2018-05

Common Barriers to Replicability and Retrieval in Systematic Review Search Strategies

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https://dx.doi.org/10.7302/7861
https://hdl.handle.net/2027.42/177127

Common Barriers to Replicability and Retrieval in Systematic Review Search Strategies

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Background

The National Academies of SCIENCES ENGINEERING MEDICINE

REPORT AT A GLANCE

Standards for Systematic Reviews

STANDARD 3.1
Conduct a comprehensive systematic search for evidence

- 3.1.1 Work with a librarian or other information specialist trained in performing systematic reviews to plan the search strategy
- 3.1.2 Design the search strategy to address each key research question
- 3.1.3 Use an independent librarian or other information specialist to peer review the search strategy
- 3.1.4 Search bibliographic databases
- 3.1.5 Search citation indexes
- 3.1.6 Search literature cited by eligible studies
- 3.1.7 Update the search at intervals appropriate to the pace of generation of new information for the research question being addressed
- 3.1.8 Search subject-specific databases if other databases are unlikely to provide all relevant evidence
- 3.1.9 Search regional bibliographic databases if other databases are unlikely to provide all relevant evidence

- Rethlefsen ML, Farrell AM, Osterhaus Trzasko LC, Brigham TJ. **Librarian co-authors correlated with higher quality reported search strategies in general internal medicine systematic reviews**. J Clin Epidemiol. 2015 Jun;68(6):617-26. doi: 10.1016/j.jclinepi.2014.11.025.
- Koffel JB. **Use of recommended search strategies in systematic reviews and the impact of librarian involvement: a cross-sectional survey of recent authors.** PLoS One. 2015 May 4;10(5):e0125931. doi: 10.1371/journal.pone.0125931.
- Meert D, Torabi N, Costella J. **Impact of librarians on reporting of the literature searching component of pediatric systematic reviews.** J Med Libr Assoc. 2016 Oct;104(4):267-277.
- Koffel JB, Rethlefsen ML. **Reproducibility of Search Strategies Is Poor in Systematic Reviews Published in High-Impact Pediatrics, Cardiology and Surgery Journals: A Cross-Sectional Study.** PLoS One. 2016 Sep 26;11(9):e0163309. doi: 10.1371/journal.pone.0163309.
- Townsend WA, Anderson PF, Ginier EC, MacEachern MP, Saylor KM, Shipman BL, Smith JE. **A competency framework for librarians involved in systematic reviews.** J Med Libr Assoc. 2017 Jul;105(3):268-275. doi: 10.5195/jmla.2017.189. Epub 2017 Jul 1.

Background

Systematic Reviews: Opportunities for Librarians

- Funded with Federal funds from the National Library of Medicine, National Institutes of Health, Department of Health and Human Services, under Contract HHSN-276-2011-00005-C with the University of Illinois at Chicago.
- Flipped Classroom Model: 2 weeks online asynchronous followed by 2 day in-person
- Data from 4 cohorts of 20-25 each spread over 1 calendar year
- IRB exempt

Our Question

What are the most common barriers to replicability and retrieval that we should target in systematic review instruction?

The Methods

Participants provided with a case scenario:

1. Standardized topic with clear population and intervention concept blocks (based on a published SR with 10 included studies)
2. Researcher requests:
   - Limit search to the last 10 years
   - Limit search to Human studies
   - Particular outcomes of interest
3. Three sentinel articles that fit inclusion criteria (3 of the 10 included studies from the published SR)

The Methods

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The Methods

Assignment Instructions:

"Create a **replicable search** strategy **using PubMed** for the systematic review topic and scenario listed below. **Use the information provided at your discretion** as you formulate your search; for example, if the research team wants to limit to English language studies but you don't feel that's appropriate, you don't need to do so in your search."

Submit: Search Strategy, Number of results

The Methods

Instructors reviewed submitted draft strategies for:

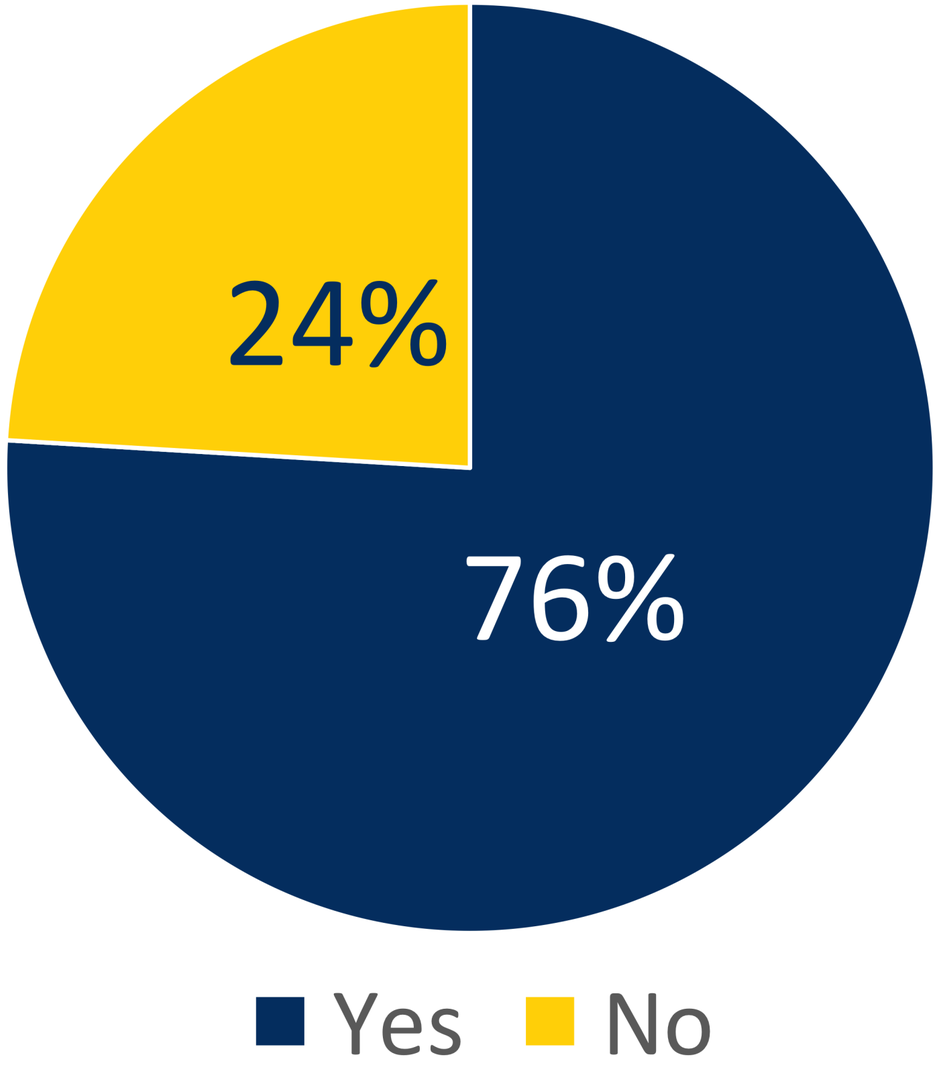
- Replicability
- Application of Limits
- Retrieval of 3 sentinel articles provided
- Retrieval of 10 included studies from published SR
  - PMIDs for identified articles and missed articles

IMPORTANT!

Good to know (aka limitations):

- Searches are DRAFTS; done in 2 weeks
- Results guide in-person discussions
- Cohort search analysis is used as an instructional exercise

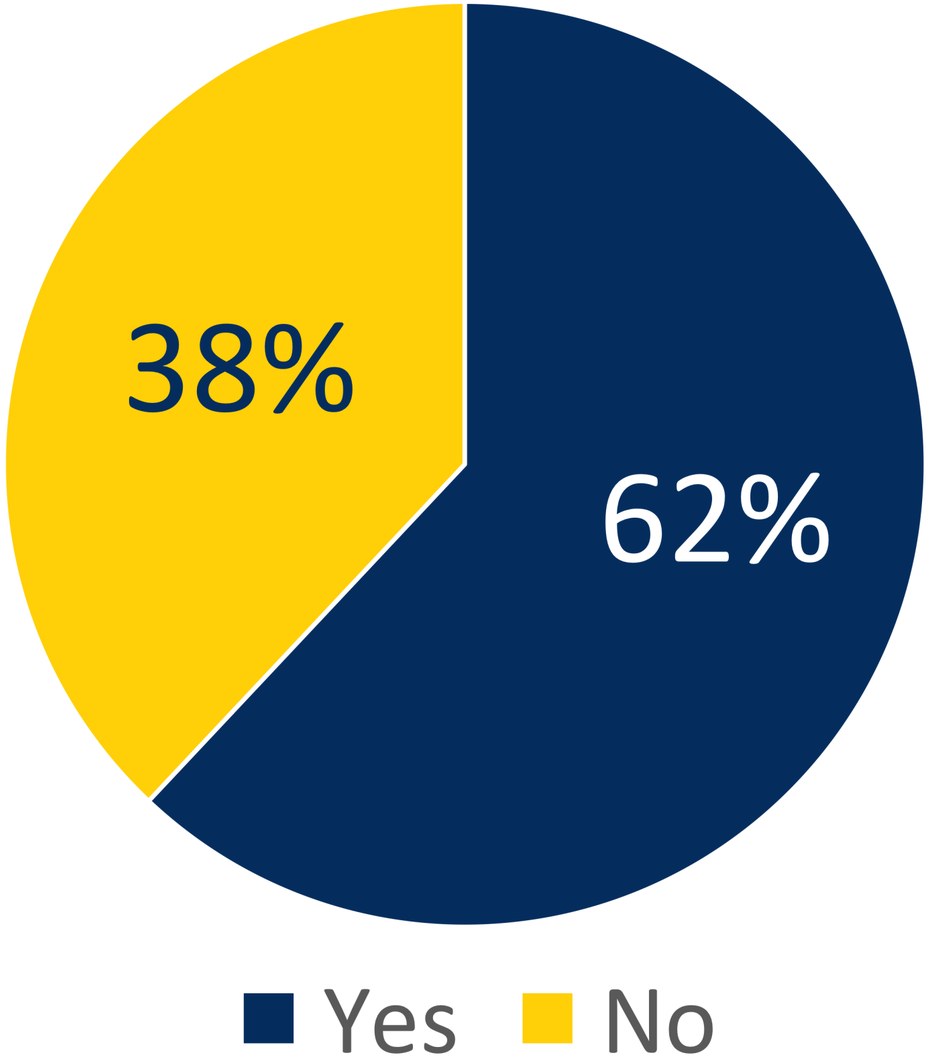
How replicable are strategies?



Replicability

- N= 79
- Difficult to define
- Generous definitions due to draft search status
- Multiple reasons for non-replicable strategies

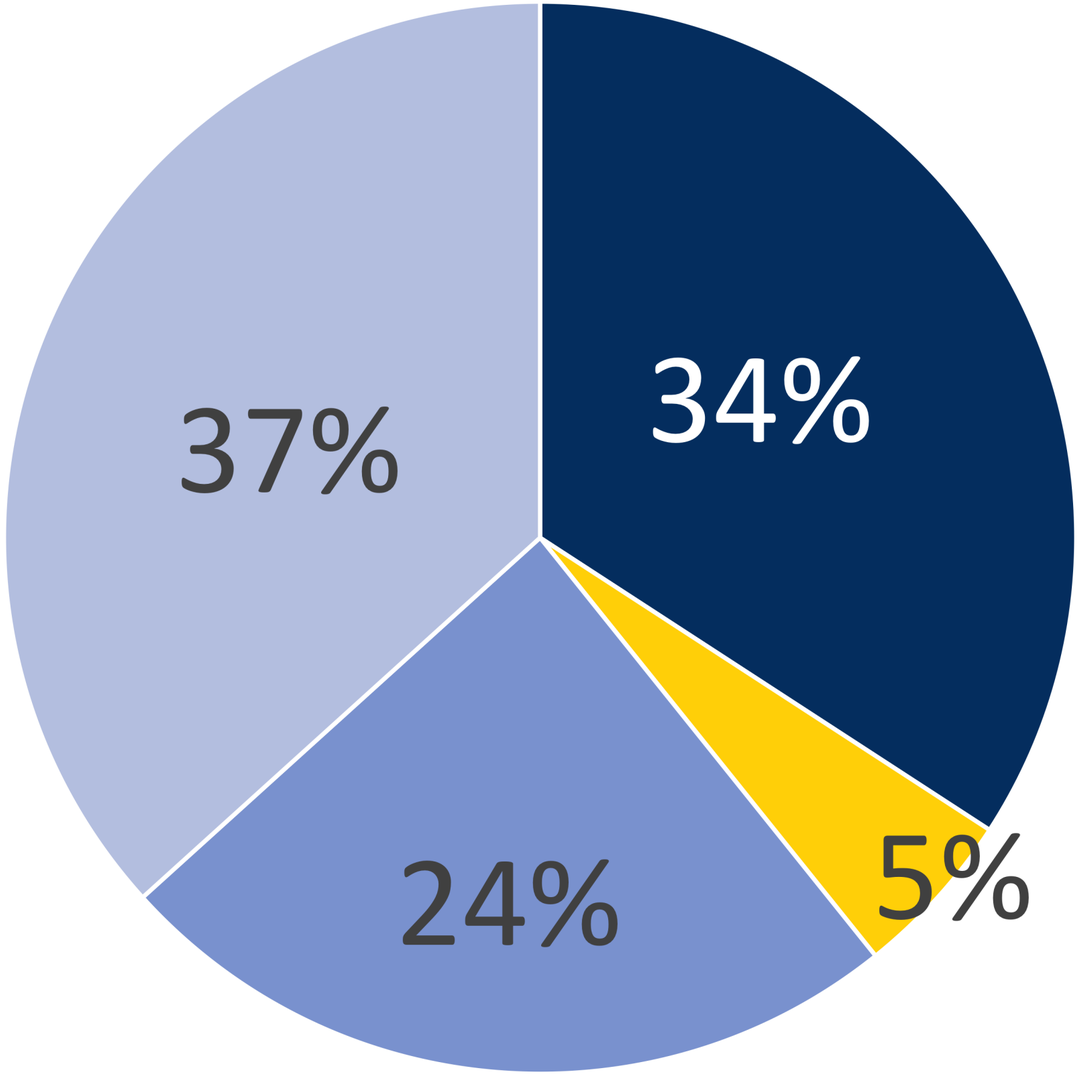
Which limits do searchers apply?



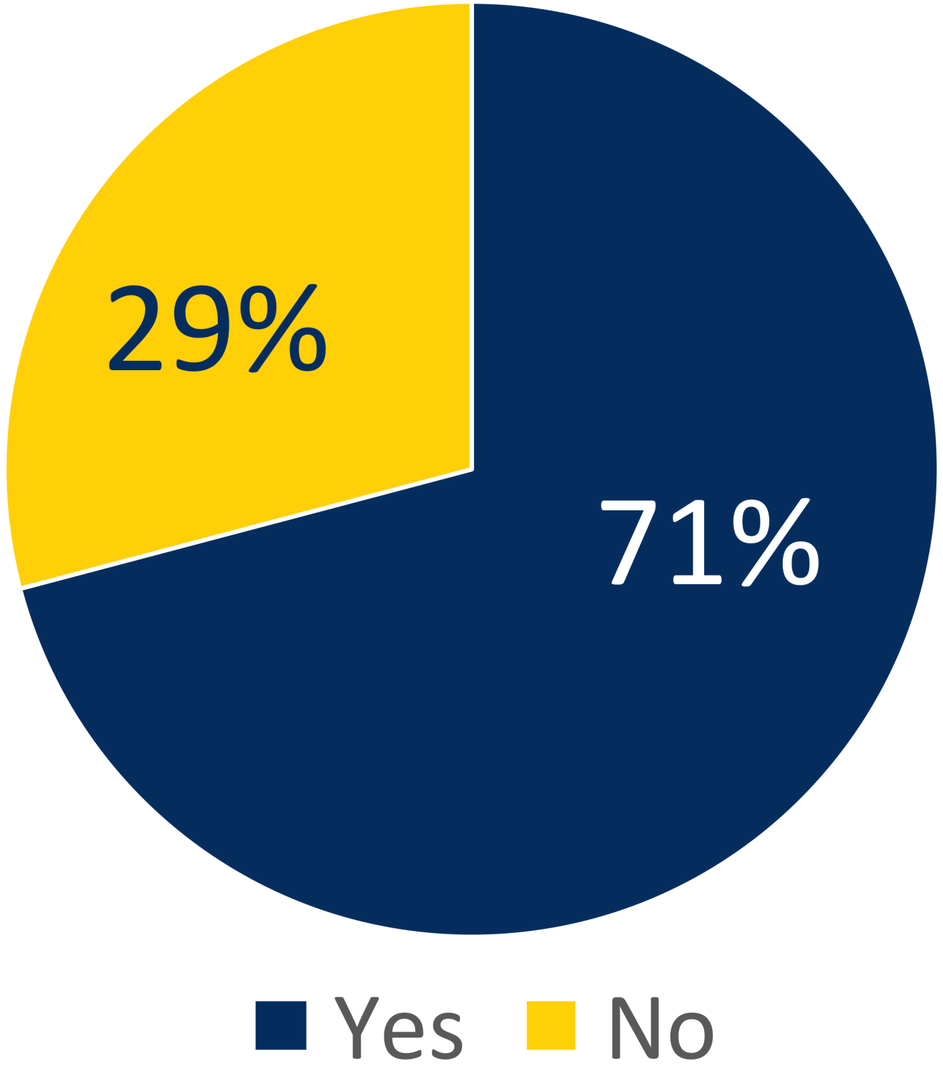
Date limit

- 10 year limit requested by scenario team
- Not required to comply
  - "Last 10 years"
  - Custom Date range
  - Others

Which limits do searchers apply?



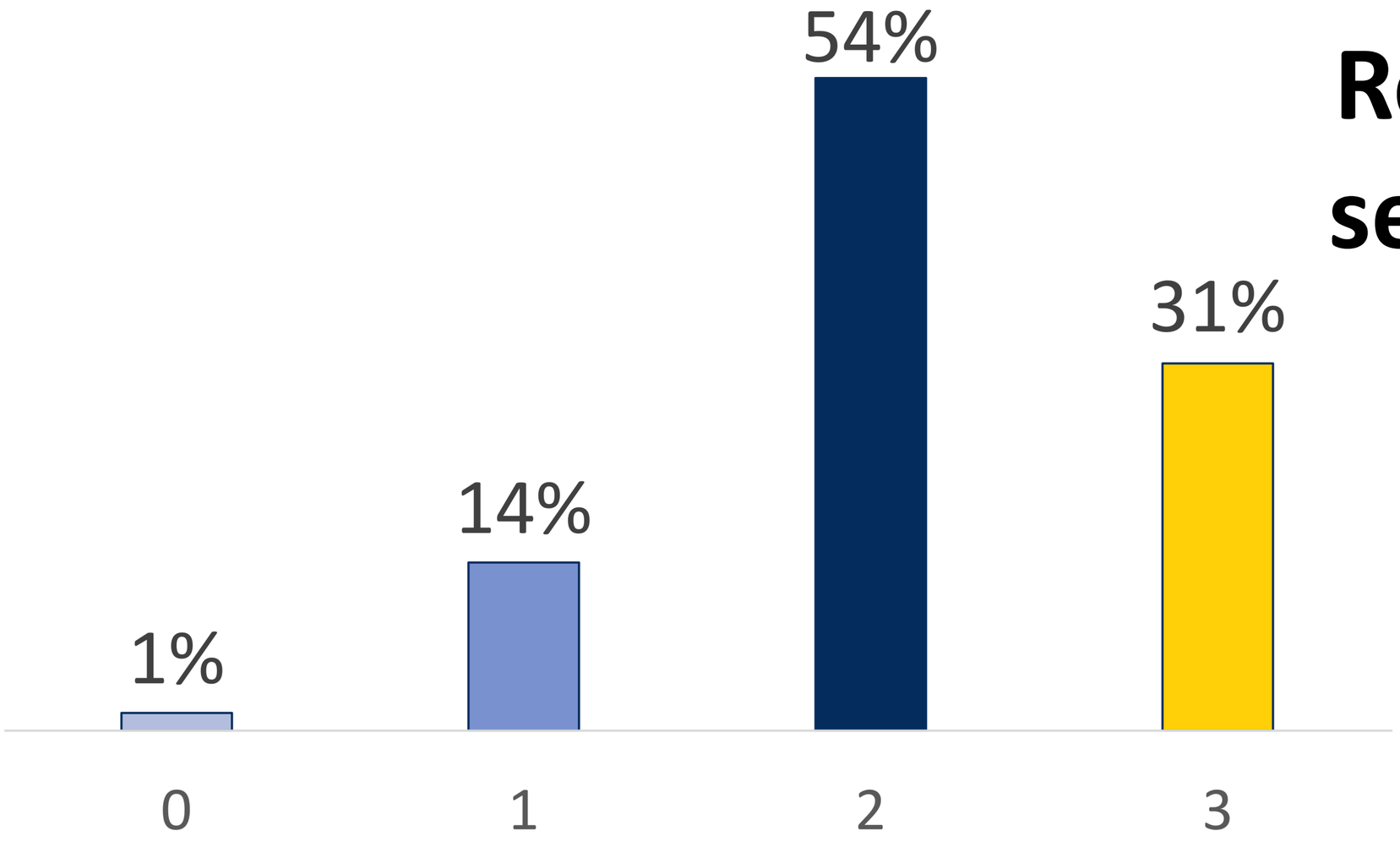
Which limits do searchers apply?



Included outcomes

- Highly topic dependent
- Not all outcomes are reported in the abstract

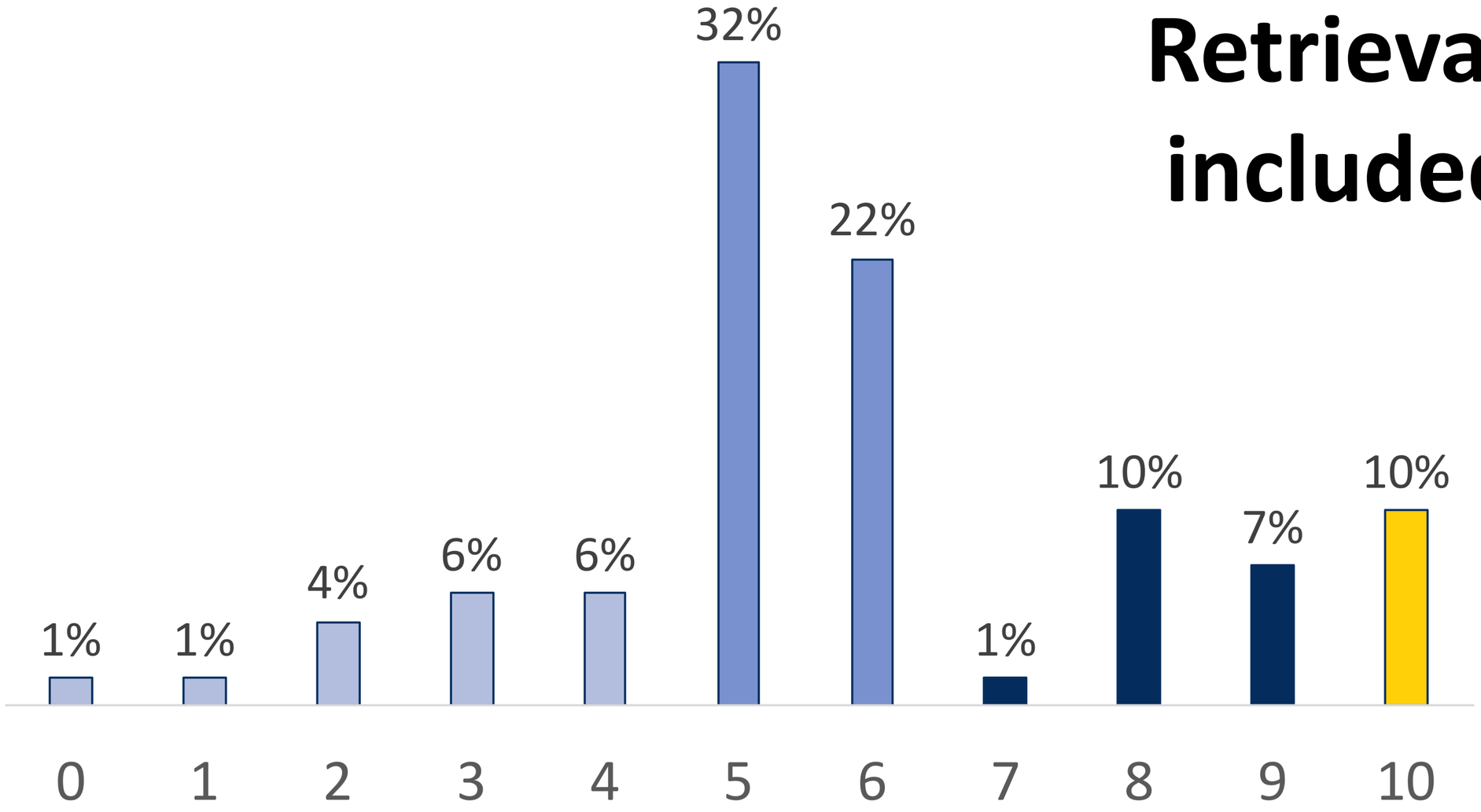
How well are known citation retrieved?



Retrieval of all 3 sentinel articles:

31%

How well are all citations retrieved?



Retrieval of all 10 included studies:

10%

Which papers were most commonly missed?

Missed Citations (PMID)	% Participants
7609106	81%
1773291	78%
2317671	71%
16413349	64%
17850374	50%
24660833	28%
18367097	17%
24989847	13%
24601996	7%
27159369	7%

Why were these papers missed?

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1773291	78%
2317671	71%
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24660833	28%
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24989847	13%
24601996	7%
27159369	7%

Outside of the 10 year date range limit for all cohorts, regardless of limiting technique

Outside of the 10 year date range limit for some cohorts

7609106
Intraoperative blood loss and prognosis in prostate cancer patients undergoing radical retropubic prostatectomy.
Oefelein MG (1995)
To assess more thoroughly the prognostic significance of perioperative transfusions, we examined a previously ignored factor, namely intraoperative blood loss. Univariate and multivariate stepwise regression analysis was performed on results of a 10-year series of 251 consecutive men who underwent radical retropubic prostatectomy for clinically localized carcinoma. Gleason score, operative blood loss and pathological stage were significantly (p < 0.0001) associated wi ratio of 1.08 (95% confidence interval 1.05 to 1.10) was demonstrated for every 100 ml. of operative bloo The operative blood loss but not the type (autologous or allogeneic) of blood transfused was significantly survival after radical retropubic prostatectomy. This finding implies that the operative events necessitating significant than the immunological effects of the transfusion.
Adult Aged
Blood Loss, Surgical*
Disease-Free Survival
Follow-Up Studies
Humans
Male Middle Aged Multivariate Analysis
Postoperative Complications / epidemiology Prognosis Prostatectomy* Prostatic Neoplasms / mortality Prostatic Neoplasms / surgery*
Regression Analysis
Survival Rate

WHAT HAPPENED?

No transfusion MeSH term or “blood transfusion” phrase

- Transfusions[tw]
- Transfusion[tw]
- Transfus*[tw]
- Transfused[tw]
- “Blood loss”[tw]
- “Blood loss, surgical”[mesh]

Table: Yale MeSH Analyzer

1773291
Peri-operative blood transfusion in relation to tumour recurrence and death after surgery for prostatic cancer.
Eickhoff JH (1991)
Several reports have suggested that peri-operative blood transfusion promotes tumour recurrence and death after surgery for cancer. We have studied the effect of transfusion in 156 patients operated on for prostatic cancer. A retrospective review was made of the clinical, histopathological and transfusion data in their hospital records. Sixty patients received blood transfusions and 96 did not. The 5-year prostatic cancer specific survival rate was 0.56 in the transfused patients and 0.69 in the non-transfused group. The transfused patients had a higher prevalence of risk factors than did the non-transfused. When the differences in risk factors were accounted for by Cox regression analysis, peri-operative blood transfusion reduced the prostatic cancer death intensity by 36%. The study does not support the hypothesis that blood transfusion promotes recurrence following surgery for prostatic cancer.
Aged Aged, 80 and over
Blood Transfusion / adverse effects*
Humans
Male Middle Aged
Neoplasm Recurrence, Local* / mortality
Prospective Studies Prostate / surgery Prostatic Neoplasms / mortality* Prostatic Neoplasms / surgery
Retrospective Studies Risk Factors
Surgical Procedures, Operative / mortality Survival Rate

WHAT HAPPENED?

No prostatectomy term (MeSH or keyword)

- Prostate/surgery[mesh]
- Prostatic Neoplasms/surgery[mesh]
- Surgical Procedures, Operative[mesh]
- ”prostatic cancer”[tw] AND surgery[tw]

Table: Yale MeSH Analyzer

PMID	2317671
Title	Blood transfusion and survival following surgery for prostatic carcinoma.
Journal Title	The British journal of surgery
Author Year	McClinton S (1990)
Abstract	Blood transfusion in the perioperative period has been reported to have a detrimental effect on survival in many types of cancer. Other studies have failed to confirm this. We have examined retrospectively the records of 246 patients with prostatic carcinoma who underwent transurethral resection of the prostate (TURP) in Aberdeen Royal Infirmary between 1977 and 1982. Bilateral orchiectomy (BLO) was performed in 193 patients. Of these patients, 71 of 246 (29 per cent) received perioperative blood transfusion. After controlling for differences due to a number of variables, transfusion of non-autologous blood was shown to be associated with a significant negative effect on survival. Perioperative transfusion of non-autologous blood should be avoided in patients with malignancy, unless there are clear overriding clinical indications. Prospective trials are needed urgently.
MeSH Headings	Aged
	Humans
	Intraoperative Period
	Male
	Orchiectomy
	Prostatectomy Prostatic Neoplasms / mortality Prostatic Neoplasms / pathology Prostatic Neoplasms / surgery*
	Retrospective Studies
	Scotland / epidemiology Survival Rate
	Transfusion Reaction*

WHAT HAPPENED?

Survival the only outcome term (MeSH or keyword)

- Specific outcomes of interest to team are not indicated (although survival is related to all of them!)

Table: Yale MeSH Analyzer

Limitations

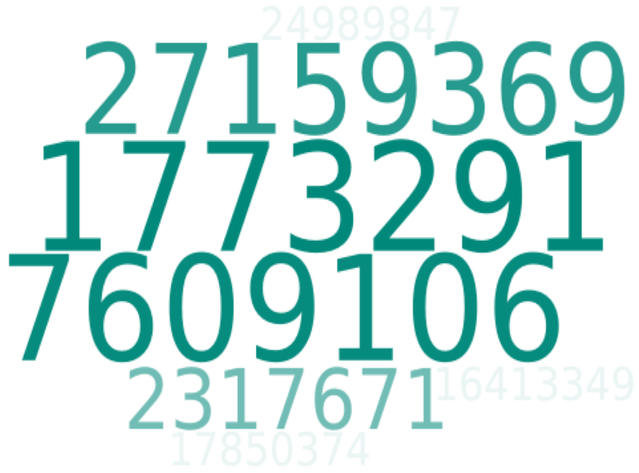
- Draft Searches!
- Required to use PubMed
- At present, don’t have data on experience levels of participants
- Refine definitions of replicable
- Small changes to course over time (additional online instruction in searching, form for assignment submission)
- This is only one topic; limits have very different effects on retrieval for other topics
- Changes in indexing over time affect replicability

Changes in Indexing

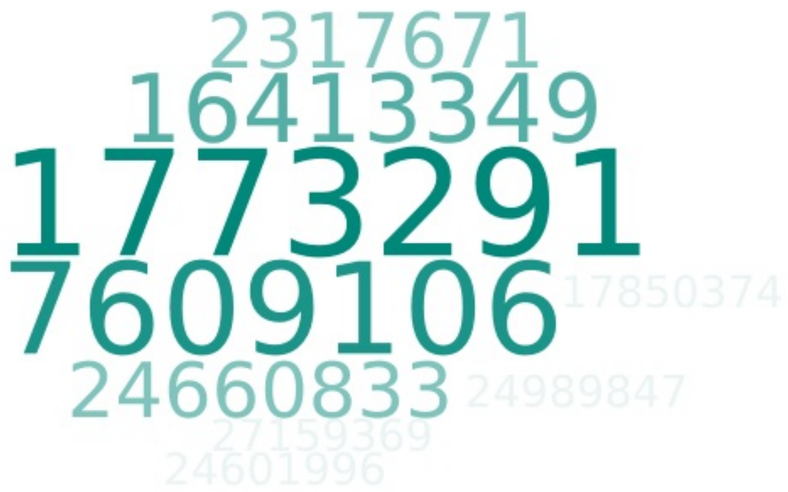
Most frequently missed articles at the time

(after removal of all search limits)

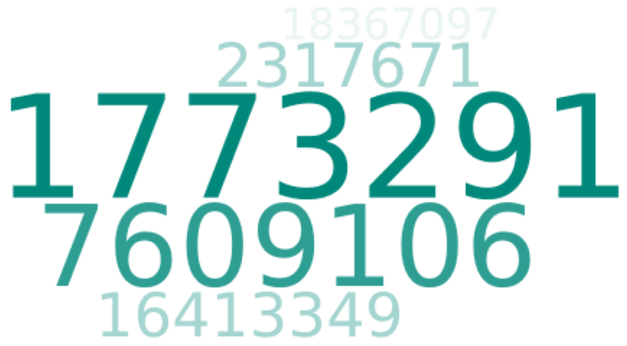
Spring 2017



Fall 2017



Spring 2018



27159369

Perioperative Blood Transfusion as a Significant Predictor of Biochemical Recurrence and Survival after Radical Prostatectomy in Patients with Prostate Cancer.

Kim JK (2016)

There have been conflicting reports regarding the association of perioperative
rates and survival outcomes in prostate cancer. We aimed to evaluate whethe
free survival (BRFS), cancer-specific survival (CSS), and overall survival (OS) fol

From Spring 2017…

A total of 2,713 patients who underwent RP for clinically localized prostate cancer between 1993 and 2014 were retrospectively analyzed. We performed a comparative analysis based on receipt of transfusion (PBT group vs. no-PBT group) and transfusion type (autologous PBT vs. allogeneic PBT). Univariate and multivariate Cox-proportional hazard regression analysis were performed to evaluate variables associated with BRFS, CSS, and OS. The Kaplan-Meier method was used to calculate survival estimates for BRFS, CSS, and OS, and log-rank test was used to conduct comparisons between the groups.

The number of patients who received PBT was 440 (16.5%). Among these patients, 350 (79.5%) received allogeneic transfusion and the other 90 (20.5%) received autologous transfusion. In a multivariate analysis, allogeneic PBT was found to be statistically significant predictors of BRFS, CSS, and OS; conversely, autologous PBT was not. The Kaplan-Meier survival analysis showed significantly decreased 5-year BRFS (79.2% vs. 70.1%, log-rank, p = 0.001), CSS (98.5% vs. 96.7%, log-rank, p = 0.012), and OS (95.5% vs. 90.6%, log-rank, p < 0.001) in the allogeneic PBT group compared to the no-allogeneic PBT group. In the autologous PBT group, however, none of these were statistically significant compared to the no-autologous PBT group.

We found that allogeneic PBT was significantly associated with decreased BRFS, CSS, and OS. This provides further support for the immunomodulation hypothesis for allogeneic PBT.

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WHAT HAPPENED THEN?

- No MeSH terms! Hadn't been indexed yet; keyword only

Changes in Indexing

1773291	
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Aged Aged, 80 and over	
Blood Transfusion / adverse effects*	
Humans	
Male Middle Aged	
Neoplasm Recurrence, Local* / mortality	
Prospective Studies Prostate / surgery Prostatic Neoplasms / mortality* Prostatic Neoplasms / surgery	
Retrospective Studies Risk Factors	
Surgical Procedures, Operative / mortality Survival Rate	

Blood Transfusion/ adverse effects

Spring 2017

PMID	1773291
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MeSH Headings	Aged Aged, 80 and over Humans
	Male Middle Aged
	Neoplasm Recurrence, Local* / mortality
	Prospective Studies Prostate / surgery Prostatic Neoplasms / mortality* Prostatic Neoplasms / surgery
	Retrospective Studies Risk Factors
	Surgical Procedures, Operative / mortality Survival Rate
	Transfusion Reaction*
Author Assigned Keywords	

Transfusion Reaction

Spring 2018

Images: Yale MeSH Analyzer, April 2017 & April 2018

Changes in Indexing

Transfusion Reaction

Complications of BLOOD TRANSFUSION. Included adverse reactions are common allergic and febrile reactions; hemolytic (delayed and acute) reactions; and other non-hemolytic adverse reactions such as infections and adverse immune reactions related to immunocompatibility.
Year introduced: 2015

Previous Indexing:

- Hemolysis (1964-2014)

See Also:

- Blood Safety

All MeSH Categories
Diseases Category
Hemic and Lymphatic Diseases
Hematologic Diseases
Transfusion Reaction
Transfusion-Related Acute Lung Injury

All MeSH Categories
Diseases Category
Immune System Diseases
Transfusion Reaction
Transfusion-Related Acute Lung Injury

Changes in Indexing: Effects

When searches were re-run in May 2018:

22% of participants added citations to their results

8% of participants lost citations from their results

So what does it all mean?

Key areas of educational need:

- Adequate term generation
- Testing searches and peer review
- Best practices for limiting searches
- Talking points with teams
- PRESS yourself before you wreck yourself!

www.cadth.ca/resources/finding-evidence/press

The Future…

- More data, more problems
- Effects of specific limits on retrieval
- PRESS of Capstone draft searches
- Data cleaning and further analysis at RTI

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Judith E Smith, MSLIS