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How information specialists & librarians can contribute to improving systematic review quality & minimise research waste

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Conflicts of Interest

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Reference list

Posted in SYRIL LinkedIn Group

(Systematic Reviews: Information & Literature Retrieval)

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Key themes

- Why SR quality is important
- Why good searching is critical
- Guides & tools
- Errors in search strategies
- KSR analysis of SR searching quality
  - KSR Evidence analysis
  - NICE Single Technology Assessments (STAs)
- Info Specialists improve quality of conduct and reporting of systematic review searches

Why SR quality is important

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"To maximise the benefit to society, you need to not just do research but do it well"

Doug Altman

Features of a good systematic search

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- Minimising bias and errors
- Clearly defined and answerable research question (PICOS?)
- Using systematic and explicit pre-defined methods to identify relevant research
- Rigorous, robust searches that are fit-for-purpose
- Judicious use of filters and limits
- Peer review of search strategies
- Appropriate range of resources
- Reference checking & supplementary/grey sources
- Transparent and reproducible reporting

Features of a good systematic search

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"Like so many things, the principles are indeed simple, but realization that the practice is not so simple arrives gradually"

Doug Altman

Why good searching is critical

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Searching is the foundation of a systematic review

- Most SR processes are undertaken by a team (2 reviewers screening)[1, 2]
- Searching is usually done by one searcher
- Poor searching and errors increase risk of bias (RoB)
- Issues with quality & reporting of SR searches[3-5]
- Librarian involvement in SRs is low: between 6%-55%[6-8]
- Only 19% article search methods written by librarians[7]
- 26% of SR articles were co-authored by librarians
- Involving Info Specialists/Librarians = improving SR quality; better searches & better reporting[3, 6-9]
- Well-reported SRs = ↑likelihood of ↑IF, ↑citations, ↑M-A[10]

Guides & tools for conduct & reporting of SRs

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- CRD Report 4: Guidance for undertaking reviews (2009)[2]
- Cochrane Handbook (2011)[1]
- Cochrane MECIR: conduct & reporting (2012-13)[11,12]
- PRISMA (2009)[13]
- Coming soon: PRISMA-S (Search extension)[14]
- AMSTAR (2007),[15] R-AMSTAR(2010)[16] & AMSTAR-2 (2017)[17]
- PRESS EBC[18, 19]
- ROBIS tool[20, 21]

Errors in search strategies[22, 25]

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Assessments of Cochrane SR Medline search strategies (2006 & 2015)[22, 25] and search methods (2015)[25]

	Sampson (2006)[22] (n=53 strategies)	Franco (2015)[25] (n=70 Cochrane SRs*)
At least one error	**90.5%**	**73%**
Inconsequential errors (no impact on recall)	**60.3%**	NR
Consequential errors (↓ sens/precision)	**82.5%**	**53%**

Evidence-based appraisal tool for search strategy peer review:
PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement (2016)[18, 19]

Errors in search strategies[22, 25]

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Common mistakes (2006)[22]: MeSH, spelling, Boolean, cross-db translation

Common mistakes (2015*)[25]: MeSH, spelling, inadequate limits, missed free-text variants

were error-free!

**Only 59/70 (84%) presented a Medline strategy for assessment!*

Analysis of SR quality: Risk of Bias (RoB)

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- ROBIS Tool, developed by Whiting et al (2016)[20, 21]
- Assesses published SRs based on what they report
- Not a tick-list to get a "quality score"
- Need to use **judgement** & expertise to assess **RISK** of bias
- Key question *"What did they do?"*
- But sometimes only: ***What do they say they did?***
- Can I replicate their review/search based on what they report?
- 4 domains – **Domain 2**: Identification & selection of studies

Whiting P. et al. ROBIS: A new tool to assess risk of bias in systematic reviews was developed. J Clin Epidemiol 2016;69:225-34.

https://tinyurl.com/ROBIS-D2 https://tinyurl.com/ROBIS-Home

KSR analysis of RoB in systematic reviews

- KSR Evidence[30] consists of >73 000 bibliographic SR records
- Subset of SRs are critically appraised using the ROBIS tool
- Analysis of SRs assessed as High RoB in Domain 2 (Searching) as well as overall assessment of high RoB
- Included appraisals already appraised and independently checked by second reviewer
- Information Specialists analysed subset of 312 SRs: assessment informed by ROBIS D2 & PRESS-EBC

(KSR Analysis, 2017-8)[26-29]

Analysis of SR quality: KSR analysis

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- Not all SRs & searches were good quality!
- Of SRs @ high RoB overall, 81% also @ high RoB in D2
- Poor reporting continues to be an issue
- Confusion between individual databases & hosts/suites of databases
- Language limits! Almost 50% restricted to English only
- Other limits: full-text only, excluding conf abstracts, age limits
- 75% of SRs on KSR Evidence had "***systematic review***" or "***meta-analysis***" in the title
- 0.35% had "**systemic review**" in the title

Analysis of SR flaws: common inadequacies

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The following searching flaws were identified in the reported strategies	
No thesaurus terms	30%
Single strategy used for all resources	36%
Lack of synonyms	41%
No variants for UK/US spelling	13%
No searching for singular/plural/ alternative forms of a word	41%

312 SRs analysed
KSR Analysis (2018)[29]

Analysis of SR flaws: conduct & reporting of searches

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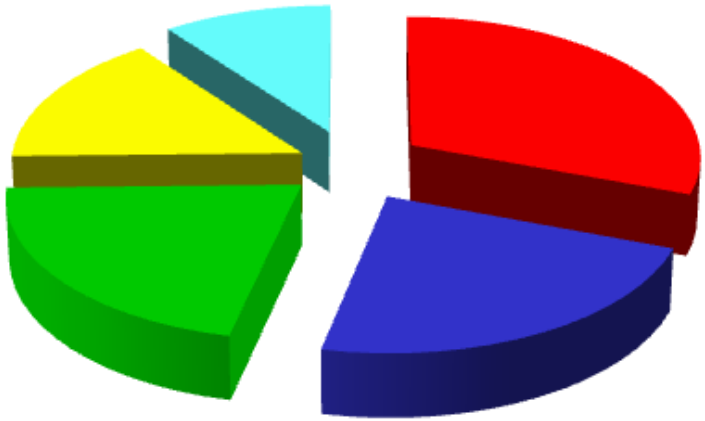

- 240 did not report a full strategy
  - 51 claimed to be PRISMA compliant
- 178 were poorly reported
  - Suite of databases listed as one
  - Hosts listed as databases
  - Portals listed as databases
  - Google / Google Scholar
  - Abstract lists different resources to methods
  - No search date reported
- 166 had inappropriate searching limits
  - Language limits
  - Date limits without explanation
  - Limited to peer-reviewed journals
  - Age filters
  - Published literature only
  - Full text accessibility only
  - Abstracts only
- 118 did not search a sufficient no. of databases
  - 50 only searched one database
- 80 did not include supplementary searches

312 SRs analysed
KSR Analysis (2018)[29]

Analysis of SR flaws: reporting of search methods

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"We conducted a literature search to tell all the studies relevant that contrasted outcomes of *Drug X.*"

"Pubmed and Embase databases were retrieved with no date restrictions"

"A literature review was overdone using the following terms…"

"We interrogated studies from PubMed, Ovid SP, EBSCO and ScienceDirect databases"

"An integrative review was undertaken within PubMed, CINAHL, and EMBASE databases for articles written between 1995 and 2012 and archived under relevant keywords, written in English."

Analysis of flaws: common inadequacies in STAs

- Databases: inappropriate range/selection of resources
- Strategy construction: **too many facets** (?outcomes?)
- Multi-file searches: **incorrect indexing**/filters used across different d/bs in simultaneous search
- Adverse Events (AE) search: application of RCT filters
- Content: **lack of synonyms/truncation**, trade names, CAS numbers
- Subject indexing: **indexing misuse, use of MeSH in Embase,** unwarranted explosion, subheadings
- Limits: overly restrictive limits, **language**, country
- Study design filters: **inappropriate RCT filters in CENTRAL,** filters not referenced

Analysis of KSR Single Technology Assessments (STAs) (Noake, 2017)

Improving SR quality: Info Spec/Librarian input

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Top tips for conducting rigorous & robust SR searches:

- **Structure:** capture Research Qu appropriately
- **Facets:** avoid too many facets (outcomes?)
- **Multi-file searches**
- **Adverse Events searches**
- **Content sensitivity**
- **Subject indexing**
- **Limits**
- **Study design filters**
- **PRESS-check!**

Improving SR quality: Info Spec/Librarian input

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Top tips for reporting rigorous & robust SR searches:

- **YOU!** The searcher should report their own searches
- **Dates:** date span & date of search
- **Databases & hosts**
- **Strategy:** provide at least one electronic strategy (PRISMA)
- **Multi-file searches**
- **Limits**
- Think about the **Title**

Conclusions

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- Poor or flawed search often results in a flawed SR
- SRs are assessed as being at high RoB in D2 for reasons which in some cases could be easily avoided
- Info Specialist involvement increases robustness of methods for searching & whole SR
- Improved searching and reporting would improve academic rigour, and increase the value of the research undertaken
- Common failures in SR searching undermine the overall value of SRs and contribute to unnecessary research waste

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