Developing and Validating a PubMed Infant Hedge: An MLA Pediatrics Librarians Caucus Initiative

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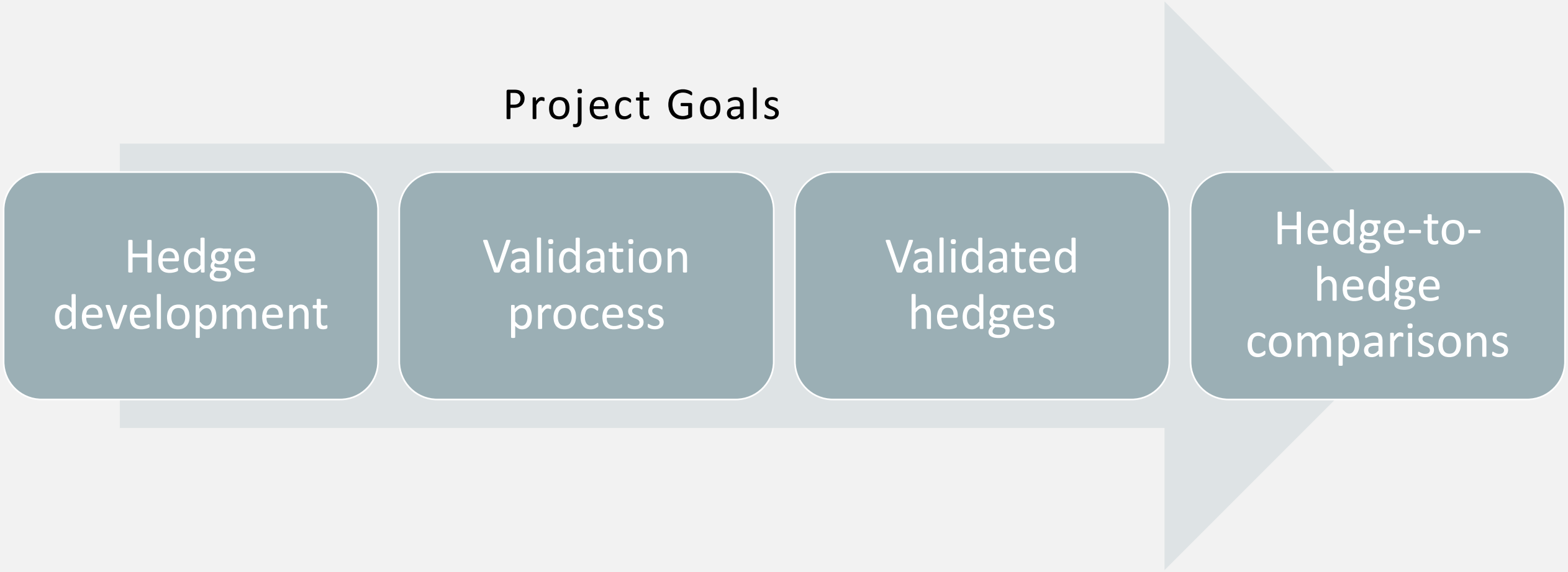
OBJECTIVES

MLA Pediatrics Librarians Caucus members expressed a need for updated pediatric hedges because of revisions to PubMed's search algorithm and librarians' growing collaboration on systematic reviews. Therefore, to create modular hedges based on age groups, the caucus started with an initiative to develop and validate five infant search hedges for use in PubMed. Four hedges were developed by the caucus, based on a combination of personal experience and existing published hedges. These hedges are sensitive and intended for systematic reviews and other broad searches. The fifth hedge, for comparison purposes, is PubMed's infant filter.

BACKGROUND



Nelson, T.M. (2021, March 25). Call for Participation in New Search Hedges Project. MLA Connect. https://www.mlanet.org/p/bl/ar/blogaid=3375

TIMELINE

Summer-Fall 2020 (background research):

- Compiled and reviewed pediatric search hedges
- Compiled and reviewed search hedge validation processes

Winter 2021 (decision-making):

- Decided to focus on sensitive infant hedges for PubMed
- Developed infant search hedges
- Decided on validation process
- Talked to MLA caucuses interested in validating search hedges

Spring-Summer 2021 (pilot project):

- Consulted with statistician
- Planned pilot project
- Registered protocol in OSF
- Completed pilot project

Spring 2022 (analysis):

- Completed hedge validation project
- Analyzed results

METHODS: HEDGE DEVELOPMENT

Hedge #1: “no field tags”

("Infant"[Mesh] OR "Infant Health"[Mesh] OR "Infant Welfare"[Mesh] OR "Infant Death"[Mesh] OR "Sudden Infant Death"[Mesh] OR "Infant Mortality"[Mesh] OR "Infant Behavior"[Mesh] OR "Infant Care"[Mesh] OR "Infant, Newborn"[Mesh] OR "Infant, Low Birth Weight"[Mesh] OR "Infant, Small for Gestational Age"[Mesh] OR "Infant, Very Low Birth Weight"[Mesh] OR "Infant, Extremely Low Birth Weight"[Mesh] OR infant OR infants OR infantile OR infancy OR infantile OR "Infant, Postmature"[Mesh] OR "Infant, Premature"[Mesh] OR "Infant, Extremely Premature"[Mesh] OR "Premature Birth"[Mesh] OR premature OR prematurity OR preterm OR pre-term OR premie OR premies OR perinatal OR peri-natal OR perinat* OR "Perinatal Death"[Mesh] OR "Perinatal Mortality"[Mesh] OR "Perinatal Care"[Mesh] OR "Postnatal Care"[Mesh] OR postnatal OR post-natal OR postnatal* OR newborn OR newborns OR neonate OR neonates OR neonatal OR neonatale OR neonatales OR neonatle OR neonatles OR neonatally OR neonatorum OR "Neonatal Screening"[Mesh] OR "Neonatology"[Mesh] OR "Neonatologists"[Mesh] OR "Neonatal Nursing"[Mesh] OR "Nurses, Neonatal"[Mesh] OR neonatology OR neonatologist OR neonatologists OR "Intensive Care, Neonatal"[Mesh] OR "Intensive Care Units, Neonatal"[Mesh] OR NICU OR NICUs OR "Neonatal Screening"[Mesh] OR "Nurseries, Infant"[Mesh] OR "Nurseries, Hospital"[Mesh] OR nursery OR nurseries OR baby OR babies)

METHODS: SEARCH HEDGES

Hedge #1

“no field tags”

- Search strategy on previous slide

Hedge #2

“tw field tags”

- Same as #1 but with [tw] field tags

Hedge #3

“tiab field tags”

- Same as #1 but with [tiab] field tags

Hedge #4

“super simple”

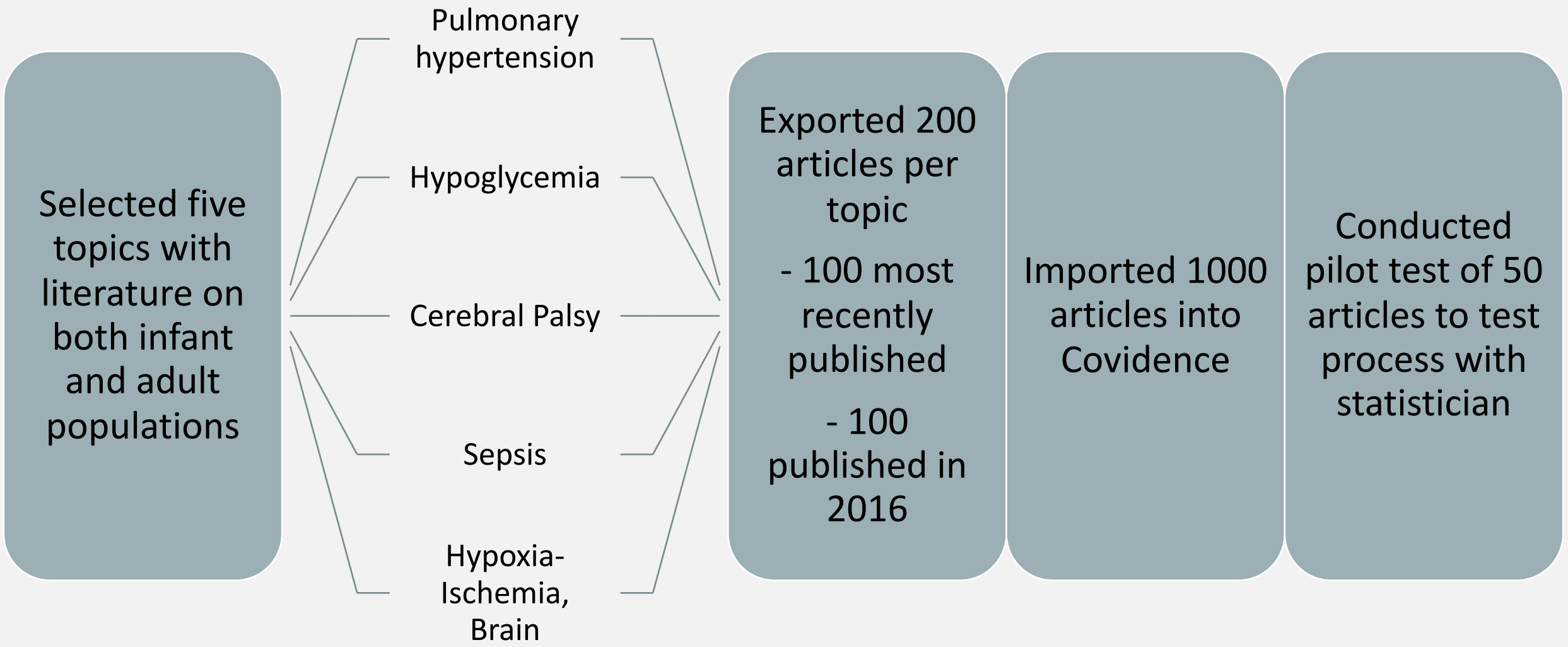
- (infan* OR babies OR neonat* OR newborns)

Hedge #5

“PubMed infant filter”

- PubMed filter: Infant: birth-23 months

METHODS

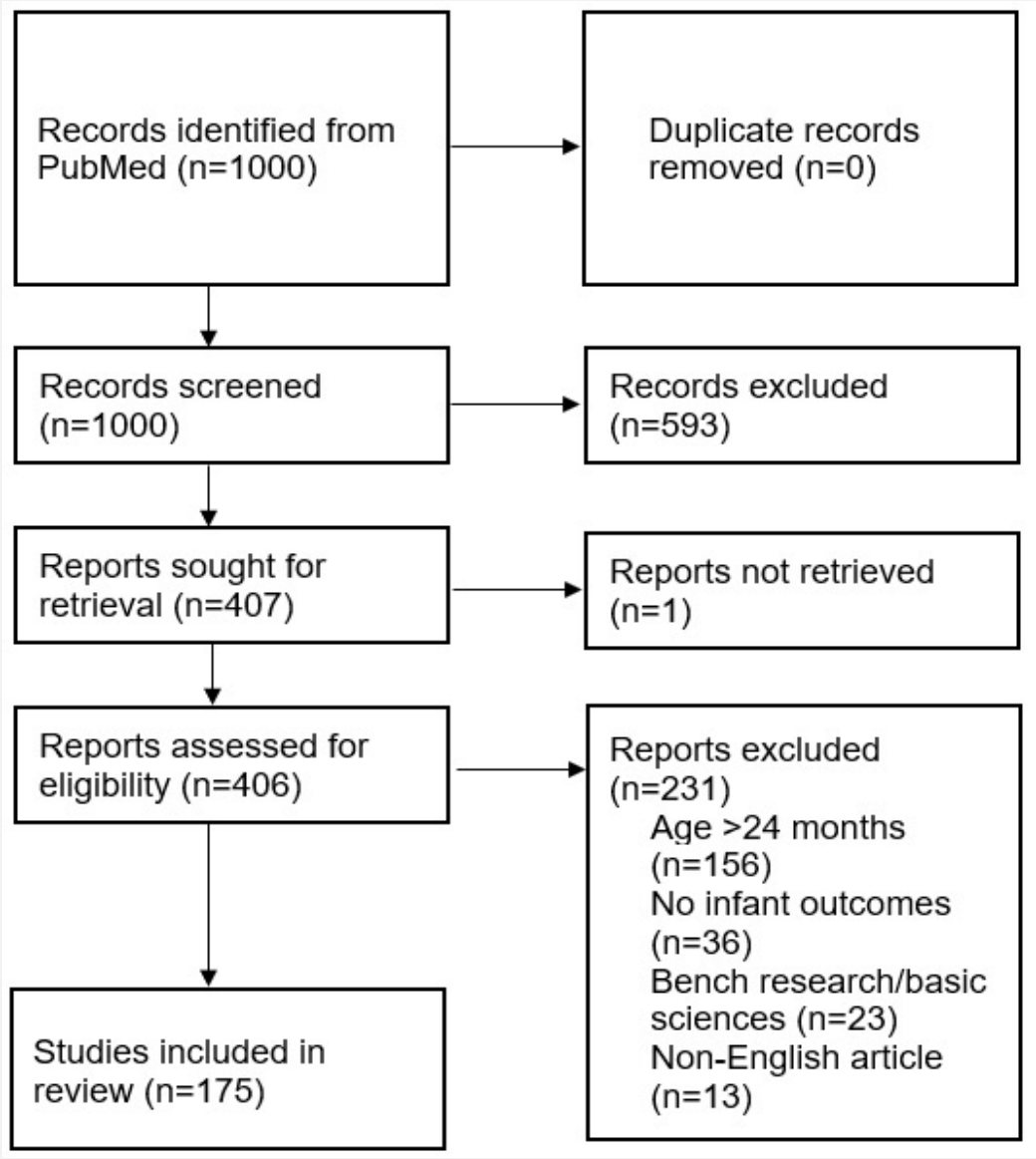

Selected five topics with literature on both infant and adult populations
Pulmonary hypertension
Hypoglycemia
Cerebral Palsy
Sepsis
Hypoxia-Ischemia, Brain
Exported 200 articles per topic
- 100 most recently published
- 100 published in 2016
Imported 1000 articles into Covidence
Conducted pilot test of 50 articles to test process with statistician

METHODS: SCREENING

Five reviewers independently screened title/abstracts and full-text with two votes needed per reference.

A third reviewer resolved conflicts.

The set of included articles is the true reference set used to calculate the interrater reliability, sensitivity and specificity of each hedge.



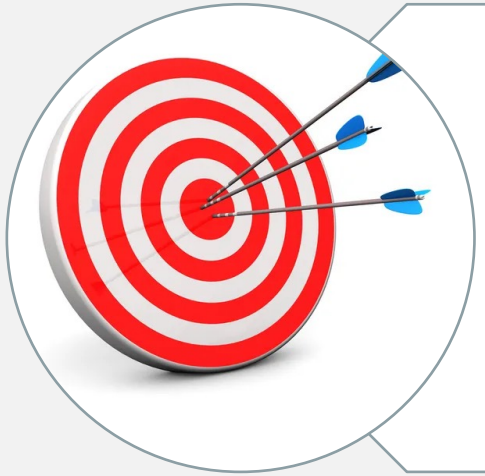
RESULTS

Interrater reliability (IRR)	Title/abstract IRR = 53% Full-text IRR = 80%
Hedge #1: : "no field tags"	Highest sensitivity
Hedge #2: "tw field tags” Hedge #3: “tiab field tags” Hedge #4: "super simple"	Same sensitivity
Hedge #4: "super simple"	High sensitivity and specificity
Hedge #5: "PubMed infant filter”	Highest specificity

DEFINITIONS

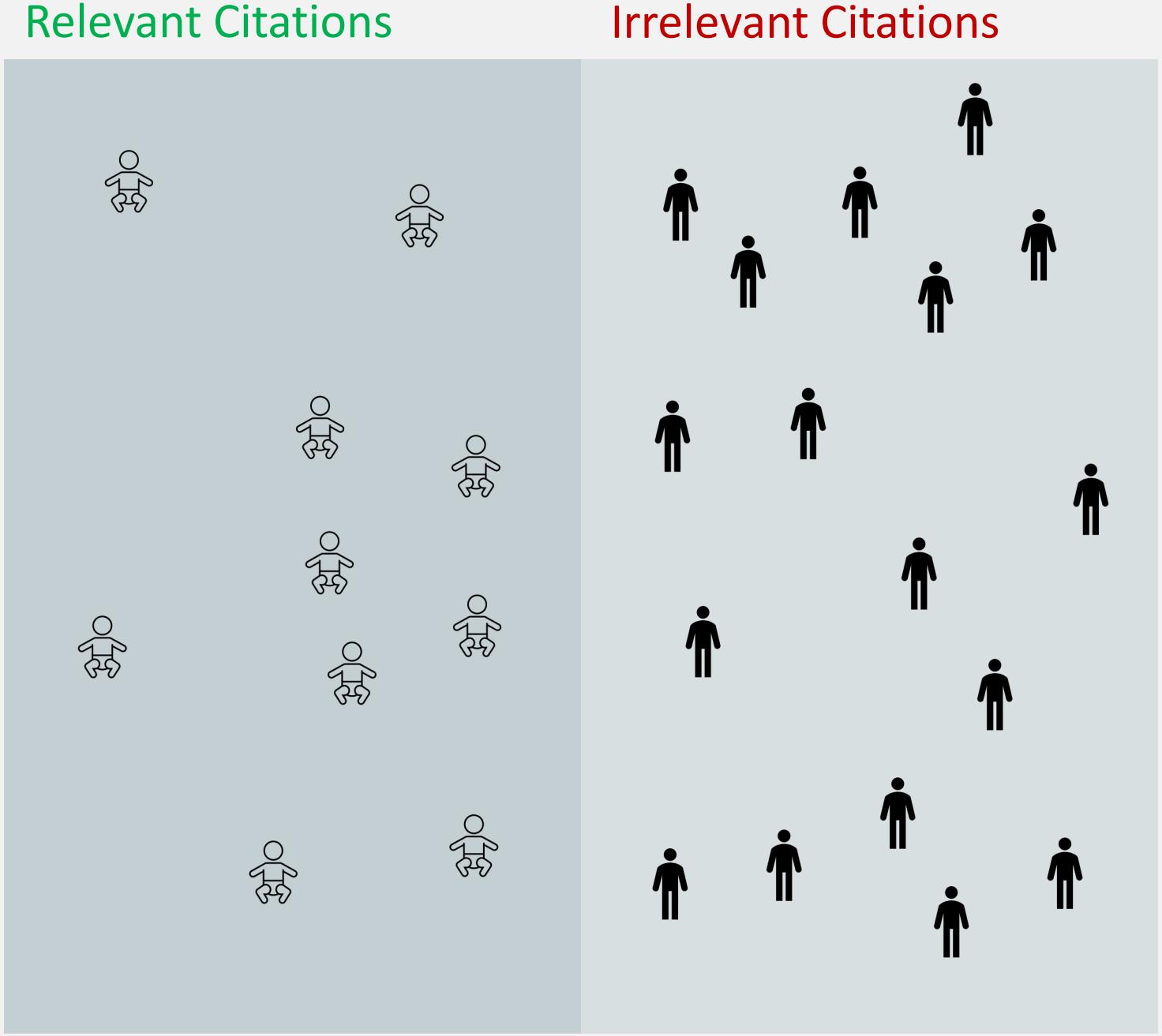
Sensitivity (recall) – *systematic review searches*

- The ability of the hedge to correctly identify citations about the population
  - True Positive: search hedge retrieved citations about infants
  - False Negatives: search hedge did not retrieve citations about infants

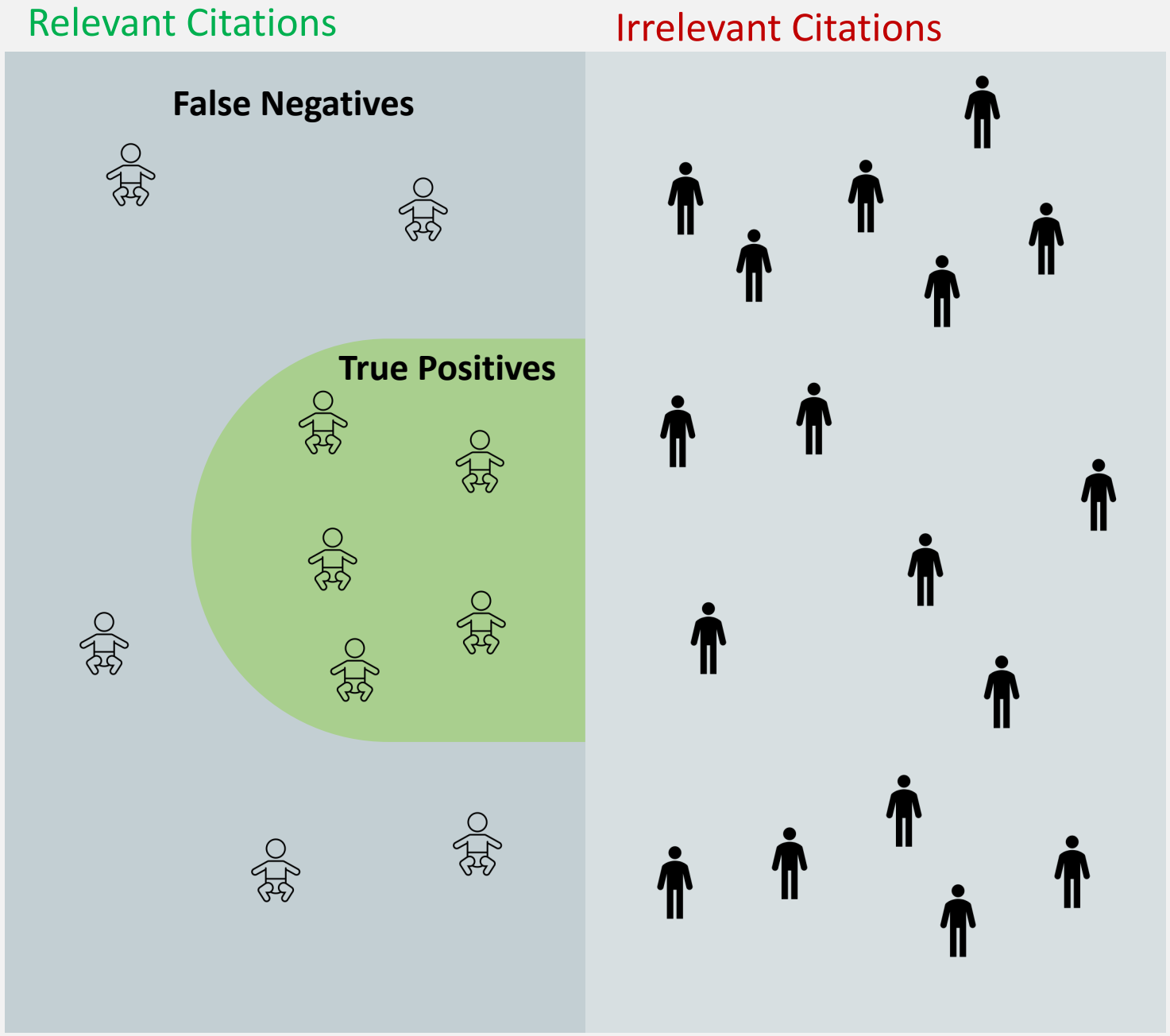


Specificity (precision) – *bedside searches*

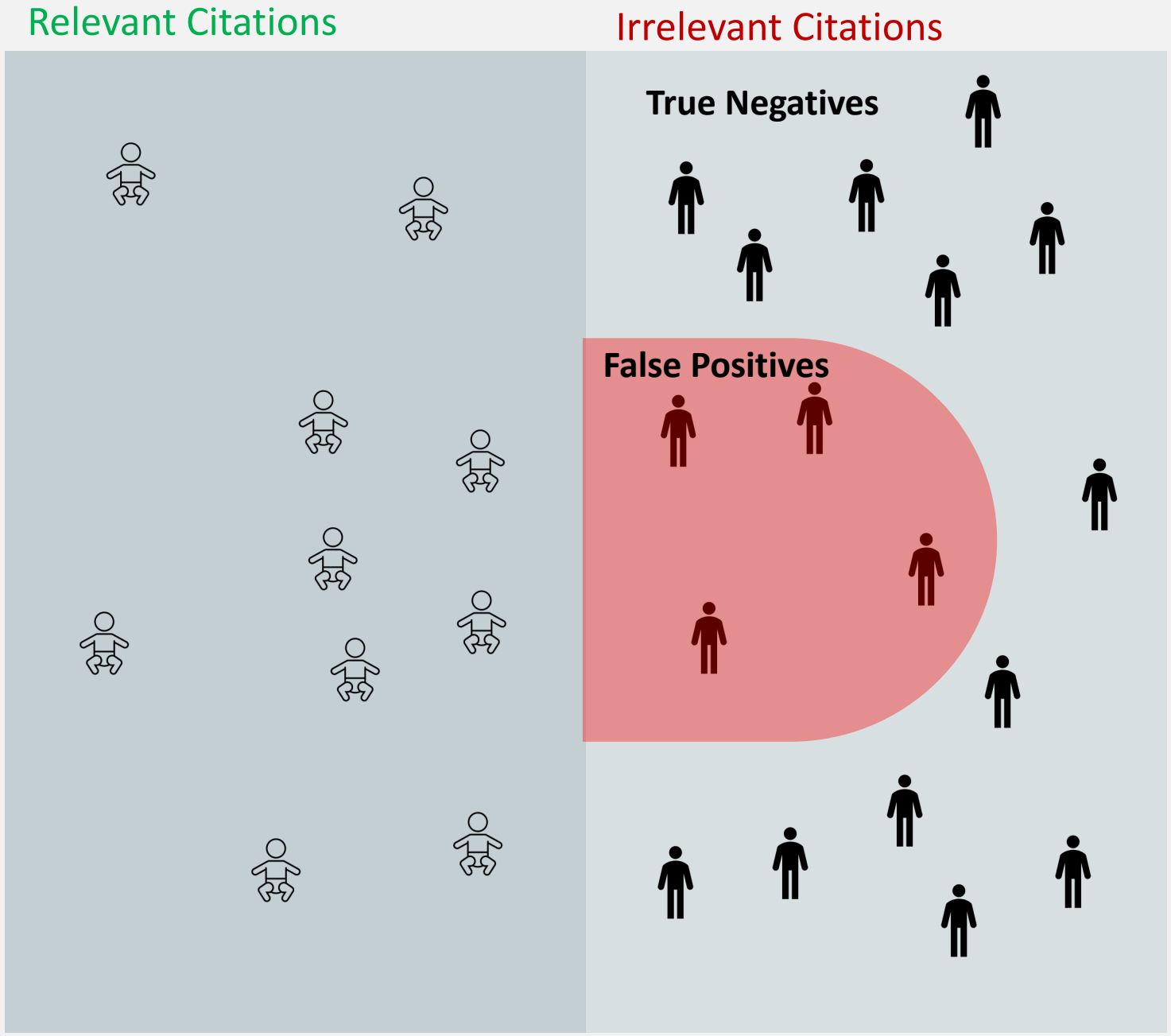
- The ability of the hedge to correctly identify citations NOT about the population
  - False Positive: search hedge retrieved citations not about infants
  - True Negatives: search hedge did not retrieve citations not about infants


Relevant Citations
Irrelevant Citations

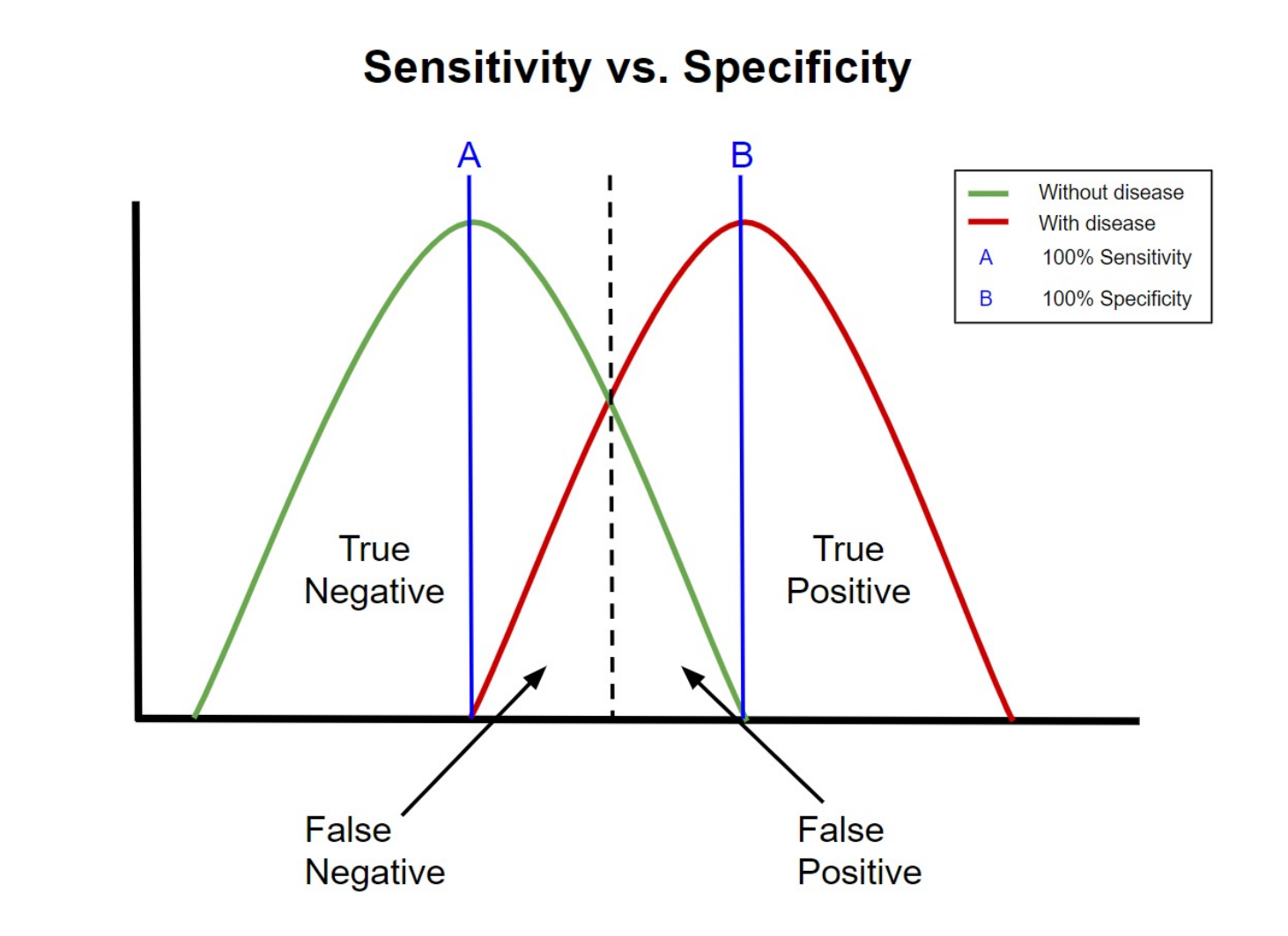
$$Sensitivity = \frac{True\ Positives}{True\ Positives + False\ Negatives}$$



$$Specificity = \frac{True\ Negatives}{True\ Negatives + False\ Positives}$$



SENSITIVITY



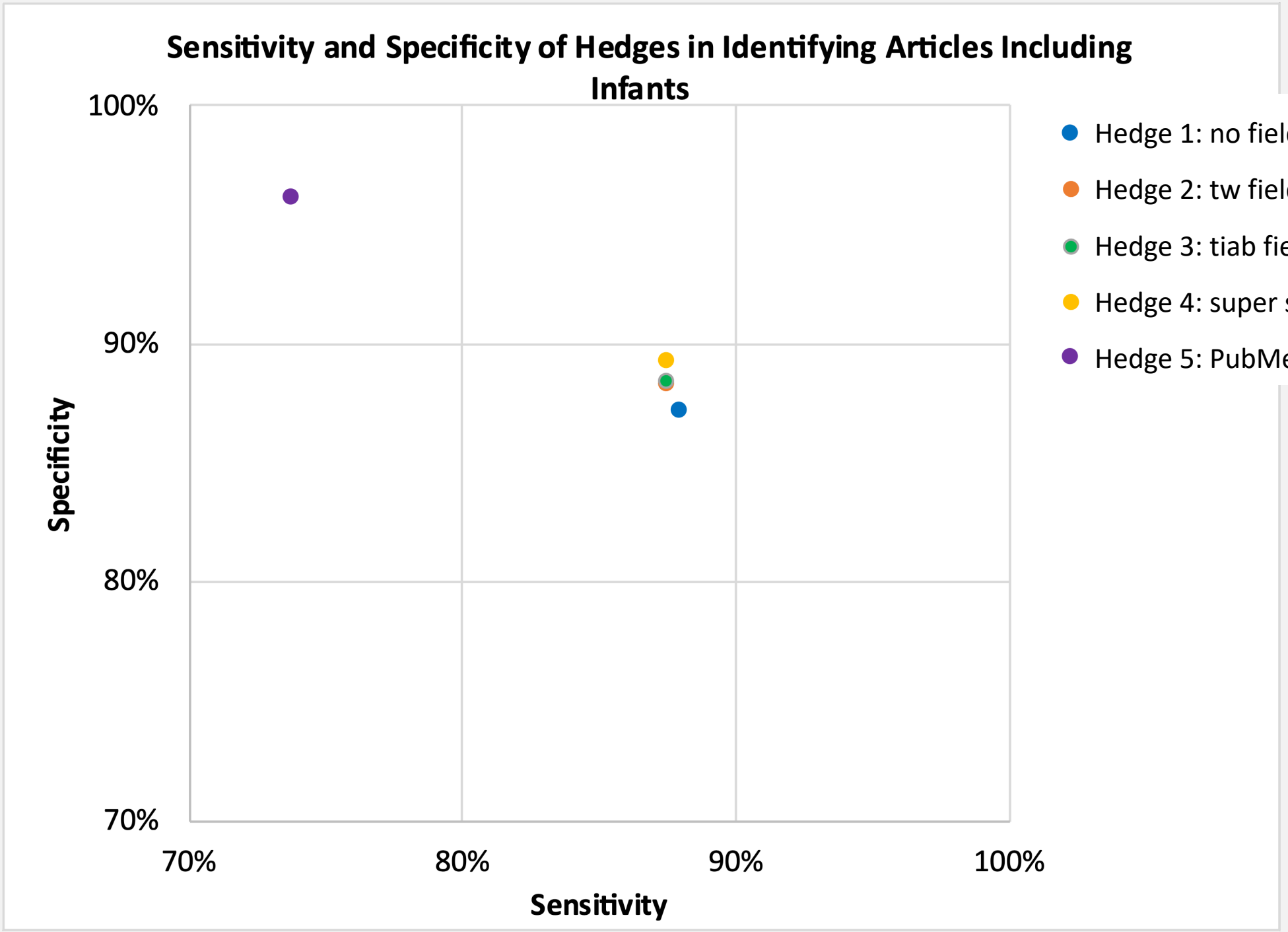
CC-BY-SA-4.0
Blue64701
https://commons.wikimedia.org/wiki/File:Specificity_vs_Sensitivity_Graph.png

SENSITIVITY

Hedge	True +	False -	Sensitivity
Hedge #1: “no field tags”	154	21	88.0%
Hedge #2: “tw field tags”	153	22	87.4%
Hedge #3: “tiab field tags”	153	22	87.4%
Hedge #4: “super simple”	153	22	87.4%
Hedge #5: “PubMed infant filter”	129	46	73.7%

SPECIFICITY

Hedge	True -	False +	Specificity
Hedge #1: “no field tags”	719	106	87.2%
Hedge #2: “tw field tags”	729	96	88.4%
Hedge #3: “tiab field tags”	730	95	88.5%
Hedge #4: “super simple”	737	88	89.3%
Hedge #5: “PubMed infant filter”	794	31	96.2%


Sensitivity and Specificity of Hedges in Identifying Articles Including Infants
100%
90%
80%
70%
Specificity
70%
80%
90%
100%
Sensitivity
Hedge 1: no field tags
Hedge 2: tw field tags
Hedge 3: tiab field tags
Hedge 4: super simple
Hedge 5: PubMed infant filter

IMPLICATIONS

- Hedge-to-hedge comparisons
  - Hedge 1 (no field tags): systematic/scoping review searches
  - Hedge 4 (super simple): everyday hedge
  - Hedge 5 (PubMed infant filter): bedside searches
- Hedge validation process

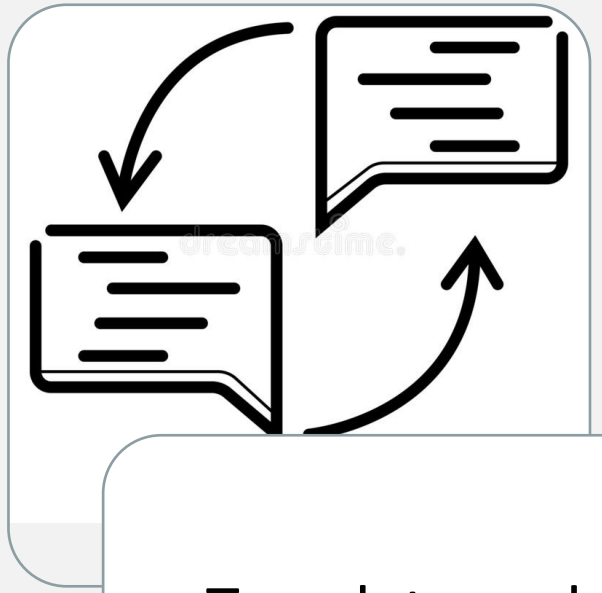
LIMITATIONS

- PubMed infant hedge results are not generalizable to other databases
- Changes in PubMed search algorithm may impact the performance of hedges
- Performance of hedge on clinical topics vs social topics
  - E.g., articles re: early intervention strategies
- Lack of subject expertise by librarian screeners (differing levels of interpretation)

NEXT STEPS

Disseminate findings

Develop and validate hedges for other age subsets in PubMed



Translate and validate PubMed infant hedges for other databases

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THANK YOU!

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