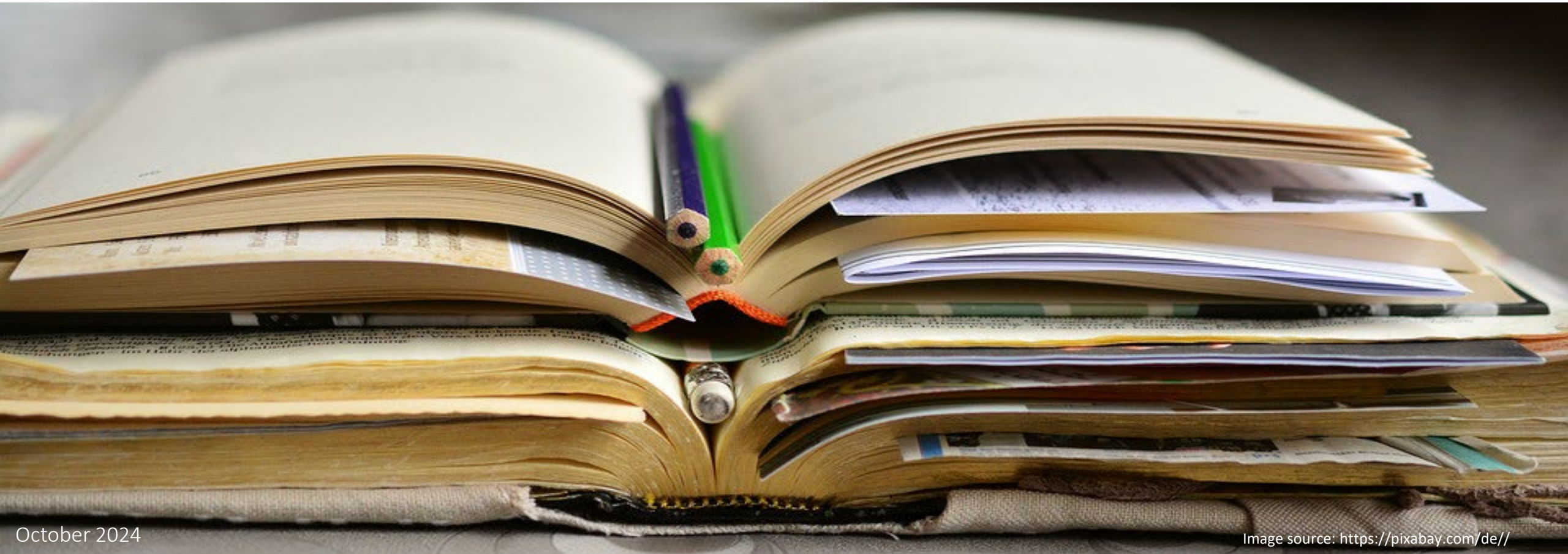


Identifying relevant literature

for Systematic Reviews and Meta-Analyses

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Learning objectives

- Why do I need to search systematically for systematic reviews?
- How do I develop a systematic search strategy?
- Where do I find reliable, up-to-date medical research findings?
- When is a search strategy «good enough»?
- How do I document/report a search strategy?

Systematic Reviews (SRs)

are based on the entire evidence on a topic

How do you find all the evidence?

1. Planned approach:

- Accurate formulation of the research question
- Determining the search terms
- Selection of subject-specific databases

2. Allow enough time

3. Acquire database knowledge



Systematic Review Workflow

Where do Information Specialists provide support?

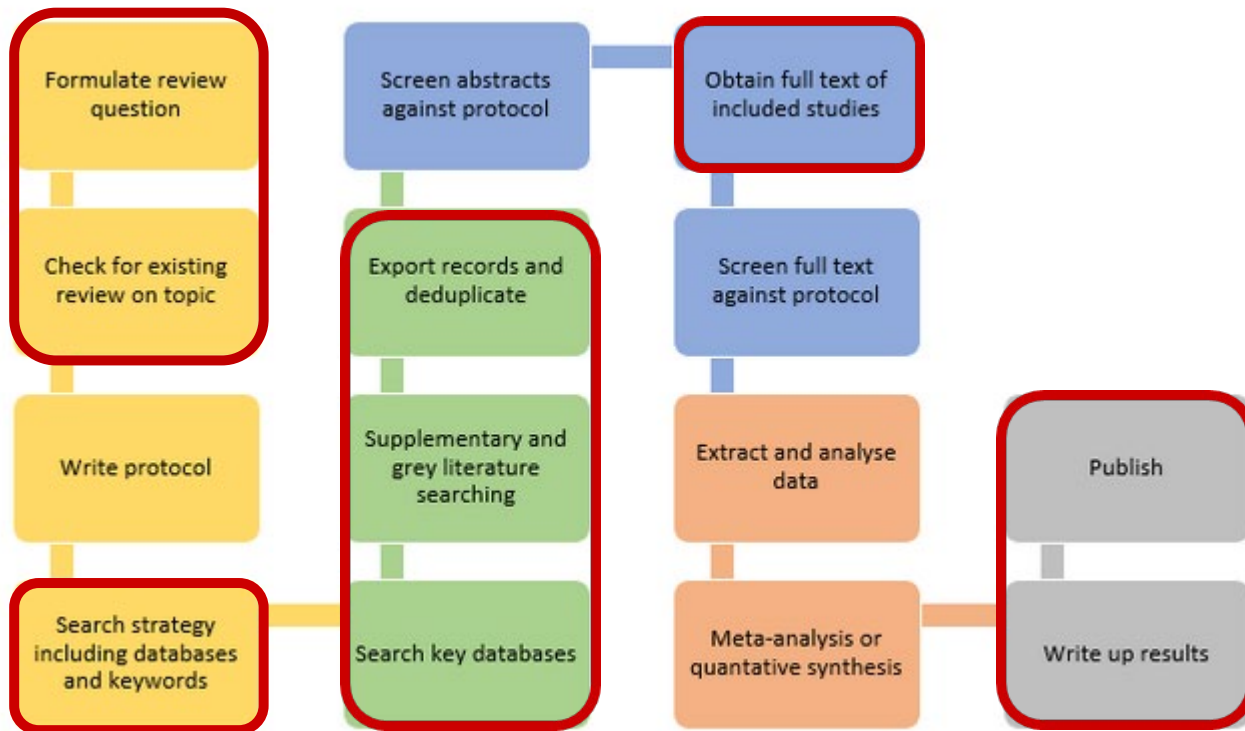


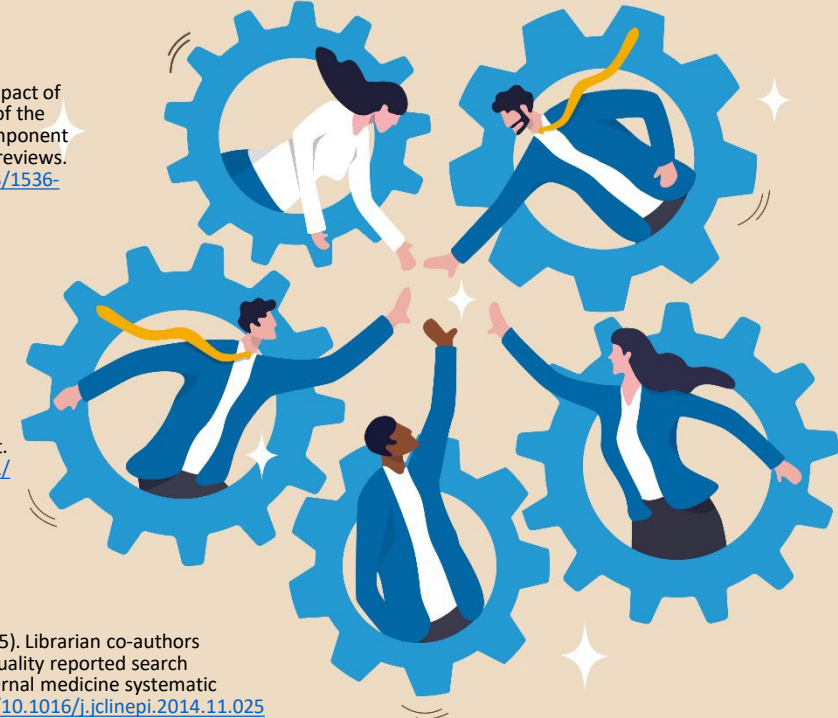
Image source: Monash University (Australia) <https://guides.lib.monash.edu/systematic-review/home>

Librarian involvement **enhances search strategy quality and reporting.**

Meert D et al (2016). Impact of librarians on reporting of the literature searching component of pediatric systematic reviews. <https://doi.org/10.3163/1536-5050.104.4.004>

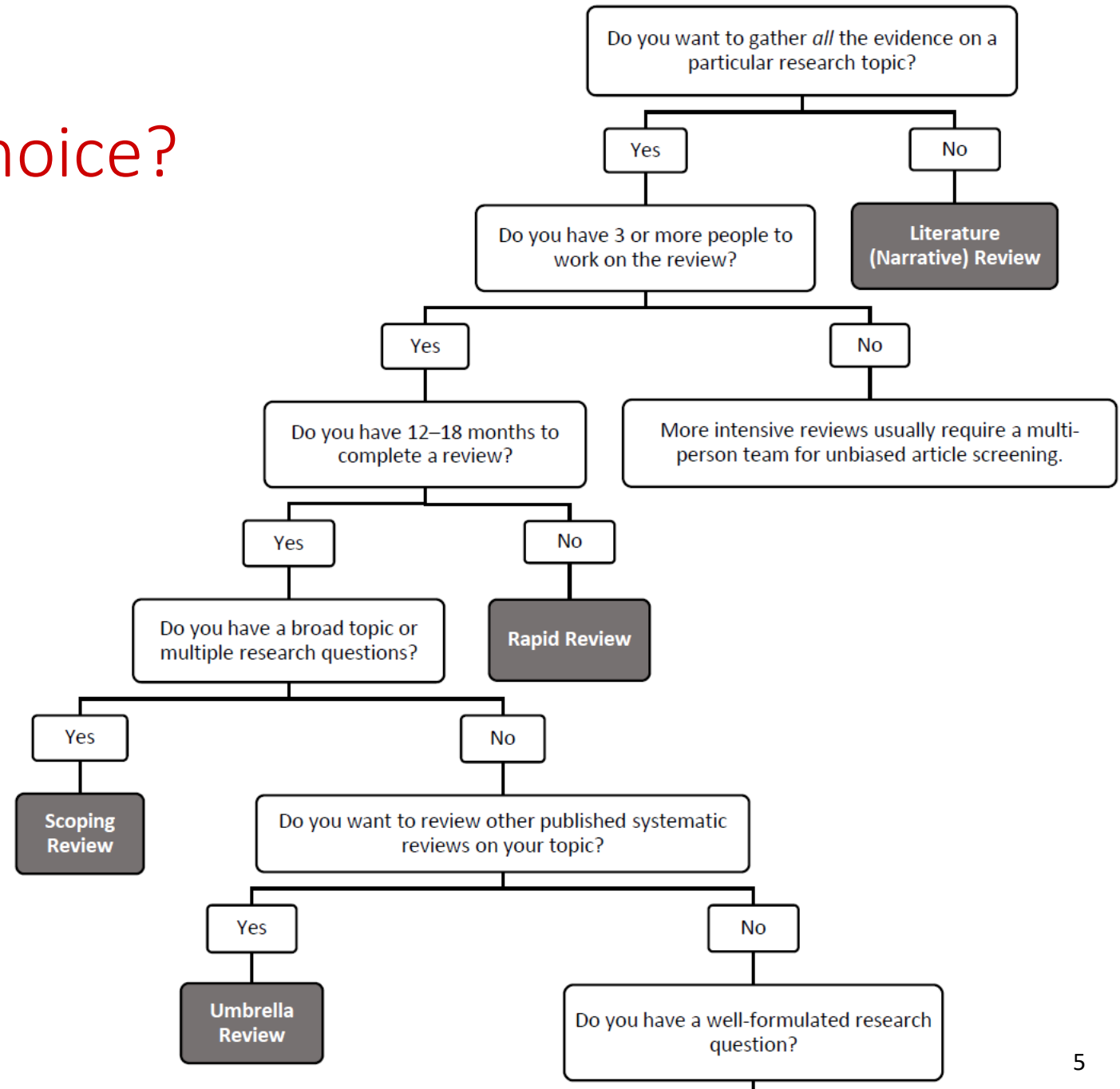
Koffel JB (2015). Use of recommended search strategies in systematic reviews and the impact of librarian involvement. <https://doi.org/10.1371/journal.pone.0125931>

Rethlefsen ML et al (2015). Librarian co-authors correlated with higher quality reported search strategies in general internal medicine systematic reviews. <https://doi.org/10.1016/j.jclinepi.2014.11.025>



Is a SR always the best choice?

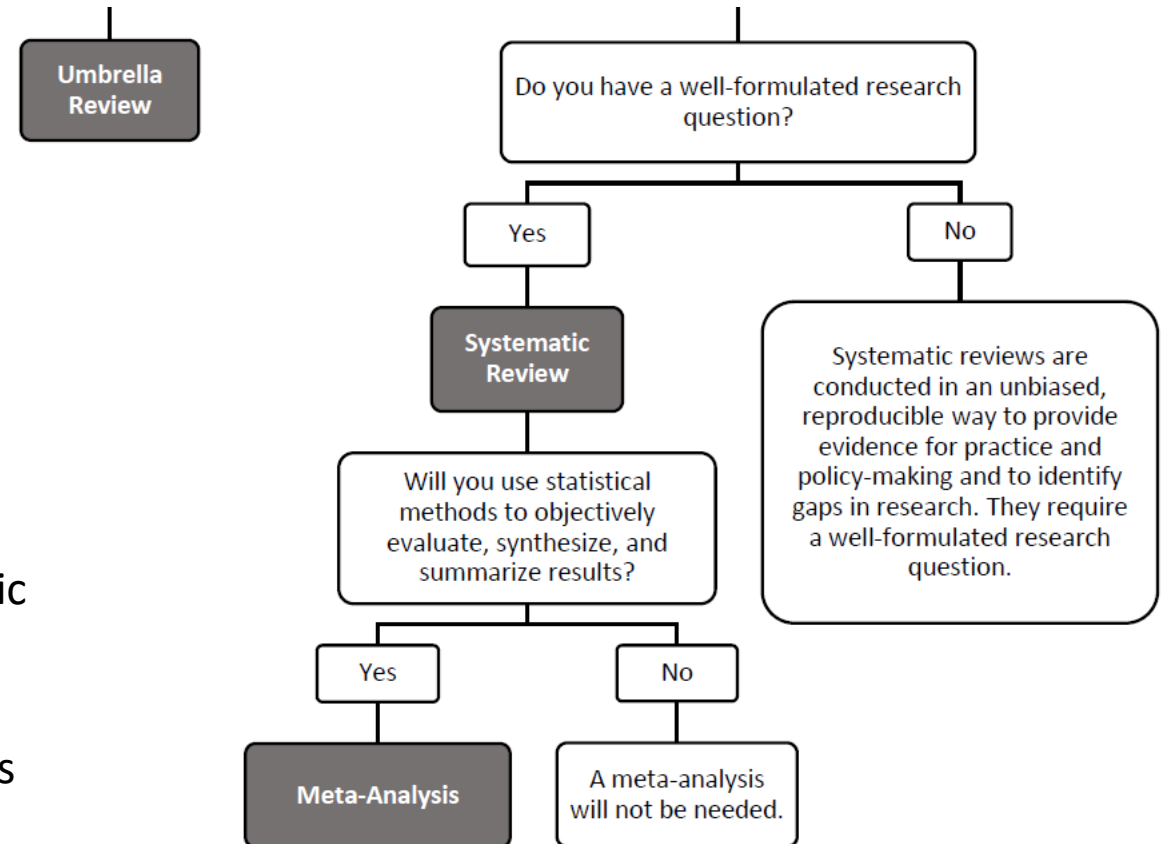
Decision tree

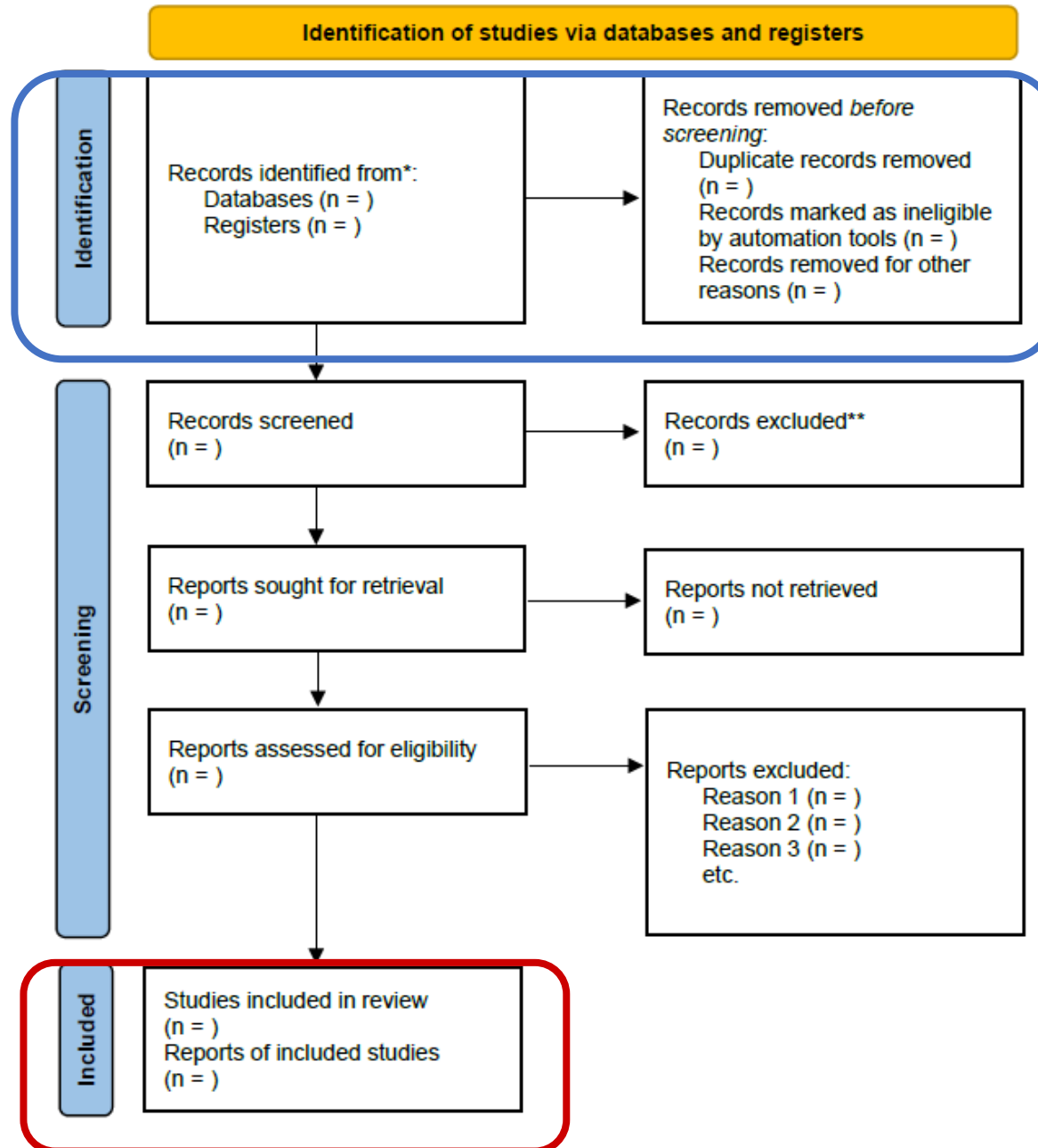
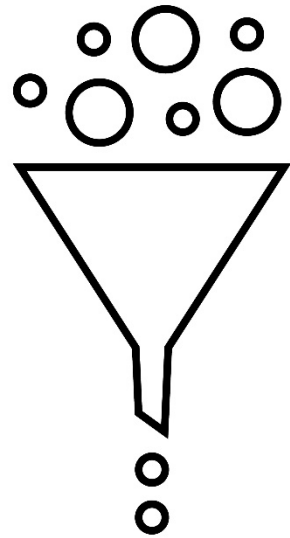


Is a SR always the best choice?

Alternatives:

- Narrative / Literature Review
Evidence, selectively gathered by the authors
- Rapid Review
Focus on speed and timeliness of evidence review
- Scoping Review
Review of a potentially diverse literature on a broad topic
- Umbrella Review
"Review of Reviews" = comparison/evaluation of reviews





New research findings are based on

the papers found with the search strategies.

If important papers were not identified, the results will be different or biased!

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71



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Research question

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Databases

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Key Papers

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terms

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Concepts Sheet

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Quality control

11
Translation
database syntax



12
Export /
Deduplicati
on

13
Document-
ation

14
Reporting



Identifying relevant studies in (huge) databases

Example of a complex search strategy

PubMed

```
((("Diabetes Mellitus, Type 1"[Mesh]) OR (type 1 diabet*[Title/Abstract] OR type I diabet*[Title/Abstract] OR diabetes mellitus type 1[Title/Abstract] OR diabetes mellitus type I[Title/Abstract] OR T1D[Title/Abstract] OR T1DM[Title/Abstract] OR insulin-dependent diabet*[Title/Abstract] OR juvenile-onset diabet*[Title/Abstract] OR sudden-onset diabet*[Title/Abstract] OR IDDM[Title/Abstract] OR autoimmune diabet*[Title/Abstract] OR brittle diabet*[Title/Abstract] OR ketosis-prone diabet*[Title/Abstract])) AND (("Adolescent"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh]) OR (child*[Title/Abstract] OR infan*[Title/Abstract] OR adolescen*[Title/Abstract] OR newborn*[Title/Abstract] OR preschool*[Title/Abstract] OR pre-school*[Title/Abstract] OR teen*[Title/Abstract] OR pediatric*[Title/Abstract] OR paediatric*[Title/Abstract])) AND (("Insulin Infusion Systems"[Mesh]) OR (insulin pump*[Title/Abstract] OR insulin infus*[Title/Abstract] OR insulin deliver*[Title/Abstract] OR CSII[Title/Abstract]))) AND ((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR clinical trials as topic[mesh:noexp] OR randomly[tiab] OR trial[ti] NOT (animals[mh] NOT humans [mh])))
```


Timeline of a SR, with focus on literature search

Time span (months)

Background

Study other reviews

Specify question

Preliminary search

Protocol

Search

Appraisal

Data extraction

Synthesis

Report

	1	2	3	4	5	6	7	8	9	10	11	12
S = Start E = End												
	S	E										
	S	E										
	S	E										
		S	E									
			S	-	-	E						
					S	-	E					
							S	E				
									S	E		
										S	-	E

Search strategy setup incl. translation into all databases and subsequent adaptations.
(calculate up to 60h!)

Practical example of a research question

01
Research question

Insulin pump therapy
will make your child's and
your life much easier.



Compared to giving
the injections, everything else
will be better, I'm sure.

TRUE? What is the evidence?

Situation / Clinical Question

Acquire background knowledge

Type 1 diabetes, an autoimmune condition in which the pancreas no longer produces the hormone insulin, which is necessary to convert glucose into energy. The therapy is to administer appropriate doses of insulin to keep the sugar levels within a normal range. This can be done by injecting the insulin several times a day, or by carrying a pump that delivers the insulin.

„In children with type 1 diabetes, does insulin pump therapy produce normoglycemia and improve the quality of life (in comparison with daily insulin injections)?“



Check for other (planned / registered) SRs

PROSPERO

International Prospective Register of Systematic Reviews

<https://www.crd.york.ac.uk/prospero>

Cochrane Library

<https://www.cochranelibrary.com>

(Health Care and Clinical Interventions)

Campbell Collaboration

<https://www.campbellcollaboration.org>

(Social Interventions)



Click to **show your search history and hide search results**. Open the **Filters** panel to find records with specific characteristics (e.g. all reviews about cancer or all diagnostic reviews etc). See our **Guide to Searching** for more details.

Click to **hide the standard search and use the Covid-19 filters**.

✕
Go
MeSH
Clear filters
Show filters

First
Previous
Next
Last
(page 1 of 1)

48 records found for **insulin pump AND children**

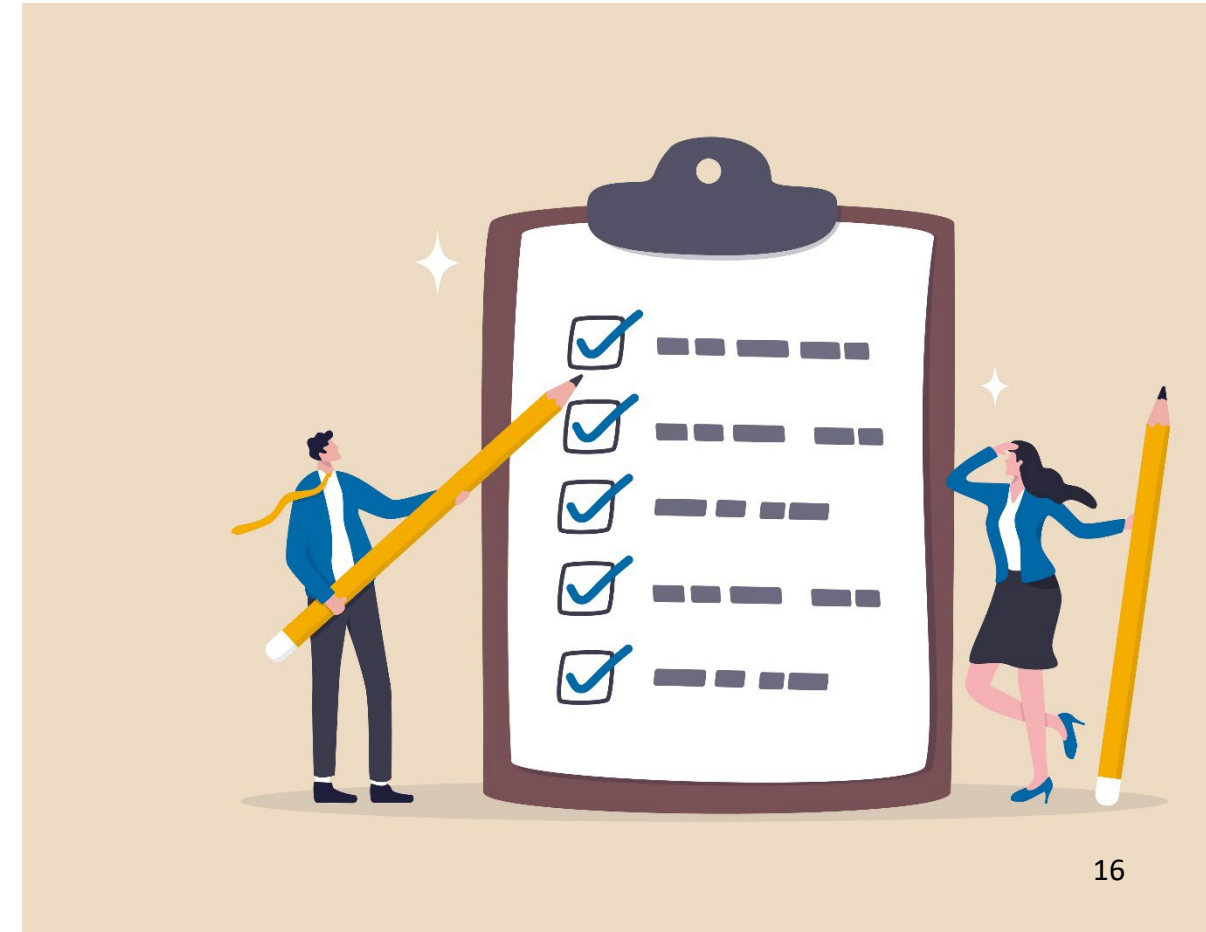
Show checked records only | Export

<input type="checkbox"/>	Registered	Title	Type	Review status
<input type="checkbox"/>	09/08/2024	Efficacy and safety of insulin pump therapy vs. multiple daily injection therapy in children with type 1 diabetes: a systematic review and meta analysis [CRD42024574618]		Review Ongoing
<input type="checkbox"/>	08/07/2024	Disparities in the Use of Diabetes Technology in the United States: A Systematic Review and Meta-Analysis [CRD42024563149]		Review Ongoing
<input type="checkbox"/>	25/06/2024	Comparative Efficacy of Closed Loop Systems versus Sensor-Augmented Pump Therapy in Type 1 Diabetes Management: An Updated Systematic Review and Meta-Analysis [CRD42024558084]		Review Ongoing
<input type="checkbox"/>	16/06/2024	Is carbohydrate counting effective in reducing glycated hemoglobin in children and adolescents with type 1 diabetes mellitus? [CRD42024555183]		Review Ongoing
<input type="checkbox"/>	28/03/2024	Effectiveness and Safety of Automated Insulin Delivery in Real-World: A Systematic Review and Meta-analysis [CRD42024525581]		Review Completed published

Protocol development

Relevant points for the literature search

- **Aim and type of review**
- **Exact research question**
- **Details of the search strategy**
(provisional version)
- **Selection of databases**
(incl. trial registries)
- **Inclusion/exclusion criteria**



Databases

Where can I find reliable studies?

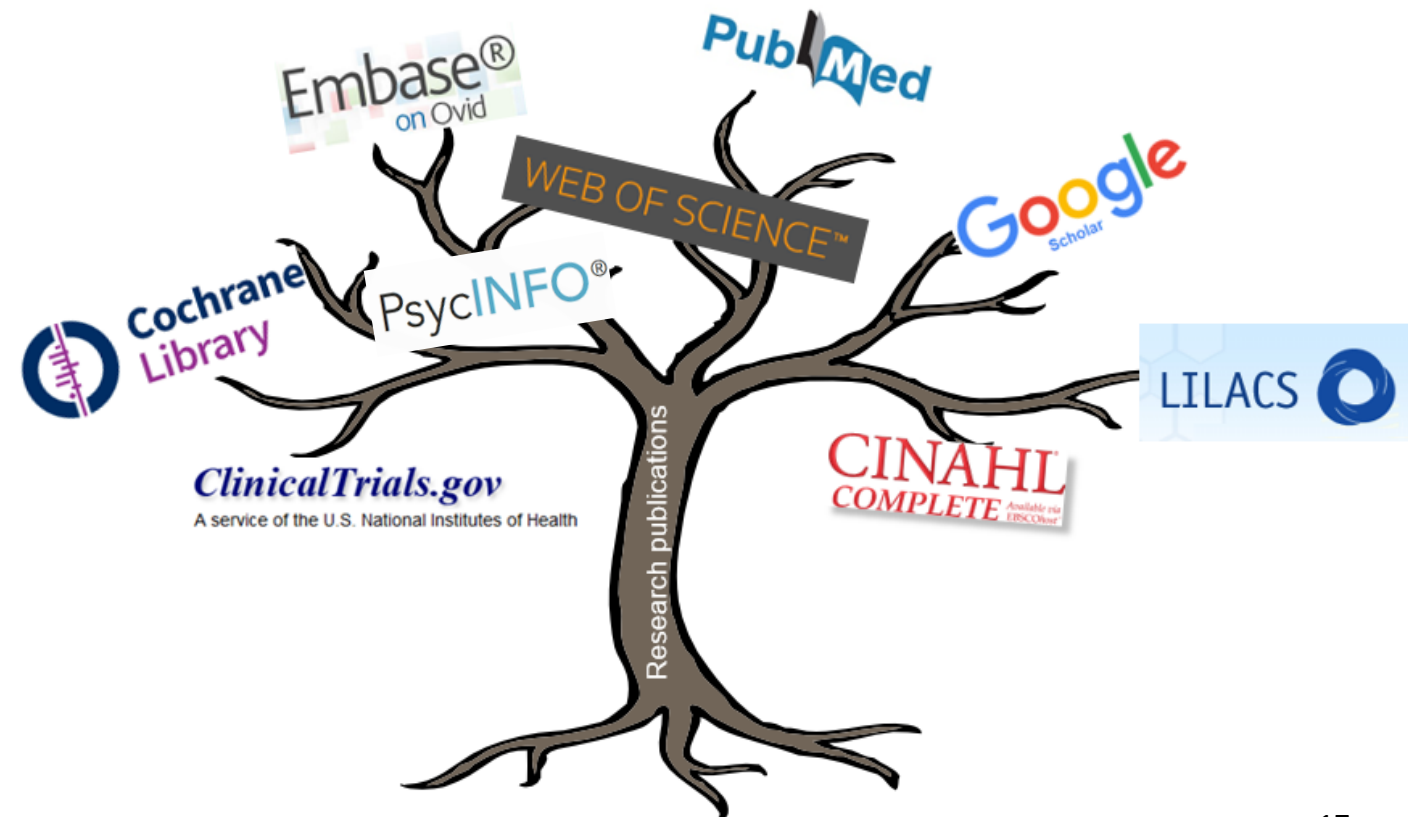
02
Databases

Published research (in professional journals):
Subject databases (medical, psychological, etc.)
(Medline, Embase, CINAHL, PsycInfo, LILACS, etc.)

Ongoing research
Clinical Trials Registries (ClinicalTrials.gov, WHO ICTRP)

Grey literature
E.g. conference papers, doctoral theses (Google,
Google Scholar, Web of Science, institutional /
company websites)

Non-published research
Direct contact with experts or research leaders,
sponsors of the studies (pharmaceutical companies)



Medical databases vs. Search engines

Where can I find reliable studies?

- Depending on the content and scope of the database **professionally appropriate and covering the subject area.**



- Documents of **high quality. Mostly peer-reviewed journals**, therefore hits from databases are usually **trustworthy.**
- **Conclusion: Indispensable** for systematic review searching in which all central and important documents are to be completely & comprehensively referenced!

- Search engines record many billions of documents, but most of the content is irrelevant (the most relevant are listed at the top).



- Documents are very **heterogeneous in terms of content, structure and quality.**
- Uncertainty regarding completeness and quality of results (no quality control).
- **Conclusion: Suitable** for systematic searches as a **preliminary search (scoping search) or as a supplement to the specialized databases.**

The two largest medical databases



- Produced in the USA
- 1966 to present (OldMedline 1946-65)
- More than 37 million records (incl 4 million PubMed-NOT-Medline records);
> 5200 journals
- Thesaurus: MeSH (over 28'000 terms)
- Overlap approx. 34%
(topics 10% to 75%)

- Produced in Europe
- 1974 to present (Embase Classic 1947-73)
- Over 45 million records (incl. Medline); 8450 journals (> 3000 not covered in Medline)
- Thesaurus: EMTREE (> 99'000 terms)
- Comprehensive inclusion of drug related and medical device information
- Includes also conference abstracts

Sources: https://www.nlm.nih.gov/medline/medline_overview.html

<https://www.elsevier.com/solutions/embase-biomedical-research/embase-coverage-and-content>

Other databases

The Cochrane Library

<https://www.cochranelibrary.com/>

Trials = Cochrane Central Register of Controlled Trials (CENTRAL).

Most comprehensive database for finding randomized controlled trials (RCTs). **Sources: Medline, Embase, ClinicalTrials.gov,** and via "handsearching" in printed journals.

Cochrane Reviews = Cochrane Database of Systematic Reviews

These are also included in Medline.

Access provided by: Universitaetsbibliothek Bern | Review language : English | Website language : English | Sign In

Cochrane Library Trusted evidence. Informed decisions. Better health.

Title Abstract Keyword

Cochrane Reviews Clinical Answers

Cochrane Reviews 8 | Cochrane Protocols 0 | **Trials 2564** | Editorials 0 | Special Collections 0 | Clinical Answers 0 | More

Filter your results

Date

Publication date

The last 3 months 0

The last 6 months 0

The last 9 months 0

The last year 1

The last 2 years 1

Custom Range:

to

Status

New search 1

8 Cochrane Reviews matching insulin pump* in Title Abstract Keyword

Did you mean: *plump* | *bump* | *dump*

Cochrane Database of Systematic Reviews
Issue 8 of 12, August 2024

Select all (8) | Export selected citation(s) | Show all previews

Order by Results per page

- Thermal stability and storage of human insulin**
Bernd Richter, Brenda Bongaerts, Maria-Inti Metzendorf
Prototype Review 6 November 2023
- Continuous subcutaneous insulin infusion versus multiple daily injections of insulin for pregnant women with diabetes**
Diane Farrar, Derek J Tuffnell, Jane West, Helen M West
Intervention Review 7 June 2016 New search Free access

Other sources: Study Registries

NIH National Library of Medicine
National Center for Biotechnology Information

PRS Login

ClinicalTrials.gov

About This Site

Find Studies

Data About Studies

Study Basics

PRS Info

ClinicalTrials.gov is a place to learn about clinical studies from around the world.



The U.S. government does not review or approve the safety and science of all studies listed on this website.

Read our full [disclaimer](#) for details.



<https://trialssearch.who.int/>

Focus Your Search (all filters optional)

Condition or disease ⓘ

Other terms ⓘ



World Health Organization



International Clinical Trials Registry Platform Search Portal

Home Advanced Search List By Search Tips UTN ICTR website REGTRAC Contact us

Example: liver cancer OR breast cancer NOT genetic

Search [Search tips](#)

Restrict to COVID-19

Search for [clinical trials in children](#)

Without Synonyms

Phases are

- All
- Phase 0
- Phase 1
- Phase 2
- Phase 3

With results only

Rare diseases / orphan drugs

Genome editing

<https://clinicaltrials.gov/>

Other sources: Grey literature

Grey Matters

Canadian Agency for Drugs and
Technologies in Health (CADTH):

Grey Matters

<https://greymatters.cadth.ca/>

For Swiss grey literature / data
search Google and Google Scholar.



More sources

Preprint Server (increased popularity since COVID-19)

A preprint is the version of a scientific paper that often appears before the official publication. Attention: Mostly this version is not (yet) peer-reviewed and possibly not yet submitted to a journal or accepted for publication.


- Preprint Archives: [medRxiv](#), [bioRxiv](#), [OSF Preprints](#), etc.
- Open access publishing platforms e.g. [F1000](#) Research

Other sources to search

Google Scholar

Google Scholar combines the ease of Google with access to scholarly materials. Google Scholar searches the Web for scholarly articles, abstracts and books, but not popular magazine, newspaper or Internet articles.

Google Scholar	PubMed (Medline)
+ Algorithm ranks relevance for you	+ More relevant results, sorted by relevance or date
- Textword search	+ Textword and subject heading search
+/- All kind of sources	+ Quality management
- Search results NOT reproducible	+ Search reproducible
+ Searches through fulltext	+/- Searches the record fields (ti, ab, sh)
- Very limited filters	+ Filters for a variety of criteria (age, dates,...)
+ Easy to use	- Needs basic training



Google Scholar is a great place to begin your search but **should not be the only place you search**. Think of it as a resource you can **use in addition** to the medical databases.

Mandatory database combinations to be searched for SR

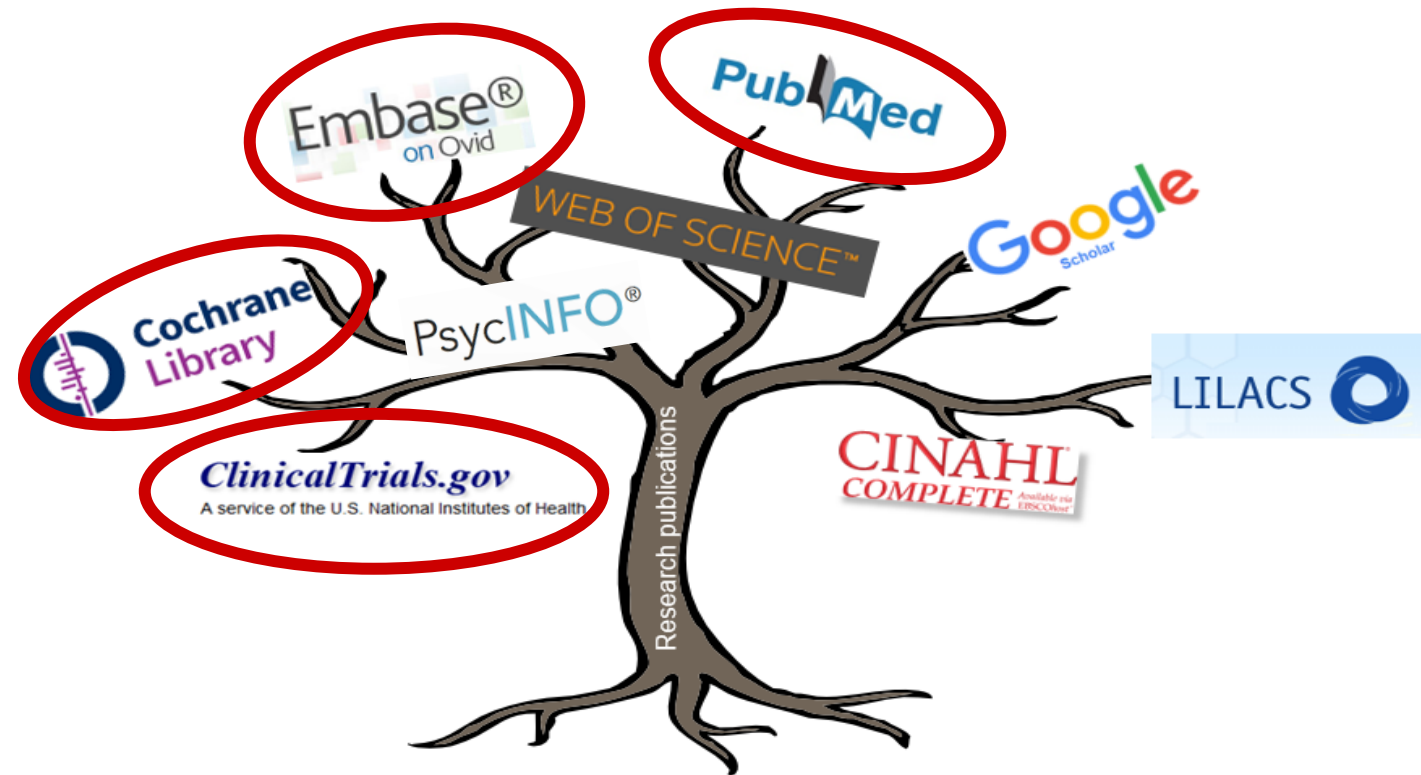
Medline (via PubMed, Ovid, etc.) &
Embase (via Elsevier or Ovid)

If Embase is not accessible:

Medline & Cochrane Library: CENTRAL
(Cochrane Central Register of Controlled Trials)

Additionally: **trials registries**, regional (e.g. **LILACS**) & subject-specific databases (e.g. **CINAHL**, **PsycInfo**), interdisciplinary DB (**WoS**), **Google Scholar**.

At the end: check **references of included studies**



Developing a focused research question

Divide your question into concepts / blocks

03
Block Building /
PICO

P	I	C	O
Population Patient Problem	Intervention Or Exposure	Comparison	Outcome
Who are the patients? What is the problem?	What do we do to them? What are they exposed to?	What do we compare the intervention with?	What happens? What is the outcome?

The formulation of a clear research question is indispensable for a successful systematic review. If it is formulated too narrowly, there may not be enough studies for an evaluation; if it is too broad, there may be a lack of meaningful results.

Auxiliary schemes, e.g. PICO

Splitting of the question into key components / blocks / concepts

Auxiliary Frameworks

How does a question become searchable?

Other auxiliary schemes / frameworks:

- [SPIDER](#) for qualitative evidence syntheses
- [SPICE](#) - for evidence-based practice
Environment (S) = Setting
Population (P) = Perspective or Population
Intervention (I)
Comparison (C)
Evaluation (E)
- [ECLIPSE](#) for Health Policy

Source for more schemes and their applications: [RefHunter](#) (German)

SPICE Acronym

(Booth 2006)

S	Setting – Where? In what context?
P	Perspective – For who?
I	Intervention – What?
C	Comparison – What else?
E	Evaluation – How well? What result?

The Block Building Approach for Public Health questions



Example:

«Urban Governance, Multisectoral Action, and Civic Engagement for Population Health, Wellbeing, and Equity in Urban Settings: A Systematic Review»

Approach: We use the block building approach and divide the question into its main concepts (together with the researcher).

Search strategy (concepts / block building approach)

Concept 1:	Subject Heading (MeSH) OR Textwords [Title/Abstract]	Urban setting, metropolitan areas
AND		
Concept 2:	Subject Heading (MeSH) OR Textwords [Title/Abstract]	Urban governance, Health governance, Civic engagement
AND		
Concept 3:	Subject Heading (MeSH) OR Textwords [Title/Abstract]	Health, Wellbeing, Equity

Block building (concepts) always works!

Medline (Ovid)

Concepts 1-4 were combined using 'AND', limits 5) were combined using 'NOT'

1) Cities, urban settings, metropolitan areas
(exp Cities/ or Urban Population/ or (urban setting* OR urban context* OR city OR cities OR metropolitan area* OR superblock* OR town OR towns OR municipal*).ab,ti,kf)
2) Urban governance, Health governance or civic engagement or multisector action
(Health Policy/ or (((urban or health) adj3 govern*) or ((state* or health* or public or built environment*) adj3 polic*) or "health in all polic*" or "healthy public polic*").ab,ti,kf) OR (Social Participation/ or Community Participation/ or Community Networks/ or (((community or public or citizen or civic or resident* or private or social or political) adj3 (particip* OR empower* OR involv* OR collaborat* OR engagement* OR implement* or partnership*)) or (participatory adj2 (approach* or framework*)) or participatory spaces or ((multisector* or multi-sector* or intersector* or inter-sector*) adj3 (action* or collaborat*)) or social citizenship or stakeholder*).ab,ti,kf)
3) Health, Wellbeing, Equity
(Urban Health/ or Health Equity/ or Healthcare Disparities/ or Health Status Disparities/ or "Social Determinants of Health"/ or Health Status Indicators/ or (wellbeing OR well-being OR health equit* OR urban health* OR quality of life OR community health* OR healthy cit* OR "urban HEART" OR health impact assessment* OR SDG11 OR "SDG 11" OR SDG3 OR "SDG 3" OR sustainable development goal* OR population health* OR residents health* OR healthy life OR healthy lives OR liveabil* OR livabil* OR ((city or cities or settlement*) AND (inclusive or safe or resilient or sustainab*))).ab,ti,kf)
4) (validated) theories, models, tools, instruments
(indicator* OR determinant* OR tool OR tools OR instrument* OR factor OR factors OR intervention* OR definition* OR domain* OR model* OR theor* OR framework* OR concept* OR dimension* OR scor* OR index* OR indices OR scal* OR valid* OR value* OR evaluat* OR evidence OR assess* OR measure* OR metric* OR monitor* OR "Urban HEART").ab,ti,kf)
5) Limits: exclusion of animal studies
not (exp animals/ not humans/)

«Urban Governance, Multisectoral Action, and Civic Engagement for Population Health, Wellbeing, and Equity in Urban Settings: A Systematic Review»

Break down the research question into blocks

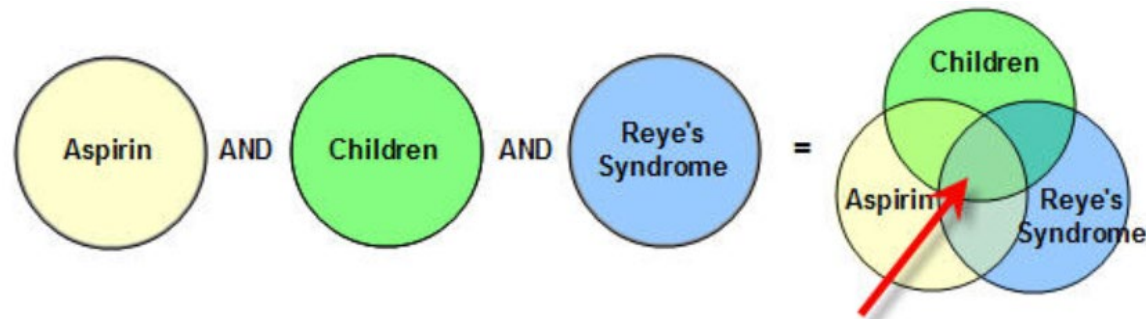
Exercise example with PICO

"In children with type 1 diabetes, does insulin pump therapy produce normoglycemia and improve the quality of life (in comparison with daily insulin injections)?"

<u>P</u>roblem	Diabetes type I
<u>P</u>opulation	Children / adolescents
<u>I</u>ntervention	Insulin pump
Comparison, if any	(compared to daily insulin injection)
<u>O</u>utcome(s)	produces normoglycemia, improves quality of life

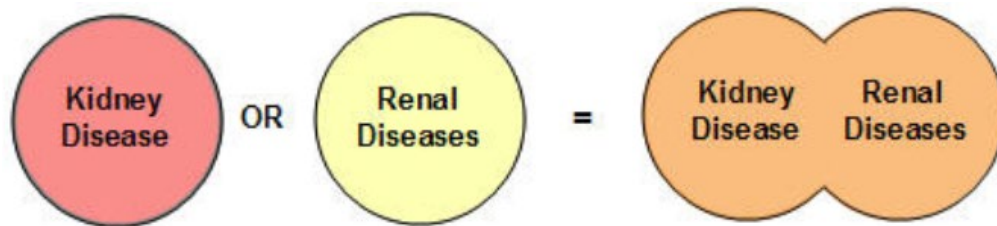
Combining search terms / concepts

The Boolean Operators



•AND

All terms have to be included in a citation.
= **NARROWING DOWN**



•OR

One of the terms has to appear in the citation.
= **EXPANDING («OR is more!»)**

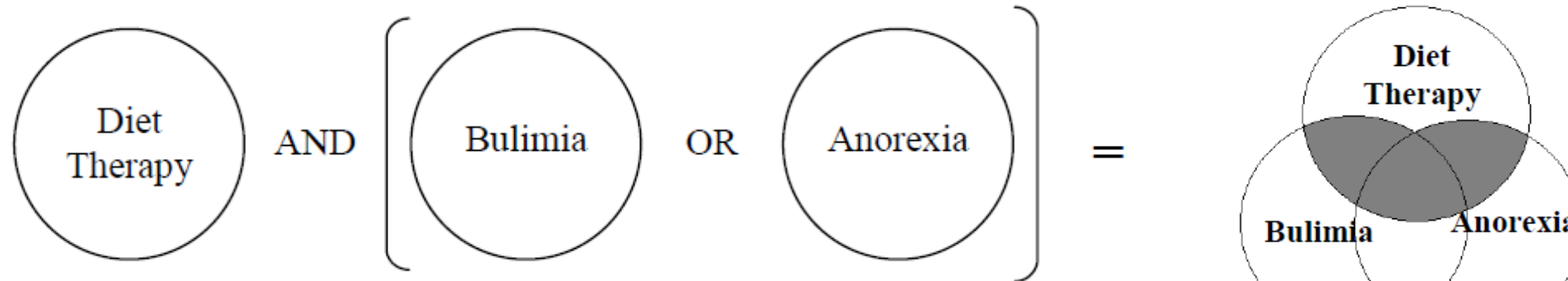


•NOT

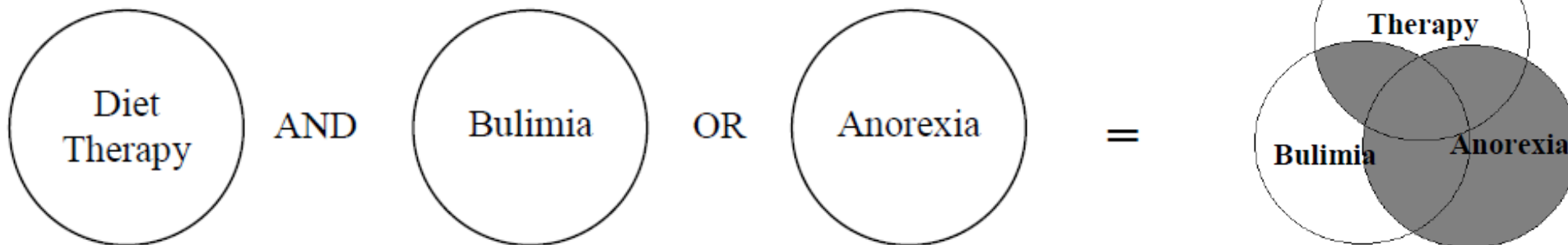
The second term is excluded from the search results. The operator NOT eliminates also results in which both of the terms appear! Therefore: be cautious about using NOT!

The Boolean Operators

Nesting



Terms **inside parentheses** are processed as a unit!



Boolean connectors are processed in a **left to right sequence!**

The Scoping Search

Uncomplicated, intuitive search

05
Scoping Search
Key Papers

- Is there already a recent Systematic Review on my research question?
- Is there a SR in the planning stage (is there a protocol)?
- Approximately how much literature exists on my research question?
- **Goal: overview of existing research on a topic and create a "gold set" of "key papers"**

Source: Gusenbauer M, Haddaway NR. [What every researcher should know about searching](#) - clarified concepts, search advice, and an agenda to improve finding in academia. Res Synth Methods. 2021 Mar;12(2):136-147. doi: 10.1002/jrsm.1457.

Techniques of a Scoping Search to identify the most relevant studies

- The focus is initially on **accuracy**, but is expanded as the iterative search process (learning process) progresses.
- **Techniques:**



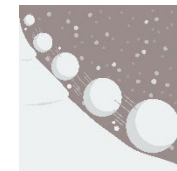
Googling: Brief search; using a few specific terms with the intention of retrieving a few relevant papers (key papers) to work with in the following techniques.



Berry picking: Scanning results of the scoping search to identify key authors, relevant journals, reference lists, cited by (forward citation tracking), and similar articles.



Pearl growing: Using key papers and their database records to harvest search terms for a comprehensive search strategy.



Snowballing: Tracking down related works by using the bibliography or reference list at the end of an article (backward citation tracking).

How to do a scoping search to find top relevant papers (in a nutshell)

1. Enter the most important terms in Google Scholar and / or PubMed.
2. The best results are displayed at the top (Relevance Ranking).
3. Read through the titles/abstracts and export the appropriate ones. They serve as your key papers.



Scoping Search in PubMed

NIH National Library of Medicine
National Center for Biotechnology Information

Log in

PubMed®

insulin pump AND type 1 diabetes AND (children OR adolescents)

Advanced Create alert Create RSS Search User Guide

Save Email Send to Sort by: Best match Display options

MY NCBI FILTERS

1,619 results

Page 1 of 9

RESULTS BY YEAR

1972 2024

TEXT AVAILABILITY

Association of **Insulin Pump** Therapy vs **Insulin** Injection Therapy With Severe Hypoglycemia, Ketoacidosis, and Glycemic Control Among **Children, Adolescents**, and Young Adults With **Type 1 Diabetes**.

Cite

Share

Karges B, Schwandt A, Heidtmann B, Kordonouri O, Binder E, Schierloh U, Boettcher C, Kapellen T, Rosenbauer J, Holl RW.

JAMA. 2017 Oct 10;318(14):1358-1366. doi: 10.1001/jama.2017.13994.

PMID: 29049584 Free PMC article.

OBJECTIVE: To determine whether rates of severe hypoglycemia and diabetic ketoacidosis are lower with **insulin pump** therapy compared with **insulin** injection therapy in **children, adolescents**, and young adults with **type 1 diabetes** ...

Article type filters: SR / Meta-Analysis

PubMed®

insulin pump AND type 1 diabetes AND (children OR adolescents) Search

Advanced Create alert Create RSS User Guide

Save Email Send to Sort by: Most recent Display options

MY NCBI FILTERS 40 results Page 1 of 1

RESULTS BY YEAR

ARTICLE TYPE

- Books and Documents
- Clinical Trial
- Meta-Analysis
- Randomized Controlled Trial
- Review
- Systematic Review

Filters applied: Meta-Analysis, Systematic Review. [Clear all](#)

We reviewed the current evidence about the psychological, safety, and exercise-related outcomes of this device in **children, adolescents**, and young adults living with **type 1 diabetes**. We screened 552 papers, but only 21 manuscripts were included ...

Insulin Pump Therapy and Adverse Skin Reactions With Focus on Allergic Contact Dermatitis in Individuals Living With Diabetes Mellitus: A Systematic Review and Clinical-Based Update.

3 Cite

Share

von Kobyletzki LB, Ulriksdotter J, von Kobyletzki E, Mowitz M, Jendle J, Svedman C. J Diabetes Sci Technol. 2024 Jun 10:19322968241252613. doi: 10.1177/19322968241252613. Online ahead of print.

Sort by:
Switch to Most recent

Article Type:
Filter by Systematic Review and Meta-Analyses

Article type filters: RCT / Clinical Trial

PubMed®

insulin pump AND type 1 diabetes AND (children OR adolescents) X Search

Advanced Create alert Create RSS User Guide

Save Email Send to Sort by: Best match Display options

MY NCBI FILTERS 307 results Page 1 of 2

RESULTS BY YEAR

ARTICLE TYPE

- Books and Documents
- Clinical Trial
- Meta-Analysis
- Randomized Controlled Trial
- Review

Filters applied: Clinical Trial, Randomized Controlled Trial. [Clear all](#)

BACKGROUND: Closed-loop control systems of **insulin** delivery may improve glycemic outcomes in young **children** with **type 1 diabetes**. ...METHODS: In this 13-week, multicenter trial, we randomly assigned, in a 2:1 ratio, **children** who were at I ...

Examining the Acute Glycemic Effects of Different Types of Structured Exercise Sessions in **Type 1 Diabetes** in a Real-World Setting: The **Type 1 Diabetes** and Exercise Initiative (T1DEXI).

3 Cite Riddell MC, Li Z, Gal RL, Calhoun P, Jacobs PG, Clements MA, Martin CK, Doyle Iii FJ, Patton SR, Castle JR, Gillingham MB, Beck RW, Rickels MR; T1DEXI Study Group.

Share

Sort by:
Switch to Best
match

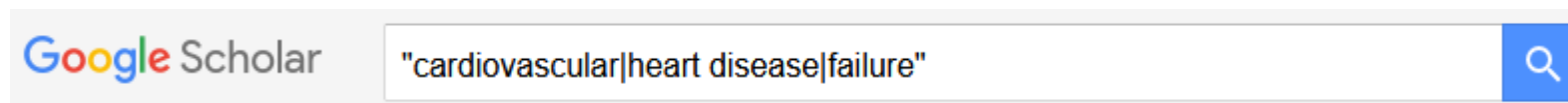
Article Type:
Filter by Clinical
Trial as well as
RCT

Scoping Search: Google Scholar Search Tips

- Use **quotation marks** to keep phrases together: "type 1 diabetes"
- Search terms are automatically combined with **AND**
- Replace **OR** with **|** (pipe sign: Alt Gr + 7 in Windows, alt + 7 in Mac), no spaces!

Advanced technique:

To search phrase variations → use **quotation marks** before and after an **|** combination:



"cardiovascular|heart disease|failure" *finds*: cardiovascular disease, heart disease, heart failure

Scoping search in Google Scholar

Google Scholar "insulin pump"|"insulin delivery" "type 1 diabetes" children|adolescents SIGN IN

Articles About 18'100 results (0.16 sec) My profile My library

Any time

Since 2024

Since 2023

Since 2020

Custom range...

Sort by relevance

Sort by date

Any type

Review articles

include patents

include citations

Create alert

<p>Safety and effectiveness of insulin pump therapy in children and adolescents with type 1 diabetes</p> <p>LP Plotnick, LM Clark, FL Brancati... - Clinical ..., 2003 - journals.viamedica.pl</p> <p>... veness of insulin pump therapy in children and adolescents with type 1 diabetes. MATERIAL ... therapy is safe and effective in selected children and adolescents with type 1 diabetes. ...</p> <p>☆ Save Cite Cited by 360 Related articles All 14 versions Web of Science: 155 »»</p>	<p>[PDF] viamedica.pl</p> <p>Uni Bern Fulltext</p>
<p>Exercise with and without an insulin pump among children and adolescents with type 1 diabetes mellitus</p> <p>G Admon, Y Weinstein, B Falk, N Weintrob... - ..., 2005 - publications.aap.org</p> <p>... a popular technique for insulin delivery among patients with type 1 diabetes mellitus (T1DM)... and risk of hypoglycemia among children and adolescents with T1DM when exercising with ...</p> <p>☆ Save Cite Cited by 150 Related articles All 7 versions Web of Science: 62 »»</p>	<p>[PDF] aap.org</p> <p>Uni Bern Fulltext</p>
<p>[HTML] Use of insulin pump therapy in children and adolescents with type 1 diabetes and its impact on metabolic control: comparison of results from three large ...</p> <p>JL Sherr, JM Hermann, F Campbell, NC Foster... - Diabetologia, 2016 - Springer</p> <p>... insulin pump ... children with type 1 diabetes. As science and technology move closer to a mechanical solution to the problems of managing children and adolescents with type 1 diabetes, ...</p> <p>☆ Save Cite Cited by 250 Related articles All 11 versions Web of Science: 175</p>	<p>[HTML] springer.com</p> <p>Uni Bern Fulltext</p>

Search for **more recent** documents

Look at **Cited by** to see closely related work (forward citation tracking)

Create an alert to get notified of new publications

Google Scholar Practical exercise

Perform a scoping search in Google Scholar (<https://scholar.google.com/>):

Choose your own topic or answer the following question:

Insulin pump therapy in type 2 diabetes: are there Systematic Reviews and/or randomized controlled trials (RCTs)?

Google Scholar

A possible solution

Research question:

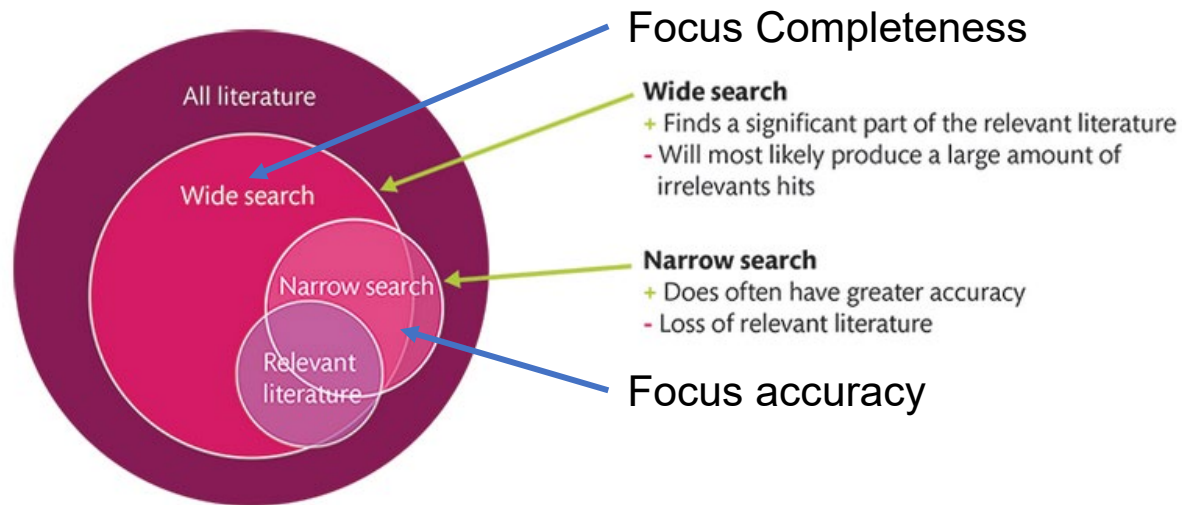
Insulin pump therapy in type 2 diabetes: are there Systematic Reviews and/or randomized controlled trials (RCTs)?

Suggested solution:

"insulin pump|infusion" "type 2 diabetes" |NIDDM "systematic review" |RCT|randomised|randomized

Defining the aim of the literature search

Getting an overview or going into depth?



Modified figure from the SBU handbook, p. 34

Accuracy vs. completeness

- Get an *overview* of a complex of topics by entering *precise search terms* in a *search engine* (e.g. Google Scholar) = **scoping search**. Goal: *find some top relevant papers*
- *In-depth* examination of a topic by means of **systematic research** in *specialist databases*. Aim: to find *ALL relevant papers*

Scoping Search & Systematic Search

Scoping Search / Initial Search (Google Scholar):

- Focus on **accuracy (Precision*)** = no claim to completeness
- For the overview / identifying key papers
- Complex search structure only possible to a limited extent



Systematic research (specialized databases):

- Focus on **completeness (recall*/sensitivity)** =.
Find as much evidence as possible
(systematic reviews / guidelines)
- Complex search / Reproducible



How to use key papers for building a systematic search strategy

Goal:

Harvest search terms from key papers (title, abstracts, author keywords, MeSH)

Example:

PubMed IDs (PMIDs) of key papers:

35272971 32846062 35045227

33453783 30292578 33179818

20587585

PubMed®

35272971 32846062 35045227 33453783 30292578 33179818 20587585

Advanced Create alert Create RSS User Guide

Save Email Send to Sort by: Best match Display options

MY NCBI FILTERS

7 results

RESULTS BY YEAR

2010 2024

TEXT AVAILABILITY

Abstract

Free full text

Full text

Cambridge hybrid closed-loop algorithm in children and adolescents with type 1 diabetes: a multicentre 6-month randomised controlled trial.

1

Cite Ware J, Boughton CK, Allen JM, Wilińska ME, Tauschmann M, Denvir L, Thankamony A, Campbell FM, Wadwa RP, Buckingham BA, Davis N, DiMeglio LA, Mauras N, Besser REJ, Ghatak A, Weinzimer SA, Hood KK, Fox DS, Kanapka L, Kollman C, Sibayan J, Beck RW, Hovorka R; DAN05 Consortium. Lancet Digit Health. 2022 Apr;4(4):e245-e255. doi: 10.1016/S2589-7500(22)00020-6. Epub 2022 Mar 7. PMID: 35272971 Free article. Clinical Trial.

Share

A Randomized Trial of Closed-Loop Control in Children with Type 1 Diabetes.

2

Cite Breton MD, Kanapka LG, Beck RW, Ekhlaspour L, Forlenza GP, Cengiz E, Schoelwer M, Ruedy KJ, Jost E, Carria L, Emory E, Hsu LJ, Oliveri M, Kollman CC, Dokken BB, Weinzimer SA, DeBoer MD, Buckingham BA, Cherňavsky D, Wadwa RP; iDCL Trial Research Group. N Engl J Med. 2020 Aug 27;383(9):836-845. doi: 10.1056/NEJMoa2004736. PMID: 32846062 Free PMC article. Clinical Trial.

Share

Identify search terms through text mining

Analyze your key papers
(entering the PubMed IDs)
in [PubMed PubReMiner](#)

- Get ideas of search terms to include from the **Word and MeSH columns** (listed from most often used to lesser use)
- Note popular journals, most publishing authors and the development of your research topic throughout the years
- Other textmining tools: [Termine](#) Upload a pdf or URL [MeSH on Demand](#)

PubMed PubReMiner

Your query resulted in 7 references

Goto PubMed with query Create CV output

Manual adjustment: 35272971 32846662 35045227 33453783 30292578 33179818 20587585

AbstractLimit: 1000 Search with Manual Adjustment

Click on a hyperlink to add that element to your query and Re-Mine or select terms (OR boxes) and press 'Search Again'
Click on the P to directly goto PubMed and view ALL references for that element
[Save the results as a txt-file](#)

Operator: AND Merge similar words: YES Minimalcount: 2 Force update: false Search Again

# OR Year	# OR Journal	# OR Author	# Count OR Word(ti_ab)	# OR Mesh	# OR Substances	# OR publication type
2 <input type="checkbox"/> 2022	3 <input type="checkbox"/> N Engl J Med P	4 <input type="checkbox"/> BECK RW P	7 36 - DIABETE *	7 - /administration & dosage P	6 <input type="checkbox"/> Insulin P	- JOURNAL ARTICLE
2 <input type="checkbox"/> 2021	2 <input type="checkbox"/> Lancet P	4 <input type="checkbox"/> SIBAYAN J P	7 29 - GLUCOSE P	7 - /analysis P	6 <input type="checkbox"/> Glycated Hemoglobin A P	6 <input type="checkbox"/> MULTICENTER STUDY
1 <input type="checkbox"/> 2020	1 <input type="checkbox"/> Lancet Digit Health P	3 <input type="checkbox"/> ALLEN JM P	7 23 - INSULIN P	6 <input type="checkbox"/> Diabetes Mellitus_Type 1 P	4 <input type="checkbox"/> Hypoglycemic Agents P	6 <input type="checkbox"/> RANDOMIZED CONTROLLED TRIAL
1 <input type="checkbox"/> 2018	1 <input type="checkbox"/> Pediatr Diabetes P	3 <input type="checkbox"/> BERGENSTAL RM P	7 25 - MEAN P	6 <input type="checkbox"/> Female P	3 <input type="checkbox"/> Blood Glucose P	6 <input type="checkbox"/> RESEARCH SUPPORT NON-U.S. GOVT
1 <input type="checkbox"/> 2010		3 <input type="checkbox"/> HOVORKAR P	7 31 - PUMP * P	6 <input type="checkbox"/> Humans P		3 <input type="checkbox"/> COMPARATIVE STUDY
		3 <input type="checkbox"/> KOLLMAN C P	7 23 - RANDOMISE * P	6 <input type="checkbox"/> Insulin Infusion Systems P		3 <input type="checkbox"/> RESEARCH SUPPORT N.I.H. EXTRAMURAL
		3 <input type="checkbox"/> TAUSCHMANN M P	7 19 - TRIAL P	6 <input type="checkbox"/> Insulin P		
		3 <input type="checkbox"/> WEINZIMER SA P	7 30 - TYPE P	6 <input type="checkbox"/> Male P		
		3 <input type="checkbox"/> WILINSKA ME P	6 6 <input type="checkbox"/> BACKGROUND P	6 <input type="checkbox"/> / drug therapy P		
		2 <input type="checkbox"/> BOUGHTON CK P	6 6 <input type="checkbox"/> CLINICALTRIAL * P	5 <input type="checkbox"/> Child P		
		2 <input type="checkbox"/> BUCKINGHAM BA P	6 11 <input type="checkbox"/> COMPARE * P	4 <input type="checkbox"/> Adolescent P		
		2 <input type="checkbox"/> CAMPBELL FM P	6 6 <input type="checkbox"/> FUND * P	4 <input type="checkbox"/> Diabetes Mellitus_Type 1/drug therapy P		
		2 <input type="checkbox"/> CRIEGO A P	6 56 <input type="checkbox"/> GROUP * P	4 <input type="checkbox"/> Glycated Hemoglobin A/analysis P		
		2 <input type="checkbox"/> HARTNELL S P	6 6 <input type="checkbox"/> METHOD * P	4 <input type="checkbox"/> Glycated Hemooglobin A P		
		2 <input type="checkbox"/> HOOD KK P	6 22 <input type="checkbox"/> SD P	4 <input type="checkbox"/> Hypoglycemic Agents P		
		2 <input type="checkbox"/> THANKAMONY A P	6 18 <input type="checkbox"/> SENSOR * P	4 <input type="checkbox"/> Insulin/administration & dosage P		
		2 <input type="checkbox"/> WADIWAR P	6 6 <input type="checkbox"/> SEVERE P	2 - Insulin/administration & dosage/adverse effects P		
		2 <input type="checkbox"/> WARE J P	5 10 <input type="checkbox"/> AGE * P	4 <input type="checkbox"/> /adverse effects P		
		1 <input type="checkbox"/> ACERINI CL P	5 5 <input type="checkbox"/> ANALYSE * P	3 <input type="checkbox"/> Adult P		
		1 <input type="checkbox"/> AHMANN A P	5 11 <input type="checkbox"/> AUG * P	3 <input type="checkbox"/> Blood Glucose/analysis P		
		1 <input type="checkbox"/> ALBANESE-ONEILL P	5 10 <input type="checkbox"/> BASELINE P	3 <input type="checkbox"/> Blood Glucose P		
		1 <input type="checkbox"/> BAILEY RJ P	5 23 <input type="checkbox"/> CHILDREN P	3 <input type="checkbox"/> Diabetic Ketoacidosis P		
			5 58 <input type="checkbox"/> CLOSE * P	3 <input type="checkbox"/> Hypoglycemia P		

OR Country

- 4 UNITED STATES
- 2 UNITED KINGDOM
- 1 CANADA
- 1 GERMANY
- 1 ISRAEL
- 1 SLOVENIA

Search terms

What are textwords?

Textword searching means using terms you choose yourself to search the "record" of a database. The record does not include the fulltext article. It mainly includes the title, abstract and author provided keywords.

Textwords are often referred to as keywords or freetext terms or natural language terms.

Use textbooks and dictionaries to find additional textwords.

Review > Expert Opin Drug Deliv. 2017 Dec;14(12):1367-1377.
doi: 10.1080/17425247.2017.1360866. Epub 2017 Aug 18.

Words from
the title

Insulin delivery and nocturnal glucose control in children and adolescents with type 1 diabetes

Martin Tauschmann^{1 2}, Roman Hovorka^{1 2}

Affiliations + expand

PMID: 28819992 PMCID: PMC5942151 DOI: 10.1080/17425247.2017.1360866

Free PMC article

06
Text words

Abstract

Nocturnal glucose control remains challenging in children and adolescents with type 1 diabetes due to highly variable overnight insulin requirements. The issue may be addressed by glucose responsive insulin delivery based on real-time continuous glucose measurements. Areas covered: This review outlines recent developments of glucose responsive insulin delivery systems from a paediatric perspective. We cover threshold-based suspend application, predictive low glucose suspend, and dual-hormone closed-loop systems. Application to nocturnal glucose control particularly during outpatient randomised controlled trials. Conclusion: Significant progress translating research from controlled clinical centre settings to free-living unsupervised home studies have been achieved over the past decade. Nocturnal glycaemic control can be improved whilst reducing the risk of hypoglycaemia with closed-loop systems. Following the US regulatory approval of the first hybrid closed-loop system in non-paediatric population, large multinational closed-loop clinical trials and pivotal studies including paediatric populations are underway or in preparation to facilitate the use of closed-loop systems in clinical practice.

Words from
the abstract

Keywords: Threshold-based insulin interruption; artificial pancreas; closed-loop system; continuous glucose monitor; control algorithm; insulin pump; low glucose suspension; type 1 diabetes.

Additional keywords
assigned keywords 47

Text word search

Stumbling blocks

British vs. American English:

- pediatric / paediatric, analyze / analyse

Synonyms / Antonyms:

- doctor / physician / clinician
- success / failure, fertility / infertility

Acronyms:

- total knee arthroplasty = TKA



Truncation

Shorten to the root

The word ending is truncated and replaced by a symbol (*, ?, \$).

Advantage: Many word variants can be searched for at one go, and the number of hits increases.

child* finds
child, children, childish, childlike, childhood, etc.

diabet* finds
diabetes, diabetic

Child ren
ish
like
hood

Diabet es
ic



From textwords to subject terms

The benefits of database thesauri

07
Thesaurus terms

Synonyms for diabetes type 1:

- type I diabetes (mellitus)
- insulin-dependent diabetes mellitus
- juvenile-onset diabetes mellitus
- sudden-onset diabetes mellitus
- autoimmune diabetes
- brittle diabetes mellitus
- ketosis-prone diabetes mellitus



Problem

- With a text word search you can never cover 100% of all synonyms and possible spellings. What now?



- **Thesauri of the subject databases:**
MeSH terms in Medline
Emtree terms in Embase

Subject Headings

What are subject headings?

Subject heading searching means using preassigned terms to search for articles labelled with that term. Each database uses its own subject headings - MEDLINE's are called **MeSH**.

Other expressions for subject headings are **thesaurus terms, index terms** or **controlled vocabulary**.

Big Plus: subject headings cover a lot of different expressions authors use in their articles to describe the same concept.

MeSH terms

- > Adolescent
- > Algorithms
- > Blood Glucose
- > Child
- > Diabetes Mellitus, Type 1 / drug therapy*
- > Humans
- > Hypoglycemia / chemically induced
- > Hypoglycemic Agents / administration & dosage*
- > Hypoglycemic Agents / therapeutic use
- > Insulin / administration & dosage*
- > Insulin / therapeutic use
- > Insulin Infusion Systems*
- > Translational Medical Research

MeSH terms of the following PubMed record: Insulin delivery and nocturnal glucose control in children and adolescents with type 1 diabetes.

Searching with subject headings

Advantages and disadvantages

Advantages of searching with MeSH Terms:

- MeSH describe the content (fulltext not searchable)
- MeSH cover many different synonyms and spellings
- higher precision
(fewer irrelevant hits than with text word search)

Disadvantages:

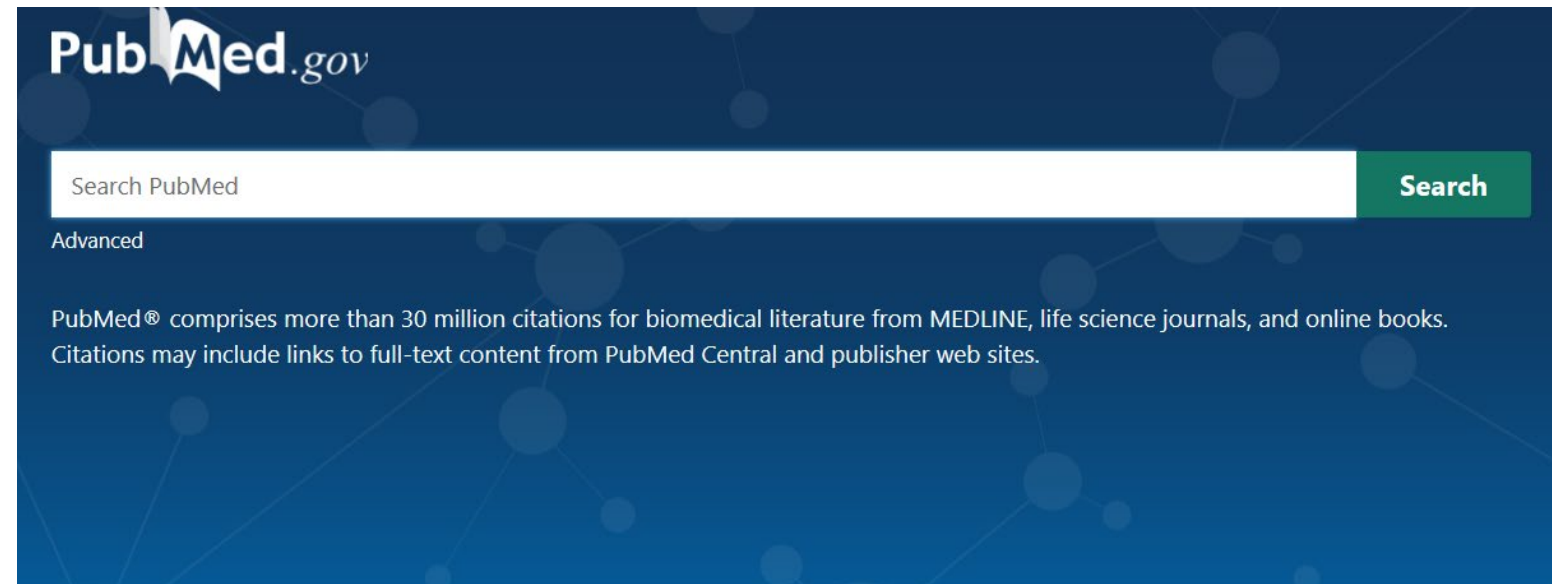
- MeSH Thesaurus = complicated query
- Not every intervention/disease has an appropriate MeSH



Where can I find MeSH Terms?

MeSH Thesaurus in PubMed

Access to the **MeSH database** via the [PubMed](#) homepage.



Explore

MeSH Database



Learn

About PubMed



Find

Advanced Search



Download

E-utilities API



Explore

MeSH Database

MeSH terms: Hierarchical structure

Example diabetes type 1

MeSH terms are organized in a tree structure (hierarchically from the most general to the most specific area)

NCBI Resources How To

MeSH

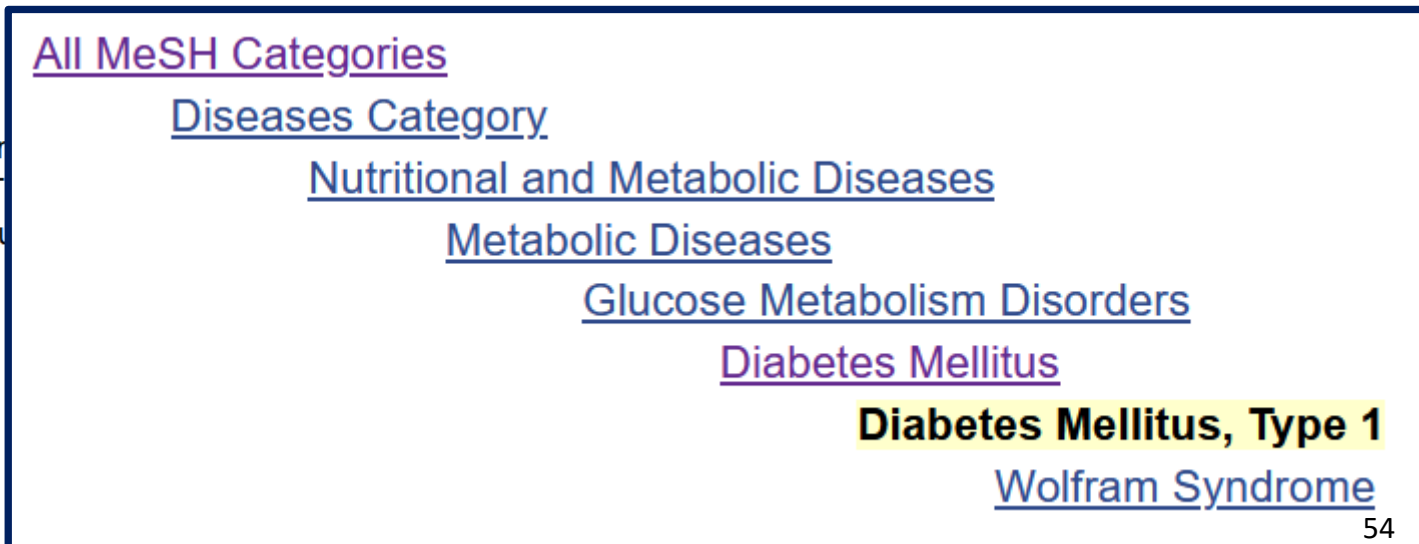
[Create alert](#) [Limits](#) [Advanced](#)

Full Send to:

Diabetes Mellitus, Type 1

A subtype of DIABETES MELLITUS that is characterized by INSULIN deficiency, the sudden onset of severe HYPERGLYCEMIA, rapid progression to DIABETES and DEATH unless treated with insulin. The disease may occur at any age, but is most common in childhood or adolescence.

Year introduced: 2005 (1984)



Structure of the search in the Concepts Sheet

Word document as a helpful tool

MeSH [Limits](#) [Advanced](#) [Help](#)

Full ▾ [Send to: ▾](#)

Diabetes Mellitus, Type 1

A subtype of DIABETES MELLITUS that is characterized by INSULIN deficiency. It is manifested by the sudden onset of severe HYPERGLYCEMIA, rapid progression to DIABETIC KETOACIDOSIS, and DEATH unless treated with insulin. The disease may occur at any age, but is most common in childhood or adolescence.

Year introduced: 2005 (1984)

PubMed search builder options
[Subheadings:](#)

PubMed Search Builder

"Diabetes Mellitus, Type 1"[Mesh]

Search strategy (concepts / block building)

Concept 1:	<input type="text" value="Subject Heading (MeSH)"/>
	OR
	<input type="text" value="Textwords [Title/Abstract]"/>
	AND
Concept 2:	<input type="text" value="Subject Heading (MeSH)"/>
	OR
	<input type="text" value="Textwords [Title/Abstract]"/>
	AND
	<input type="text" value="Subject Heading (MeSH)"/>
	OR
	<input type="text" value="Textwords [Title/Abstract]"/>

55

The Concepts Sheet

Build up your search

For each thematic block:

Search for matching **MeSH** terms in the MeSH database;

Identify as many **textwords** as possible (from title/abstract of relevant studies, reference books, entry terms in the MeSH Thesaurus, etc.), then combine both search approaches with **OR**.

Combine thematic blocks with AND

(concept 1 AND concept 2 AND concept 3) in order to only have records containing all topics in the results list.

<p>Concept 1:</p> <p>Type 1 Diabetes</p>	<p>Subject Heading [MeSH] "Diabetes Mellitus, Type 1"[Mesh]</p> <p>OR</p> <p>Textwords [Title/Abstract] type 1 diabet* OR type I diabet* OR diabetes mellitus type 1 OR diabetes mellitus type I OR T1D OR T1DM OR insulin-dependent diabet* OR juvenile-onset diabet* OR sudden-onset diabet* OR IDDM OR autoimmune diabet* OR brittle diabet* OR ketosis-prone diabet*</p>
<p>AND</p>	
<p>Concept 2:</p> <p>Children/Adolescents (age: up to 18 years)</p> <p><i>Please note: If you create a search for a systematic review, make sure to include even more terms, like: youth*, schoolchild*, girl*, boy* etc.</i></p>	<p>Subject Heading [MeSH] "Adolescent"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh]</p> <p>OR</p> <p>Textwords [Title/Abstract] child* OR infan* OR adolescen* OR newborn* OR preschool* OR teen* OR pediatric* OR paediatric*</p>
<p>AND</p>	
<p>Concept 3:</p> <p>Insulin pump <i>continuous subcutaneous insulin infusion (CSII)</i></p>	<p>Subject Heading [MeSH] "Insulin Infusion Systems"[Mesh]</p> <p>OR</p> <p>Textwords [Title/Abstract] insulin pump* OR insulin infus* OR CSII</p>

Does AI help? Strategy of ChatGPT-4.0

Give precise instructions!

I need a PubMed search string for the following topic: insulin pump for children or adolescents with type 1 diabetes. I need a combined search with MeSH terms and textwords.



Here's a comprehensive PubMed search string for your topic, combining both MeSH terms and textwords:

```
arduino Code kopieren

(("Insulin Infusion Systems"[MeSH] OR "insulin pump"[tw] OR "insulin pumps"[tw] OR "continuous subcutaneous insulin infusion"[tw] OR "CSII"[tw]) AND ("Diabetes Mellitus, Type 1"[MeSH] OR "type 1 diabetes"[tw] OR "T1DM"[tw])) AND ("Child"[MeSH] OR "Adolescent"[MeSH] OR "children"[tw] OR "adolescents"[tw] OR "pediatric"[tw] OR "youth"[tw] OR "teenagers"[tw])
```

Breakdown:

1. Insulin Pump:

MeSH: "Insulin Infusion Systems"[MeSH]

Textwords: "insulin pump"[tw], "insulin pumps"[tw], "continuous subcutaneous insulin infusion"[tw], "CSII"[tw]

2. Type 1 Diabetes:

MeSH: "Diabetes Mellitus, Type 1"[MeSH]

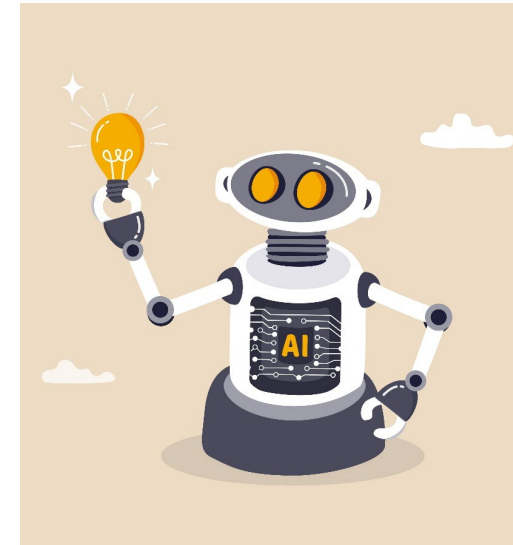
Textwords: "type 1 diabetes"[tw], "T1DM"[tw]

3. Children/Adolescents:

MeSH: "Child"[MeSH], "Adolescent"[MeSH]

Textwords: "children"[tw], "adolescents"[tw], "pediatric"[tw], "youth"[tw], "teenagers"[tw]

This search string will target both controlled vocabulary (MeSH) and free text, ensuring a broad yet focused search on the use of insulin pumps in children and adolescents with type 1 diabetes.



Code supplied by ChatGPT

To insert in PubMed

```
(("Insulin Infusion Systems"[MeSH] OR
"insulin pump"[tw] OR "insulin
pumps"[tw] OR "continuous
subcutaneous insulin infusion"[tw] OR
"CSII"[tw]) AND ("Diabetes Mellitus,
Type 1"[MeSH] OR "type 1 diabetes"[tw]
OR "T1DM"[tw])) AND ("Child"[MeSH]
OR "Adolescent"[MeSH] OR
"children"[tw] OR "adolescents"[tw] OR
"pediatric"[tw] OR "youth"[tw] OR
"teenagers"[tw])
```

NIH National Library of Medicine
National Center for Biotechnology Information

PubMed®

Search
] OR "adolescents"[tw] OR "pediatric"[tw] OR "youth"[tw] OR "teenagers"[tw]

Advanced Create alert Create RSS User Guide

Save Email Send to Sort by: Best match Display options

MY NCBI FILTERS

RESULTS BY YEAR

1979 2024

TEXT AVAILABILITY

Abstract
 Free full text
 Full text

ARTICLE ATTRIBUTE

2,498 results

Page 1 of 13

Continuous subcutaneous insulin infusion versus multiple daily injection regimens in **children** and young people at diagnosis of **type 1 diabetes**: pragmatic randomised controlled trial and economic evaluation.
Cite Blair JC, McKay A, Ridyard C, Thornborough K, Bedson E, Peak M, Didi M, Annan F, Gregory JW, Hughes DA, Gamble C; SCIPi investigators.
Share BMJ. 2019 Apr 3;365:l1226. doi: 10.1136/bmj.l1226.
PMID: 30944112 **Free PMC article.** Clinical Trial.
OBJECTIVE: To compare the efficacy, safety, and cost utility of **continuous subcutaneous insulin infusion (CSII)** with multiple daily injection (MDI) regimens during the first year following diagnosis of **type 1 diabetes** in ...

Comparative effectiveness and safety of methods of insulin delivery and glucose monitoring for diabetes mellitus: a systematic review and meta-analysis.
Cite Yeh HC, Brown TT, Maruthur N, Ranasinghe P, Berger Z, Suh YD, Wilson LM, Haberl EB, Brick J, Bass EB, Golden SH.

Human-made PubMed search string

PubMed

```
(("Diabetes Mellitus, Type 1"[Mesh]) OR (type 1 diabet*[Title/Abstract] OR type I
diabet*[Title/Abstract] OR diabetes mellitus type 1[Title/Abstract] OR diabetes mellitus
type I[Title/Abstract] OR T1D[Title/Abstract] OR T1DM[Title/Abstract] OR insulin-
dependent diabet*[Title/Abstract] OR juvenile-onset diabet*[Title/Abstract] OR sudden-
onset diabet*[Title/Abstract] OR IDDM[Title/Abstract] OR autoimmune
diabet*[Title/Abstract] OR brittle diabet*[Title/Abstract] OR ketosis-prone
diabet*[Title/Abstract])) AND (("Adolescent"[Mesh] OR "Child"[Mesh] OR
"Infant"[Mesh]) OR (child*[Title/Abstract] OR infan*[Title/Abstract] OR
adolescen*[Title/Abstract] OR newborn*[Title/Abstract] OR preschool*[Title/Abstract]
OR pre-school*[Title/Abstract] OR teen*[Title/Abstract] OR pediatric*[Title/Abstract]
OR paediatric*[Title/Abstract])) AND (("Insulin Infusion Systems"[Mesh]) OR (insulin
pump*[Title/Abstract] OR insulin infus*[Title/Abstract] OR insulin
deliver*[Title/Abstract] OR CSII[Title/Abstract]))))
```

What are the obvious differences?

- Longer (more MeSH terms, more textwords)
- Truncation
- Field code [tiab] vs. [tw]

And what's in common?

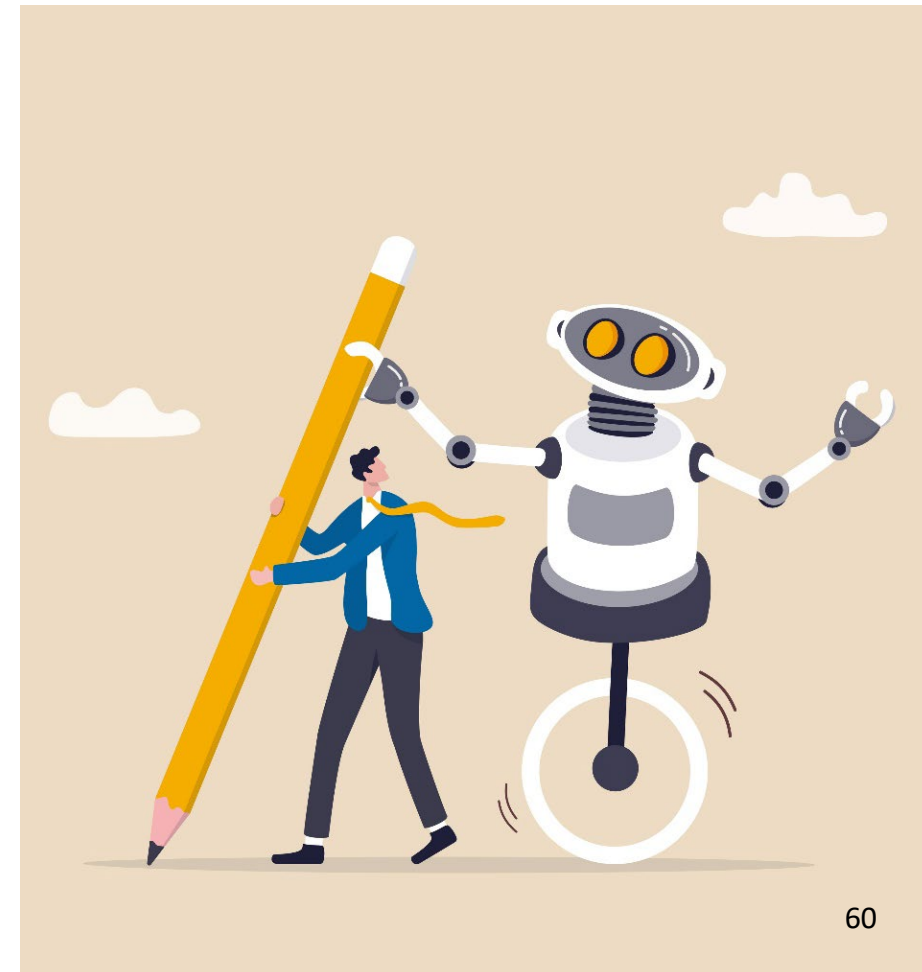
- Block-building
- Combination of MeSH terms and textwords

Code by ChatGPT as a starting point

```
("Insulin Infusion Systems"[MeSH] OR "insulin pump"[tw] OR "insulin pumps"[tw] OR "continuous subcutaneous insulin infusion"[tw] OR "CSII"[tw]) AND ("Diabetes Mellitus, Type 1"[MeSH] OR "type 1 diabetes"[tw] OR "T1DM"[tw])) AND ("Child"[MeSH] OR "Adolescent"[MeSH] OR "children"[tw] OR "adolescents"[tw] OR "pediatric"[tw] OR "youth"[tw] OR "teenagers"[tw])
```

Important:

- Check if the MeSH terms provided are appropriate and actually exist.
- Check textwords and truncate them.
- Add more textwords and more MeSH terms.
- Check for American/British spelling.
- Check the correct application of Boolean Operators.



And if there are too many hits?

Limits / Filters

Filter search results by:

- Dates
- Languages
- Study type (RCTs, etc.)
- Population (age)

Watch out for database filters!

Many **filters** are based solely on MeSH terms.

Consequence: Studies are missed

Exceptions:

systematic reviews, languages & publication dates

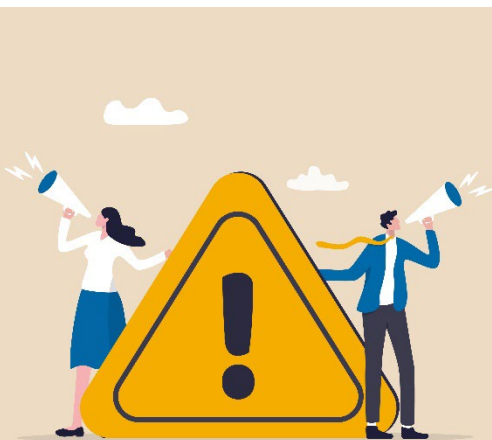
09
Filters / Limits



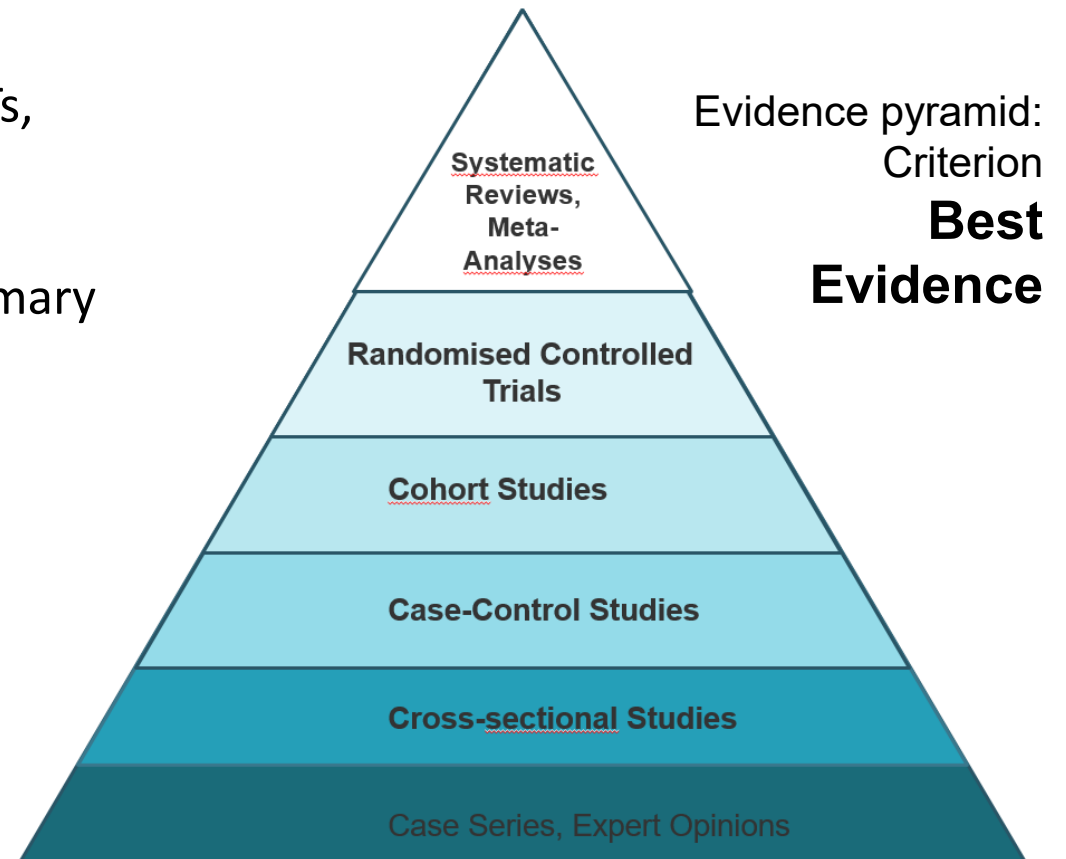
And if there are too many hits?

Filter by Best Evidence

Studies with appropriate methodological quality (RCTs, cohort studies) have higher evidence.
SR & MA are ranked highest, having systematically searched for, assessed, and statistically evaluated primary studies.



**The best
"filter" is the
human being!**



Validated methodological filters

State-of-the-art for SR searches



Cochrane Search Filter for RCTs:

<https://work.cochrane.org/pubmed> (PubMed)

UTHealth (School of Public Health, University of Texas)

https://libguides.sph.uth.tmc.edu/search_filters/pubmed_filters (PubMed)

SIGN (Healthcare Improvement Scotland)

<https://www.sign.ac.uk/what-we-do/methodology/search-filters/>
(Medline, Embase, CINAHL on the Ovid Platform)

ISSG Search Filters Resource (York)

<https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/home>

Validated filters: Cochrane filters for RCTs

<https://work.cochrane.org/pubmed>

The Cochrane highly sensitive search strategies for identifying randomized trials in PubMed

Not all randomised controlled trials have been indexed as RCTs in MEDLINE. There is a validated filter in the Cochrane Handbook for both PubMed and Ovid interfaces¹.

Sensitivity-maximizing version (2008 revision); PubMed format

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

Direct link to PubMed!

Direct link to PubMed with **sensitivity-maximizing version** (2008 revision)

Related Resources

The Cochrane highly sensitive search strategies for identifying randomized trials in PubMed

Link to PubMed with sensitivity-maximizing version (2008 revision)

Link to PubMed with sensitivity- and precision-maximizing version (2008 revision)

Cochrane's validated filter searches not only in MeSH (= [mh]), but also within other fields:

- [pt] = publication types
- [tiab] = titles/abstracts
- [sh] = subheadings

Note:

#10 and #11 additionally show how animal studies are excluded in a state-of-the-art search.



Source: Lefebvre C, Glanville J. et al. Chapter 4: Searching for and selecting studies [last updated September 2024]. In: Higgins JPT et al. (editors). Cochrane Handbook for Systematic Reviews of Interventions. Version 6.5. Cochrane, 2024. Available from <https://training.cochrane.org/handbook/>

Why validated methodological filters?

Example

Helmets for preventing head and facial injuries in bicyclists		
<p>Sets 1-3 are the MeSH terms & text words [words found in the TITLE or ABSTRACT of a record] for the population (i.e bicyclists). They are combined using OR</p>	<ol style="list-style-type: none"> 1. bicycl* or cycling or cyclist*.ab,ti 2. exp Bicycling/ 3. 1 or 2 	Population (P)
<p>Sets 4-6 are the MeSH terms & text words [words found in the TITLE or ABSTRACT of a record] for the intervention (i.e helmets). They are combined using OR</p>	<ol style="list-style-type: none"> 4. helmet* .ab,ti 5. exp Head Protective Devices/ 6. 4 or 5 	Intervention (I)

Source: <http://training.cochrane.org/resource/tsc-induction-mentoring-training-guide/appendix-6>

Comparison

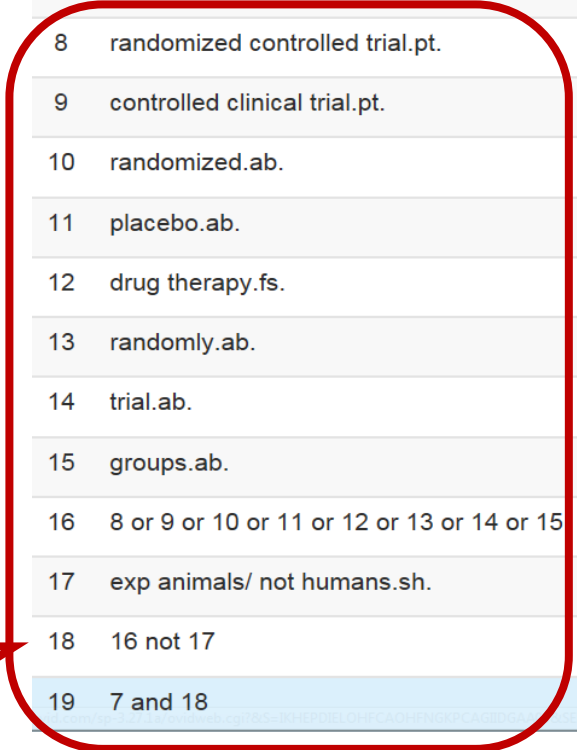
Search			Journals	Books	Multimedia	My Workspace	Mo	
▼ Search History (8)								
<input type="checkbox"/>	# ▲	Searches						Results
<input type="checkbox"/>	1	(bicycl* or cycling or cyclist*).ab,ti,kw.						75951
<input type="checkbox"/>	2	exp Bicycling/						10450
<input type="checkbox"/>	3	1 or 2						78717
<input type="checkbox"/>	4	helmet*.ab,ti,kw.						4936
<input type="checkbox"/>	5	exp Head Protective Devices/						3290
<input type="checkbox"/>	6	4 or 5						5862
<input type="checkbox"/>	7	3 and 6						1316
<input type="checkbox"/>	8	limit 7 to randomized controlled trial						31

Database filter for RCTs



# ▲	Searches	Results
1	(bicycl* or cycling or cyclist*).ab,ti,kw.	75951
2	exp Bicycling/	10450
3	1 or 2	78717
4	helmet*.ab,ti,kw.	4936
5	exp Head Protective Devices/	3290
6	4 or 5	5862
7	3 and 6	1316
8	randomized controlled trial.pt.	498497
9	controlled clinical trial.pt.	99301
10	randomized.ab.	435394
11	placebo.ab.	203373
12	drug therapy.fs.	2120171
13	randomly.ab.	299943
14	trial.ab.	459230
15	groups.ab.	1852118
16	8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	4383015
17	exp animals/ not humans.sh.	4685302
18	16 not 17	3791664
19	7 and 18	213

Cochrane RCT Study design Filter



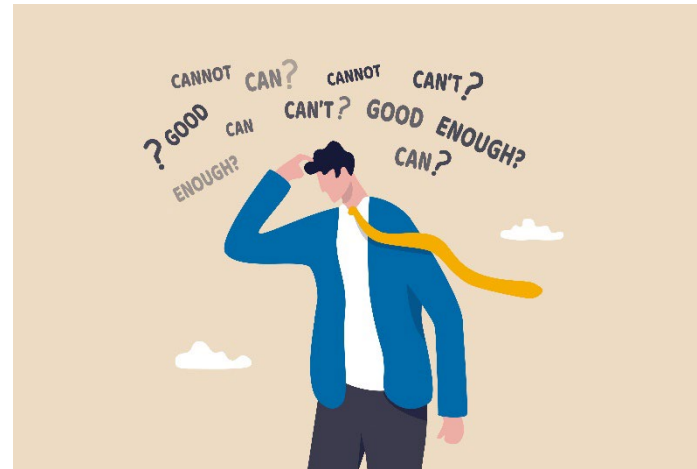
When is a search "good enough"?

Quality assurance with the PRESS Checklist

10
Quality control

A "state-of-the-art" literature search for a SR must meet the PRESS criteria:

Original PRESS Element
Translation of the research question
Boolean and proximity operators
Subject headings
Text word searching (free text)
Spelling, syntax, and line numbers
Limits and filters
Search strategy adaptations



PRESS Checklist: Peer Review of Electronic Search Strategies

TABLE 9: PRESS 2015 EVIDENCE-BASED CHECKLIST

Translation of the research question	<ul style="list-style-type: none"> Does the search strategy match the research question/PICO? Are the search concepts clear? Are there too many or too few PICO elements included? Are the search concepts too narrow or too broad? Does the search retrieve too many or too few records? (Please show number of hits per line.) Are unconventional or complex strategies explained?
Boolean and proximity operators (these vary based on search service)	<ul style="list-style-type: none"> Are Boolean or proximity operators used correctly? Is the use of nesting with brackets appropriate and effective for the search? If NOT is used, is this likely to result in any unintended exclusions? Could precision be improved by using proximity operators (e.g., adjacent, near, within) or phrase-searching instead of AND? Is the width of proximity operators suitable (e.g., might adj5 pick up more variants than adj2)?
Subject headings (database-specific)	<ul style="list-style-type: none"> Are the subject headings relevant? Are any relevant subject headings missing; e.g., previous index terms? Are any subject headings too broad or too narrow? Are subject headings exploded where necessary and vice versa? Are major headings ("starring" or restrict to focus) used? If so, is there adequate justification? Are subheadings missing? Are subheadings attached to subject headings? (Floating subheadings may be preferred.) Are floating subheadings relevant and used appropriately? Are both subject headings and terms in free text (see below) used for each concept?

Checking the search strategy

PubMed

("Diabetes Mellitus, Type 1" Mesh) OR (type 1 diabet* Title/Abstract) OR type I
 diabet*[Title/Abstract] OR diabetes mellitus type 1[Title/Abstract] OR diabetes mellitus type
 I[Title/Abstract] OR T1D[Title/Abstract] OR T1DM[Title/Abstract] OR insulin-dependent
 diabet*[Title/Abstract] OR juvenile-onset diabet*[Title/Abstract] OR sudden-onset
 diabet*[Title/Abstract] OR IDDM[Title/Abstract] OR autoimmune diabet*[Title/Abstract] OR
 brittle diabet*[Title/Abstract] OR ketosis-prone diabet*[Title/Abstract])) AND
 ("Adolescent"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh]) OR (child*[Title/Abstract] OR
 infan*[Title/Abstract] OR adolescen*[Title/Abstract] OR newborn*[Title/Abstract] OR
 preschool*[Title/Abstract] OR pre-school*[Title/Abstract] OR teen*[Title/Abstract] OR
 pediatric*[Title/Abstract] OR paediatric*[Title/Abstract])) AND ("Insulin Infusion
 Systems"[Mesh]) OR (insulin pump*[Title/Abstract] OR insulin infus*[Title/Abstract] OR insulin
 deliver*[Title/Abstract] OR CSII[Title/Abstract])) AND ((randomized controlled trial[pt] OR
 controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR clinical trials as
 topic[mesh:noexp] OR randomly[tiab] OR trial[ti] NOT (animals[mh] NOT humans [mh])))

Disease

AND

Population

AND

Therapy

AND

Study type

NOT

Animal studies

Quality control: Key papers as test set

Have all key papers been identified?

History and Search Details Download Delete

Search	Actions	Details	Query	Results	Time
#10	...	>	Search: #8 AND #9	1	13:41:21
#9	...	>	Search: Ware J 2022 209	1	13:41:05
#8	...	>	Search: (((("Diabetes Mellitus, Type 1"[Mesh]) OR (type 1 diabet* [Title/Abstract] OR type 1 diabet*[Title/Abstract] OR diabetes mellitus type 1[Title/Abstract] OR diabetes mellitus type I[Title/Abstract] OR T1D[Title/Abstract] OR T1DM[Title/Abstract] OR insulin-dependent diabet*[Title/Abstract] OR juvenile-onset diabet*[Title/Abstract] OR sudden-onset diabet*[Title/Abstract] OR IDDM[Title/Abstract] OR autoimmune diabet*[Title/Abstract] OR brittle diabet*[Title/Abstract] OR ketosis-prone diabet*[Title/Abstract])) AND (("Adolescent"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh]) OR (child*[Title/Abstract] OR infan*[Title/Abstract] OR adolescen*[Title/Abstract] OR newborn*[Title/Abstract] OR preschool*[Title/Abstract] OR pre-school*[Title/Abstract] OR teen*[Title/Abstract] OR pediatric*[Title/Abstract] OR paediatric*[Title/Abstract])) AND (("Insulin Infusion Systems"[Mesh] OR (insulin pump*[Title/Abstract] OR insulin infus*[Title/Abstract] OR insulin deliver*[Title/Abstract] OR CSII[Title/Abstract]))) AND ((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR clinical trials as topic[mesh:noexp] OR randomly[tiab] OR trial[ti] NOT (animals[mh] NOT humans [mh])))	574	13:40:09

#10: If the **intersection of the hits from the search strategy and the key paper** results in **1**, the key paper was found with the search strategy.

If **0**, then find out why and **optimize search strategy**.

#9: Key Paper to Review

Ware, Julia et al. "Randomized Trial of Closed-Loop Control in Very Young Children with Type 1 Diabetes." *The New England journal of medicine* vol. 386.3 (2022): 209-219. doi:10.1056/NEJMoa2111673.

#8: Final search strategy

Evidence from other databases

Translate" search strategy syntax

11
Translation
database syntax

Databases use different field codes, truncation characters etc.

Example field codes:

PubMed **[tiab]**

Ovid Medline **.ab,ti.**

Cochrane **:ab,ti**

Attention: Thesaurus

Terms must also be translated!

Fields	PubMed	EBSCO	OvidSP Medline/PsycInfo	Cochrane
Title/ abstract	[tiab]	TI () OR AB ()	().ab,ti.	():ab,ti
Meaningful text	[tw]	TX ()	().mp. (.tw,kf,ot.)	():ab,ti,kw
Including subheadings	"		"	"
Keyword	"Mesh term"[mesh]	DE cinahl heading	exp term/	[mh "mesh term"] ¹
No explode	"Mesh term"[mesh:noexp]	DE cinahl heading+	term/	[mh ^"mesh term"]
with subheading	"Mesh term"/sh[mesh]		exp term/sh	[mh "mesh term"/SH,SH]
just subheading	[sh]	MW	.xs. (exp) of .fs. (noexp)	[mh /SH]
synonyms	-		-	-
Proximity (n terms)	-	Nn - Wn ²	ADJn	NEAR/n - NEXT/n
Phrases	MeSH with "double quotes", free text without quotes	No quotes needed	No quotes needed	"double quotes"
Phrase truncation	No quote*	No quote*	No quote*	"use quote*"
Truncation	End	End/ mid ³	End/ mid	End/ mid
endless	*	*	*	*
0 or 1 character		#	?	
1 character		?	#	?
Filters				
Limit humans	NOT (animals[mesh] NOT humans[mesh])	NOT (MH animals+ NOT MH humans)	NOT (animals NOT humans).sh.	(Not necessary)
Added since	yyyy/mm/dd:3000 [mhda]	EM yyyy(mm)(dd)-	limit 1 to rd=yyyymmdd-yyyymmdd	AND ("yyyy, Issue m" OR "yyyy Issue m+1" etc...) ⁴
Publication date		S1	limit 1 to yr=yyyy-yyyy	
Recordset-numbers	#1	Cinahl headings	1 ⁵	#1
Thesaurus	MeSH		MeSH / own thesaurus	MeSH

Translation PubMed to Cochrane Library

More than one possible solution

Cochrane Library (advanced search)

```
("type 1 diabetes" OR "type I diabetes " OR "diabetes mellitus type 1" OR "diabetes mellitus type I" OR T1D OR T1DM OR "insulin-dependent diabetes" OR "juvenile-onset diabetes" OR "sudden-onset diabetes" OR IDDM OR "autoimmune diabetes" OR "brittle diabetes" OR "ketosis-prone diabetes"):ti,ab)
AND
((child* OR infan* OR adolescen* OR newborn* OR preschool* OR pre-school* OR teen* OR pediatric* OR paediatric*):ti,ab)
AND
(("insulin pump" OR "insulin pumps" OR "insulin infusion" OR "insulin delivery" OR CSII):ti,ab)
```

Cochrane Library (expert search)

```
(((((diabet*) NEAR/3 ("type 1" OR "type 1" OR "type I" OR insulin-dependent OR juvenile* OR sudden-onset OR early-onset OR autoimmune* OR auto-immune OR brittle* OR ketosis-prone OR ketoacid* OR keto-acidotic OR keto-acidosis)) OR T1D OR T1DM OR IDDM OR "dm 1"):ab,ti) AND ((child* OR infan* OR adolescen* OR newborn* OR preschool* OR pre NEXT school* OR teen* OR pediatric* OR paediatric*):ab,ti) AND (((insulin NEAR/3 (infus* OR pump* OR deliver*)) OR CSII):ab,ti,kw)
```

→ Use proximity operators

→ Expand search fields

Translation PubMed in ClinicalTrials.gov

Simplify search string for trial registries

PubMed

((("Diabetes Mellitus, Type 1"[Mesh]) OR (type 1 diabet*[Title/Abstract] OR type I diabet*[Title/Abstract] OR diabetes mellitus type 1[Title/Abstract] OR diabetes mellitus type I[Title/Abstract] OR T1D[Title/Abstract] OR T1DM[Title/Abstract] OR insulin-dependent diabet*[Title/Abstract] OR juvenile-onset diabet*[Title/Abstract] OR sudden-onset diabet*[Title/Abstract] OR IDDM[Title/Abstract] OR autoimmune diabet*[Title/Abstract] OR brittle diabet*[Title/Abstract] OR ketosis-prone diabet*[Title/Abstract])) AND (("Adolescent"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh]) OR (child*[Title/Abstract] OR infan*[Title/Abstract] OR adolescen*[Title/Abstract] OR newborn*[Title/Abstract] OR preschool*[Title/Abstract] OR pre-school*[Title/Abstract] OR teen*[Title/Abstract] OR pediatric*[Title/Abstract] OR paediatric*[Title/Abstract])) AND (("Insulin Infusion Systems"[Mesh]) OR (insulin pump*[Title/Abstract] OR insulin infus*[Title/Abstract] OR insulin deliver*[Title/Abstract] OR CSII[Title/Abstract]))) AND ((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR clinical trials as topic[mesh:noexp] OR randomly[tiab] OR trial[ti] NOT (animals[mh] NOT humans [mh])))

ClinicalTrials.gov

- *Condition or disease:*
Type 1 Diabetes OR Insulin-Dependent Diabetes Mellitus OR Juvenile-Onset Diabetes OR Sudden-Onset Diabetes OR Autoimmune Diabetes OR Brittle Diabetes OR Ketosis-Prone Diabetes OR IDDM OR T1D OR T1DM

- *Intervention:*
insulin infusion OR
insulin pump OR
insulin delivery

- *Age Filter:*
Child (birth - 17)



Export & deduplicate the search results

12
Export /
Deduplication

← **Export** hits from all databases to literature management program and

remove duplicates →

	Before deduplication	After deduplication
Embase.com	2968	1369
Medline (Ovid)	1919	1913
Cochrane Database of Systematic Reviews	3	1
Cochrane CENTRAL = trials	251	95
CINAHL (EBSCOhost)	3108	1650
Google Scholar	First 200	31
Total	8449	5059

3390 duplicated records have been removed

Duplicate check

Delete records found by multiple databases

Most literature management programs offer a duplicate check.
This is usually insufficient and requires a final manual check.



DUPLICATE CONTENT

Alternative deduplication methods (more information in the [learning materials on ILIAS](#)):

- Bramer et al. 2016, Duplicate removal with the "**Bramer Method**" in EndNote.
Bramer WM, Giustini D, de Jonge GB, Holland L, Bekhuis T. [De-duplication of database search results for systematic reviews in EndNote](#). J Med Libr Assoc. 2016 Jul;104(3):240-3. doi: 10.3163/1536-5050.104.3.014. erratum in: J Med Libr Assoc. 2017 Jan;105(1):111.
- [Deduklick](#), a tool based on an algorithm developed at the University of Bern using AI (however, this tool is fee-based):
Borissov N, Haas Q, Minder B, Kopp-Heim D, von Gernler M, Janka H, Teodoro D, Amini P. [Reducing systematic review burden using Deduklick: a novel, automated, reliable, and explainable deduplication algorithm to foster medical research](#). Syst Rev. 2022 Aug 17;11(1):172. doi: 10.1186/s13643-022-02045-9.
- [Deduplicator](#), part of the Systematic Review Accelerator at Bond University (Australia).

Documentation of the search strategy

Saving the search in the databases

13

Documentation

Reproducibility

Set alerts to continuously receive new results for the search

Update the search before submitting the manuscript. (after approx. 6 months)



Search: (((("Diabetes Mellitus, Type 1"[Mesh]) OR (type 1 diabet* [Title/Abstract] OR type I diabet*[Title/Abstract] OR diabetes mellitus type 1[Title/Abstract] OR diabetes mellitus type I[Title/Abstract] OR T1DM[Title/Abstract] OR insulin-dependent diabet*[Title/Abstract] OR juvenile-onset diabet*[Title/Abstract] OR sudden-onset diabet* [Title/Abstract] OR IDDM[Title/Abstract] OR autoimmune diabet* [Title/Abstract])) AND (((("Adolescent"[Mesh]) OR "Child"[Mesh]) OR "Infant"[Mesh]) OR (child*[Title/Abstract] OR infan*[Title/Abstract] OR adolescen*[Title/Abstract] OR newborn*[Title/Abstract] OR preschool*[Title/Abstract] OR teen*[Title/Abstract] OR pediatric* [Title/Abstract] OR paediatric*[Title/Abstract])) AND (("Insulin Infusion Systems"[Mesh]) OR (insulin pump*[Title/Abstract] OR insulin infus*[Title/Abstract]))) AND (randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR drug therapy[sh] OR randomly[tiab] OR trial[tiab] OR groups[tiab] NOT (animals [mh] NOT humans [mh])))

Documentation Concepts Sheet

For your own documentation:

Explain your search strategy
to your supervisor

Understand your search
Strategy even after
months / years



<p>Concept 1: Type 1 Diabetes</p>	<p><i>Subject Heading [MeSH]</i> "Diabetes Mellitus, Type 1"[Mesh] OR <i>Textwords [Title/Abstract]</i> type 1 diabet* OR type I diabet* OR diabetes mellitus type 1 OR diabetes mellitus type I OR T1D OR T1DM OR insulin-dependent diabet* OR juvenile-onset diabet* OR sudden-onset diabet* OR IDDM OR autoimmune diabet* OR brittle diabet* OR ketosis-prone diabet*</p>
<p>AND</p>	
<p>Concept 2: Children/Adolescents (age: up to 18 years)</p> <p><i>Please note: If you create a search for a systematic review, make sure to include even more terms, like: youth*, schoolchild*, girl*, boy* etc.</i></p>	<p><i>Subject Heading [MeSH]</i> "Adolescent"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh] OR <i>Textwords [Title/Abstract]</i> child* OR infan* OR adolescen* OR newborn* OR preschool* OR teen* OR pediatric* OR paediatric*</p>
<p>AND</p>	
<p>Concept 3: Insulin pump <i>continuous subcutaneous insulin infusion (CSII)</i></p>	<p><i>Subject Heading [MeSH]</i> "Insulin Infusion Systems"[Mesh] OR <i>Textwords [Title/Abstract]</i> insulin pump* OR insulin infus* OR CSII</p>

Reporting of the search strategies

The PRISMA Checklist Points #6 & #7

 14
Reporting

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)



PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item
TITLE		
Title	1	Identify the report as a systematic review.
ABSTRACT		
Abstract	2	See the PRISMA 2020 for Abstracts checklist.
INTRODUCTION		
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened records independently, and if applicable, details of automation tools used in the process.
	9	Specify the methods used to collect data from the included studies, including how many reviewers collected data from each report, whether data were collected from study investigators, and if applicable, details of automation tools used in the process.
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome of interest were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources, adverse events, reasons for non-compliance). Specify any assumptions made about any missing or unclear information.

PRISMA 2020 Statement at
<http://www.prisma-statement.org/>

Note: ALL search strategies!

Section/topic	#	Checklist item	Location(s) Reported
INFORMATION SOURCES AND METHODS			
Database name	1	Name each individual database searched, stating the platform for each.	
Multi-database searching	2	If databases were searched simultaneously on a single platform, state the name of the platform, listing all of the databases searched.	
Study registries	3	List any study registries searched.	
Online resources and browsing	4	Describe any online or print source purposefully searched or browsed (e.g., tables of contents, print conference proceedings, web sites), and how this was done.	
Citation searching	5	Indicate whether cited references or citing references were examined, and describe any methods used for locating cited/citing references (e.g., browsing reference lists, using a citation index, setting up email alerts for references citing included studies).	
Contacts	6	Indicate whether additional studies or data were sought by contacting authors, experts, manufacturers, or others.	
Other methods	7	Describe any additional information sources or search methods used.	
SEARCH STRATEGIES			
Full search strategies	8	Include the search strategies for each database and information source, copied and pasted exactly as run.	
Limits and restrictions	9	Specify that no limits were used, or describe any limits or restrictions applied to a search (e.g., date or time period, language, study design) and provide justification for their use.	
Search filters	10	Indicate whether published search filters were used (as originally designed or modified), and if so, cite the filter(s) used.	
Prior work	11	Indicate when search strategies from other literature reviews were adapted or reused for a substantive part or all of the search, citing the previous review(s).	
Updates	12	Report the methods used to update the search(es) (e.g., rerunning searches, email alerts).	
Dates of searches	13	For each search strategy, provide the date when the last search occurred.	
PEER REVIEW			
Peer review	14	Describe any search peer review process.	
MANAGING RECORDS			
Total Records	15	Document the total number of records identified from each database and other information sources.	
Deduplication	16	Describe the processes and any software used to deduplicate records from multiple database searches and other information sources.	

PRISMA-S 2021 Extension at <http://prisma-statement.org/prisma-search>



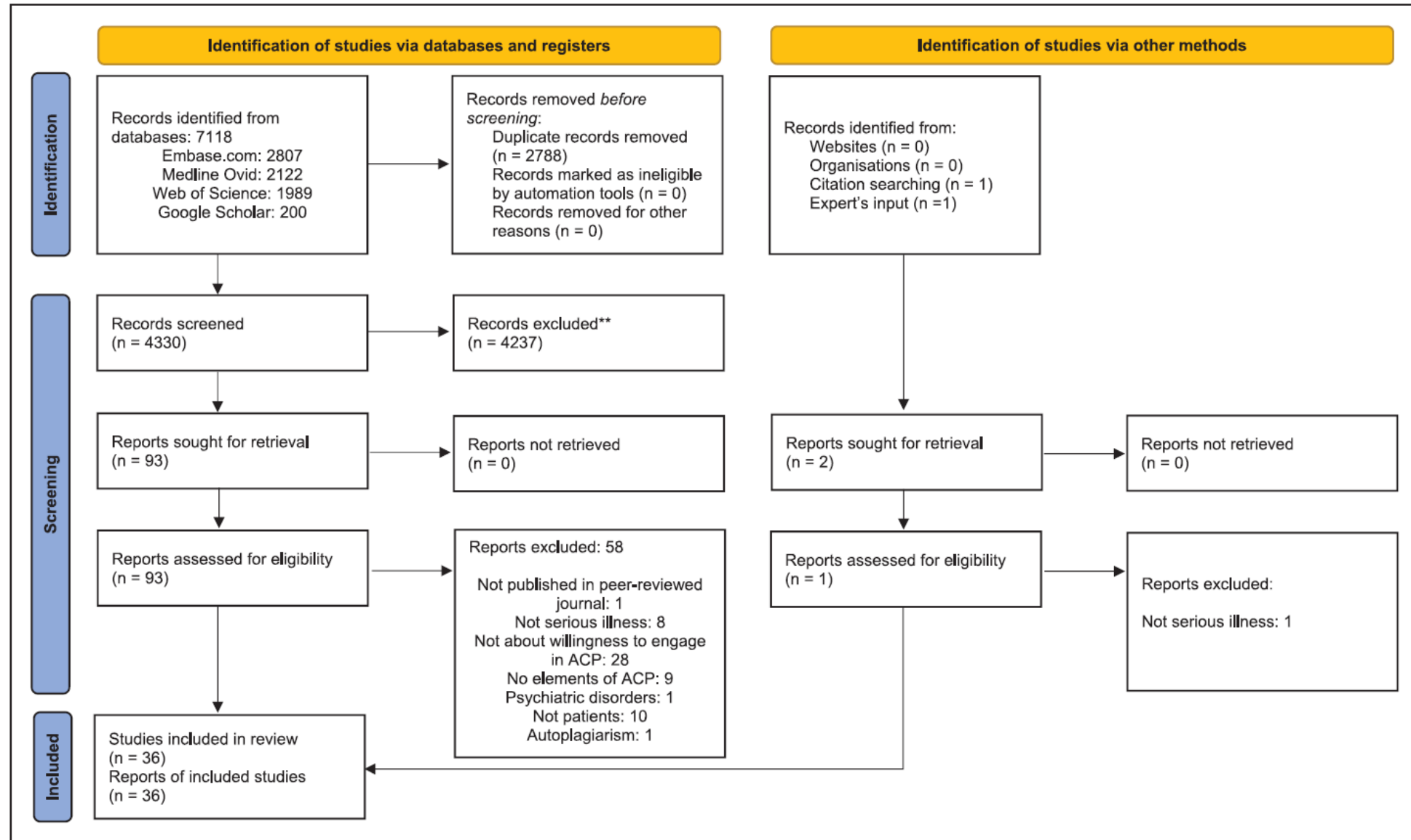
PRISMA 2020 Flow Diagram

PRISMA 2020:

Page MJ, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021 Mar 29;372:n71. doi: [10.1136/bmj.n71](https://doi.org/10.1136/bmj.n71)

Example of the new version (PRISMA 2020 Flow Diagram) of:

Martina D, Geerse OP, Lin CP, et al. Asian patients' perspectives on advance care planning: a mixed-method systematic review and conceptual framework [published online ahead of print, 2021 Sep 6]. *Palliat Med*. 021;2692163211042530. doi:10.1177/02692163211042530



Reporting: Appendix in the paper

Appendix 1. Search strategies

Search terms and databases

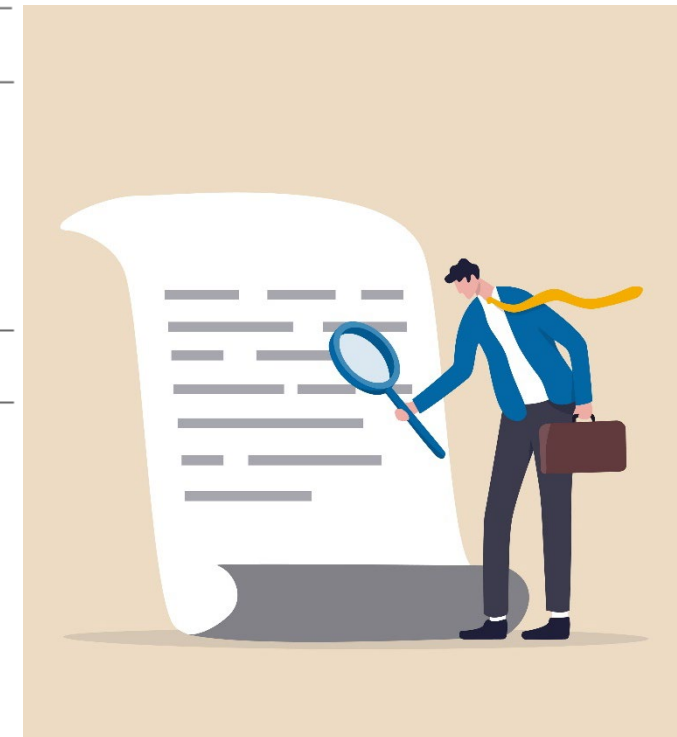
Unless otherwise stated, search terms are free text terms.

Abbreviations:

'\$': stands for any character; '?': substitutes one or no character; adj: adjacent (i.e. number of words within range of search term); exp: exploded MeSH; MeSH: medical subject heading (MEDLINE medical index term); pt: publication type; sh: MeSH; tw: text word.

The Cochrane Library

- #1 MeSH descriptor Diabetes mellitus, type 1 explode all trees
- #2 (IDDM in All Text or T1DM in All Text or T1D in All Text)
- #3 (("insulin* depend*" in All Text or "insulindepend*" in All Text) and not ("non insulin* depend*" in All Text or "non insulindepend*" in All Text))
- #4 ("typ? 1 diabet*" in All Text or "typ?1 diabet*" in All Text or "typ? 1 diabet*" in All Text or "typ?! diabet*" in All Text)
- #5 (child* in All Text near/2 diabet* in All Text)
- #6 (acidos* in All Text near/2 diabet* in All Text)
- #7 (labil* in All Text near/2 diabet* in All Text)
- #8 (britt* in All Text near/2 diabet* in All Text)
- #9 (keto* in All Text near/2 diabet* in All Text)
- #10 (juvenil* in All Text near/2 diabet* in All Text)
- #11 (autoimmun* in All Text near/2 diabet* in All Text)





01
Research question

02
Protocol /
Databases

03
Block Building /
PICO

04
Boolean
operators



14
Reporting

13
Document-
ation

12
Export /
Deduplicati
on



05
Scoping
Search
Key Papers

06
Text words

07
Thesaurus
terms

11
Translation
database syntax

10
Quality control

09
Filters / Limits

08
Concepts Sheet



„Reading“ a complex search string

Research Question:

What are the **risk factors** for patients to **fall** during a **hospitalization on a medical ward**?

Limit to **adult patients, no letters, editorials, etc.**

PubMed (<https://pubmed.ncbi.nlm.nih.gov/>)

```
(Hospitals[Mesh] OR Hospitalization[Mesh:no exp] OR Inpatients[Mesh:no exp] OR "Patient Care"[Mesh:no exp] OR "Internal Medicine"[Mesh:no exp] OR (hospital*[tiab] OR inpatient*[tiab] OR in-patient[tiab] OR "non-ICU patient*" [tiab] OR "medical patient*" [tiab] OR "internal medicine"[tiab] OR "acute care setting*" [tiab] OR ward*[tiab])) AND ("Accidental Falls"[Majr:no exp] OR ("accidental fall*" [tiab] OR fall[tiab] OR falling*[tiab] OR falls[tiab] OR faller*[tiab] OR fallen[tiab] OR fell[tiab] OR near-fall[tiab] OR fall-related[tiab] OR slip*[tiab] OR trip[tiab] OR tripping[tiab] OR stumbl*[tiab] OR tumb*[tiab] OR collaps*[tiab])) AND (Risk[Mesh] OR Prevalence[Mesh:no exp] OR Incidence[Mesh:no exp] OR (risk*[tiab] OR threat*[tiab] OR predict*[tiab] OR implicat*[tiab] OR probabilit*[tiab] OR prevalenc*[tiab] OR incidence*[tiab] OR associat*[tiab])) NOT (("infant"[mesh] OR "child"[mesh] OR "adolescent"[mesh]) NOT ("adult"[mesh])) NOT ((paediatric*[ti] OR pediatric*[ti] OR child*[ti])) NOT (letter[pt] OR news[pt] OR comment[pt] OR editorial[pt] OR congress[pt])
```

„Reading“ a complex search string

Making block building visible

Research Question:

What are the risk factors for patients to fall during a hospitalization on a medical ward?

Limit to adult patients, no letters, editorials, etc.

PubMed (<https://pubmed.ncbi.nlm.nih.gov/>)

```
(Hospitals[Mesh] OR Hospitalization[Mesh:no exp] OR Inpatients[Mesh:no exp] OR "Patient Care"[Mesh:no exp] OR "Internal Medicine"[Mesh:no exp] OR (hospital*[tiab] OR inpatient*[tiab] OR in-patient[tiab] OR "non-ICU patient"[tiab] OR "medical patient"[tiab] OR "internal medicine"[tiab] OR "acute care setting"[tiab] OR ward*[tiab])) AND ("Accidental Falls"[Majr:no exp] OR ("accidental fall"[tiab] OR fall[tiab] OR falling*[tiab] OR falls[tiab] OR faller*[tiab] OR fallen[tiab] OR fell[tiab] OR near-fall[tiab] OR fall-related[tiab] OR slip*[tiab] OR trip[tiab] OR tripping[tiab] OR stumbl*[tiab] OR tumb*[tiab] OR collaps*[tiab])) AND (Risk[Mesh] OR Prevalence[Mesh:no exp] OR Incidence[Mesh:no exp] OR (risk*[tiab] OR threat*[tiab] OR predict*[tiab] OR implicat*[tiab] OR probabilit*[tiab] OR prevalenc*[tiab] OR incidence*[tiab] OR associat*[tiab])) NOT (("infant"[mesh] OR "child"[mesh] OR "adolescent"[mesh]) NOT ("adult"[mesh])) NOT ((paediatric*[ti] OR pediatric*[ti] OR child*[ti])) NOT (letter[pt] OR news[pt] OR comment[pt] OR editorial[pt] OR congress[pt]))
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Pharmacy update
Management of insulin pump therapy in children with type 1 diabetes

Nadeem Abdullah¹, Claire Pesterfield¹, Daniela Elleri^{1, 2}, David B Dunger^{1, 2}

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PubMed search help

PubMed Tutorial

[Video tutorial](#) for the search process in PubMed (by Welch Medical Library, Johns Hopkins University)

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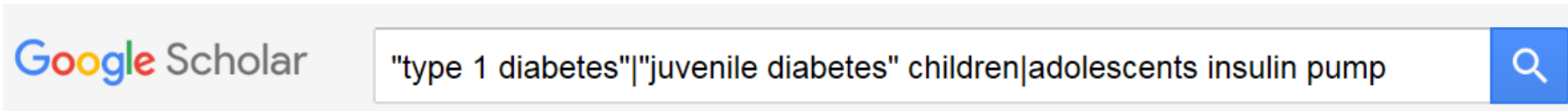
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Quick Tours for Everyone

Title	Date	Runtime	Format
PubMed: Find articles by author A brief tutorial on how to find articles by an author using PubMed.	Jan. 22, 2020	2 min(s)	MP4 Video / Quick Tour
PubMed: Find articles by journal A brief tutorial on how to find articles from a journal using PubMed.	Jan. 23, 2020	2 min(s)	MP4 Video / Quick Tour
PubMed: Find articles from a citation A brief tutorial on how to find articles from citation information using PubMed.	Jan. 24, 2020	2 min(s)	MP4 Video / Quick Tour
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PubMed: Find the latest treatments for a disease or disorder A brief tutorial on how to find the latest treatments for a disease or disorder using PubMed.	July 27, 2021	2 min(s)	MP4 Video / Quick Tour
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Google Scholar Search Tips



["Google Scholar: the ultimate guide"](#)
(Paperpile)

[Tips to improve your searching](#)
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Google Scholar search

Authors: Years: -

Publication name: ISSN:

Title words:

Keywords: "insulin pump" "type 2 diabetes"|NIIDDM "systematic review"|RCT|randomised

Maximum number of results: Include: CITATION records Patents

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Cites	Per year	Rank	Authors	Title
<input checked="" type="checkbox"/> h 267	26.70	1	Y Reznik, O Cohen...	Insulin pump treatment compared with multiple dai
<input checked="" type="checkbox"/> h 46	6.57	2	Z Landau, I Raz, J ...	The role of insulin pump therapy for type 2 diabetes
<input checked="" type="checkbox"/> h 78	9.75	3	R Aronson, Y Rezn...	Sustained efficacy of insulin pump therapy compare
<input checked="" type="checkbox"/> 28	2.80	4	R Aronson, O Coh...	OpT2mise: a randomized controlled trial to compare
<input checked="" type="checkbox"/> h 69	4.93	5	BW Bode	Insulin pump use in type 2 diabetes
<input checked="" type="checkbox"/> 22	2.75	6	J Morera, M Joube...	Sustained efficacy of insulin pump therapy in type 2
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<input checked="" type="checkbox"/> 0	0.00	8	AL Borel, S Lablan...	... Insulin Therapy for People With Type 2 Diabetes Tr
<input checked="" type="checkbox"/> h 61	5.55	9	Y Reznik, O Cohen	Insulin pump for type 2 diabetes: use and misuse of
<input checked="" type="checkbox"/> 27	4.50	10	DL Levitt, EK Span...	Insulin pump and continuous glucose monitor initia
<input checked="" type="checkbox"/> h 160	10.00	11	JC Pickup, E Renard	Long-acting insulin analogs versus insulin pump the
<input checked="" type="checkbox"/> h 54	18.00	12	G Freckmann, S B...	Insulin pump therapy for patients with type 2 diabet
<input checked="" type="checkbox"/> 44	7.33	13	RA Vigersky, S Hu...	... dose, and treatment satisfaction with insulin pum
<input checked="" type="checkbox"/> h 50	8.33	14	D Ehrmann, B Kulz...	Efficacy of an education program for people with di
<input checked="" type="checkbox"/> h 69	6.90	15	K Kumareswaran, ...	Feasibility of closed-loop insulin delivery in type 2 d

h-index: 46

g-index: 99

hI,norm: 29

hI,annual: 1.04

hA-index: 18

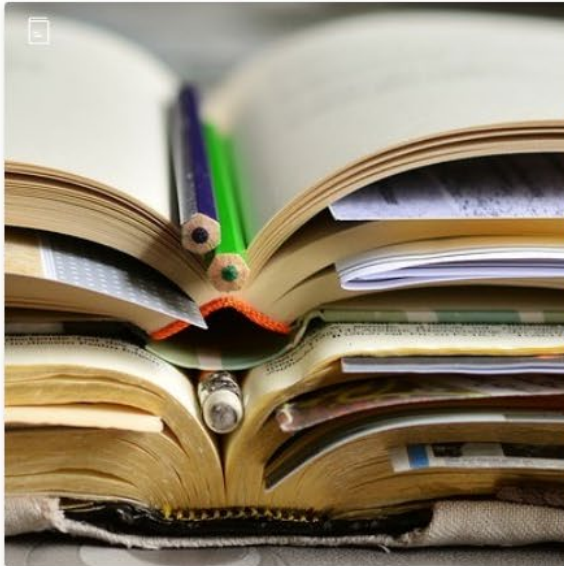
Papers with ACC >= 1,2,5,10,20:
90,83,54,31,17

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Training Material & Templates on ILIAS

How to Build a Robust, Comprehensive Search of the Literature for Evidence Synthesis



1 | The Basics of Literature Searching (Theory)

Overview of all you need to know about systematic literature searching before you start out



2 | Guided Search Examples (Practical)

Building a search strategy step-by-step in Ovid Medline and PubMed (with lots of explanations)



3 | Templates, Tools & Checklists

Useful templates, tools, weblinks and checklists to build search strategies in multiple databases, remove duplicate content, an...



4 | Further training needed?

Links to websites with recommended (advanced) training guides on systematic literature searching

- **Step-by-step instructions for a search in PubMed**
- **Step-by-step instructions for a search in Medline (via Ovid)**
- **Templates (Concepts Sheet, PRISMA Flow Chart, etc.)**

- Tools for translation into various database languages
- Glossary for systematic literature search
- Instructions for working with EndNote
- Web links to other training sites

How to access Literature Search Services @Uni Bern

ISPM or BIHAM Affiliation:

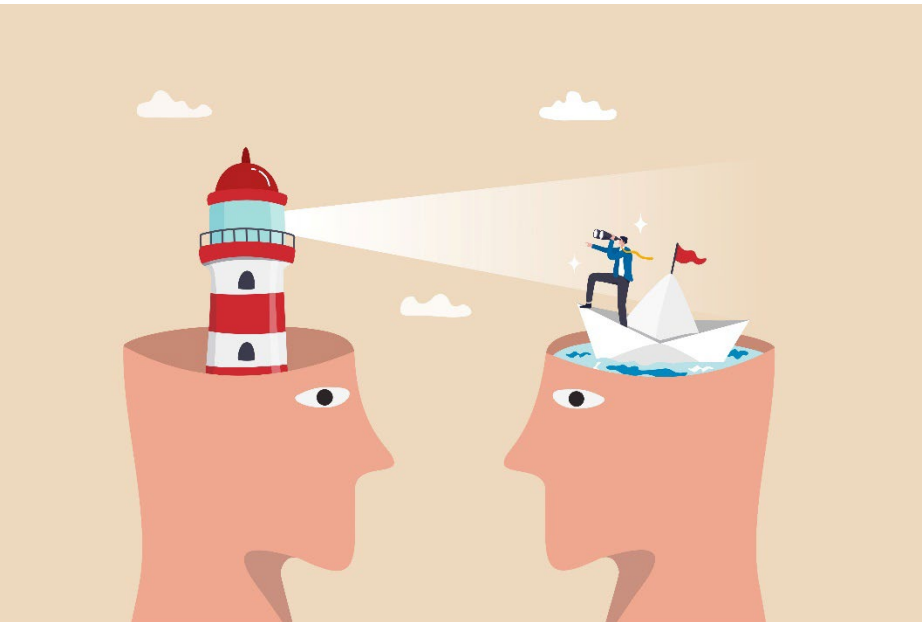
- Contact: biblio.ispm@unibe.ch
- Submit a Literature Search Request Form via the Intranet: [Link](#)

Other medical institutes & university hospital (Inselspital) researchers:

- Contact the Medical Library at support_med.ub@unibe.ch
- Submit your search request here: [Link](#)

SR Process Assistance

Interactive [LibGuide](#)
[Monash University Library](#)



Systematic Review: Home

Home
Getting started
Manuals, documentation & PRISMA
Develop question & key concepts
Look for existing reviews
Scoping searches & gold set
Identify search terms
Select databases & grey literature sources
Develop criteria & protocol
Run your search
Limits & filters
Review & test your search
Save & manage your search results
Database search translation
Screening process steps
Assess quality of your included studies

About systematic reviews

A systematic review is a type of literature review that demonstrates your awareness of existing primary research in your field. It is sometimes referred to as secondary research as it is research conducted on research.

Using this guide

Our guide is designed to help you:

- Understand the purpose of systematic reviews
- Follow a clear process to create your systematic review
- Adhere to relevant standards, guidelines or manuals
- Search for existing reviews
- Develop a research question and key concepts
- Select databases and grey literature sources

Get help

Get help from a librarian when you need support beyond what you can find in this guide. 15-minute bookings are available for students, educators, and researchers.

1 hour consultations are available to HDR students and Researchers only. For medical/biomedical systematic-style reviews, see [Request a consultation](#) for details on the review support service.

[Next: Getting started >>](#)

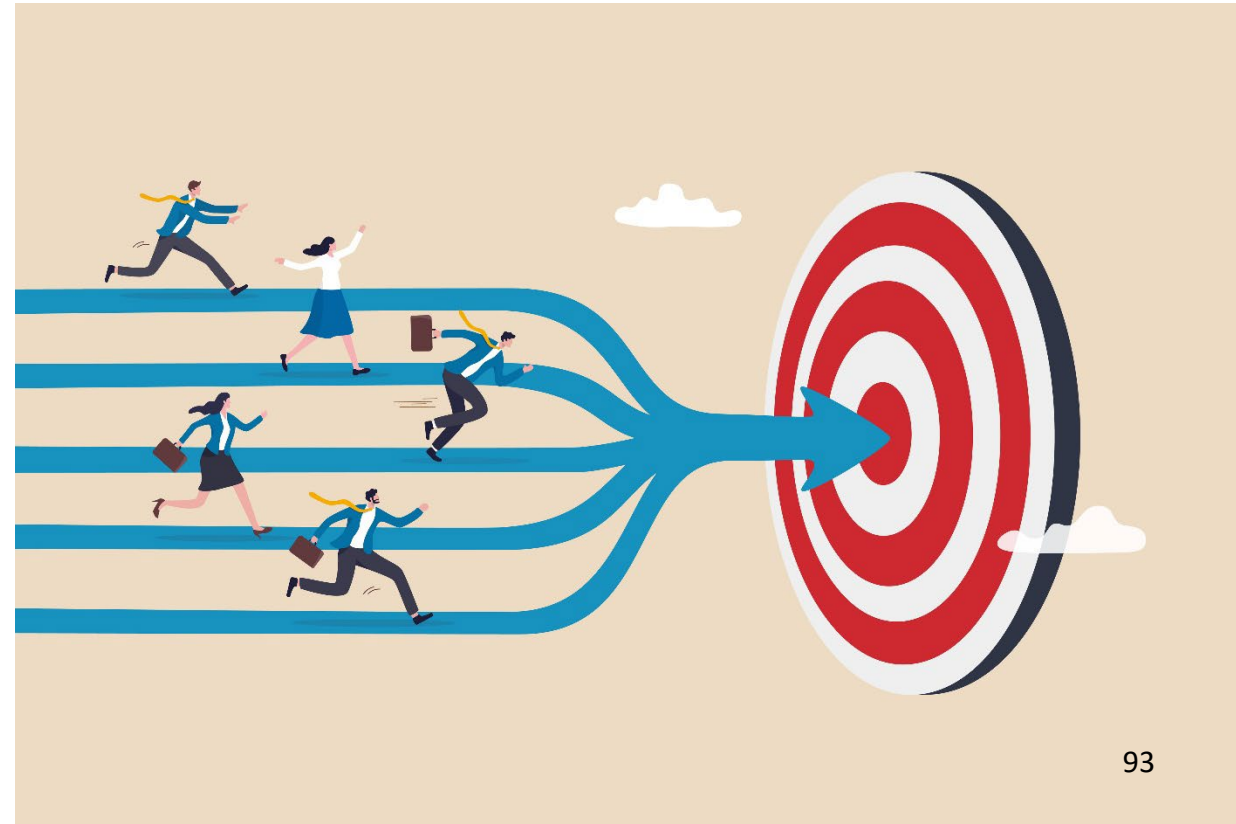
Literature search: how do you go about it?

Helpful video tutorials

Simple, easy to understand videos (English) about

[Starting a search](#) and [Tips & tricks](#)

(by the University of Reading Library)



Top 3 Take-Home Messages

1. Allow **enough time** for a state-of-the-art literature search.



2. ALWAYS take the **block building approach** (concepts sheet).



3. **Document** the search process on an **ongoing basis**.

