: +44 1904 324832

Website: www.yhec.co.uk

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http://twitter.com/YHEC1

http://www.linkedin.com/company/york-health-economics-consortium

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