Artificial Intelligence for Healthcare Quality and Patient Safety: A Scoping Review of Diagnostic, Predictive, and Decision Support Applications

From understanding the literature to finding your own research direction

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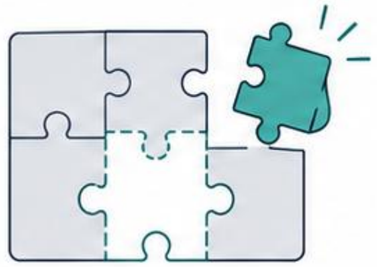
Why Start with a Review Paper

1 Understand the field

What has already been studied?

What data, methods, and topics are common?

2 Identify the gaps



What is missing, weak, or underdeveloped?

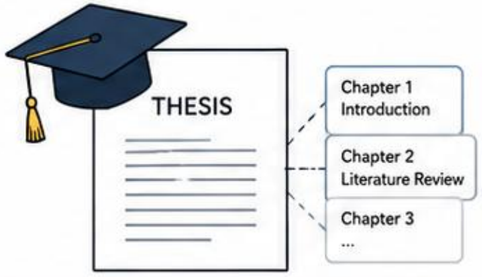
Where is the evidence still limited?

3 Design your next study

Turn gaps into research questions

Build your own project from the literature

4 Support your thesis



Use the review as the foundation for Introduction and Literature Review

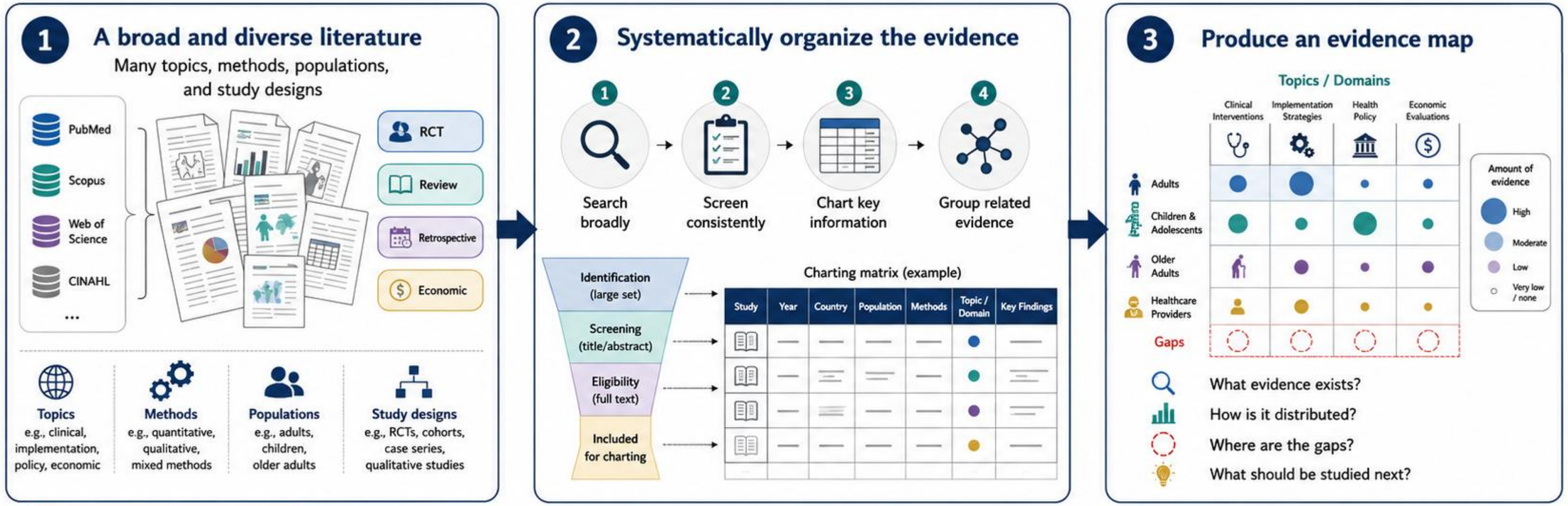
Expand it later into MSc or PhD thesis chapters

My example

- Two methane review papers
- → identified key gaps in multi-source data modeling and physics-informed neural networks (PINNs)
- → led to two later research articles

A review paper is not only a publication — it is also a tool to understand a field, find a gap, and prepare your next study.

What is a Scoping Review



Example from our review

Scoping Review or Systematic Review?

Choose the review type based on your research question

SCOPING REVIEW

Best for broad mapping questions

Use it when you want to:

- Explore a broad or emerging field
- Include different study designs
- Map concepts, methods, and evidence
- Identify gaps and future directions

Main question: **How is AI used to predict or detect heart attacks, and what research gaps remain?**

VS

SYSTEMATIC REVIEW

Best for focused evidence questions

Use it when you want to:

- Answer a focused research question
- Compare similar studies or interventions
- Assess study quality and risk of bias
- Estimate an effect or reach a focused conclusion

Main question: **Does AI help doctors detect heart attacks more accurately than standard methods?**

What is happening across the field? → Scoping review

Does one specific method work better? → Systematic review

How to Write a Scoping Review

1. **Frame the question** *PCC framework and eligibility criteria*
2. **Build the search strategy** *Database plan and search strings*
3. **Screen the literature** *Included records and PRISMA flow*
4. **Extract and chart the data** *Structured charting matrix*
5. **Map and synthesize the evidence** *Evidence maps, gaps, and themes*
6. **Write, report, and submit** *Manuscript and appendices*

The PCC Framework

P — Population

Who or what group is the review about?

IN OUR REVIEW

Patients, healthcare professionals, and health systems

C — Concept

What main topic or phenomenon is being mapped?

IN OUR REVIEW

AI and machine-learning applications relevant to healthcare quality and patient safety, including diagnostic, predictive, decision-support, and economic evidence

C — Context

Where and under what healthcare conditions?

IN OUR REVIEW

Hospitals, clinics, community care, nursing, public health, and other real-world or clinically relevant healthcare settings

Research question generated from PCC: How is AI being used across healthcare settings to support healthcare quality and patient safety, and what evidence gaps remain?

PCC → research question → eligibility criteria → Table 1

Build the Search Strategy

BLOCK 1 — AI and Machine Learning

"artificial intelligence" OR "machine learning" OR "deep learning" OR "neural network*" OR "large language model*" OR…

OR = include similar terms

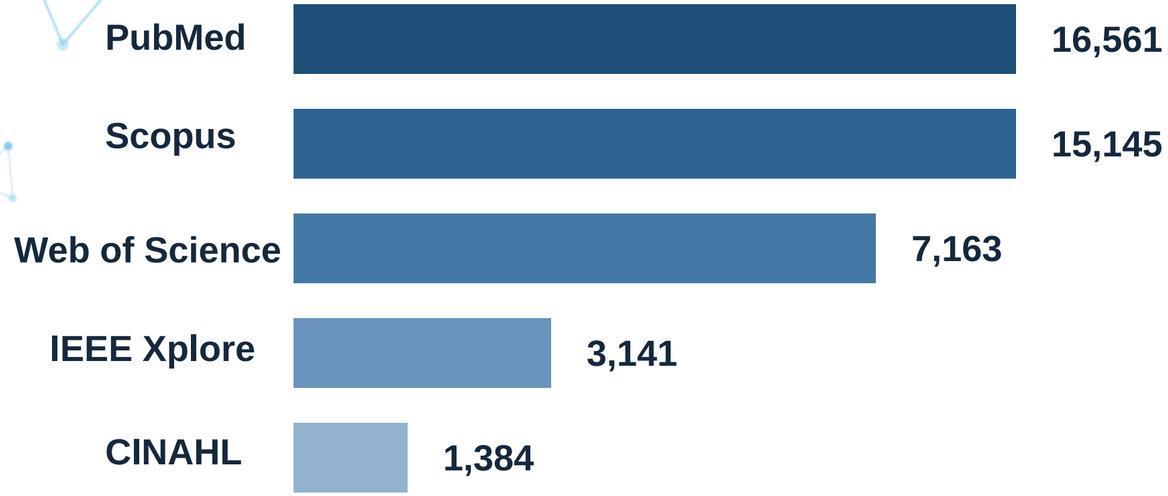
AND **AND = connect different concepts**

BLOCK 2 — Healthcare Quality and Patient Safety

"patient safety" OR "quality of care" OR "clinical decision support" OR "medical error*" OR…

Full reproducible search strategies are provided in Appendix 2.

Database Selection and Search Results



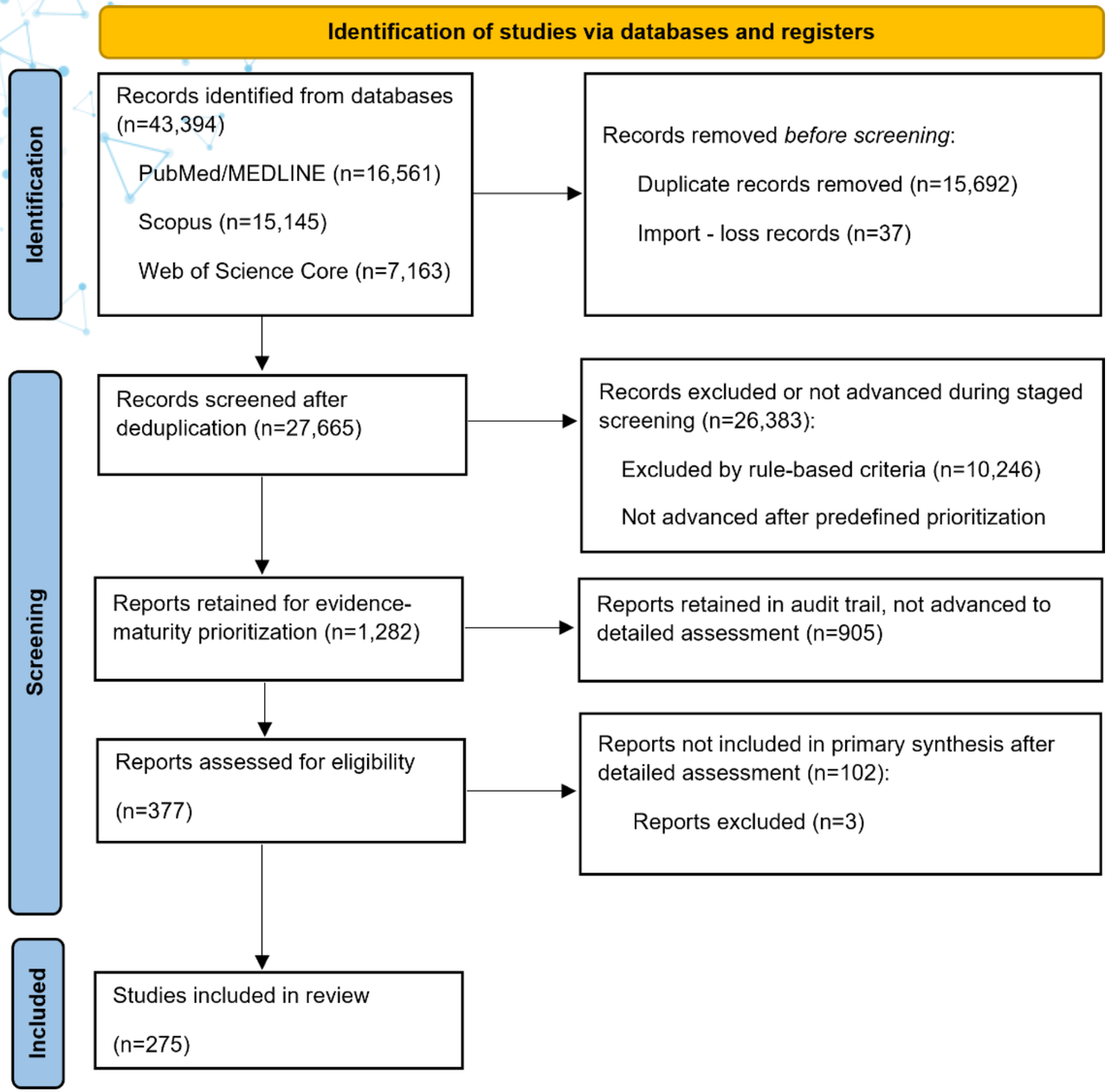
Total records identified **43,394**

Why these databases?

PubMed：Biomedical and clinical research
Scopus & WOS: Broad, multidisciplinary research
IEEE Xplore: Engineering, computing, and AI
CINAHL: Nursing

Select databases based on your review question and PCC framework.

Data Screening with the PRISMA-ScR Flow



1 **Every record must be accounted for:**
Included, excluded, or not advanced

2 **Record reasons at each stage:**
Keep counts and exclusion reasons during screening, not after writing.

3 **All numbers must match:**
The PRISMA figure, manuscript, abstract, and appendices must be the same.

https://www.prisma-statement.org/prisma-2020-flow-diagram

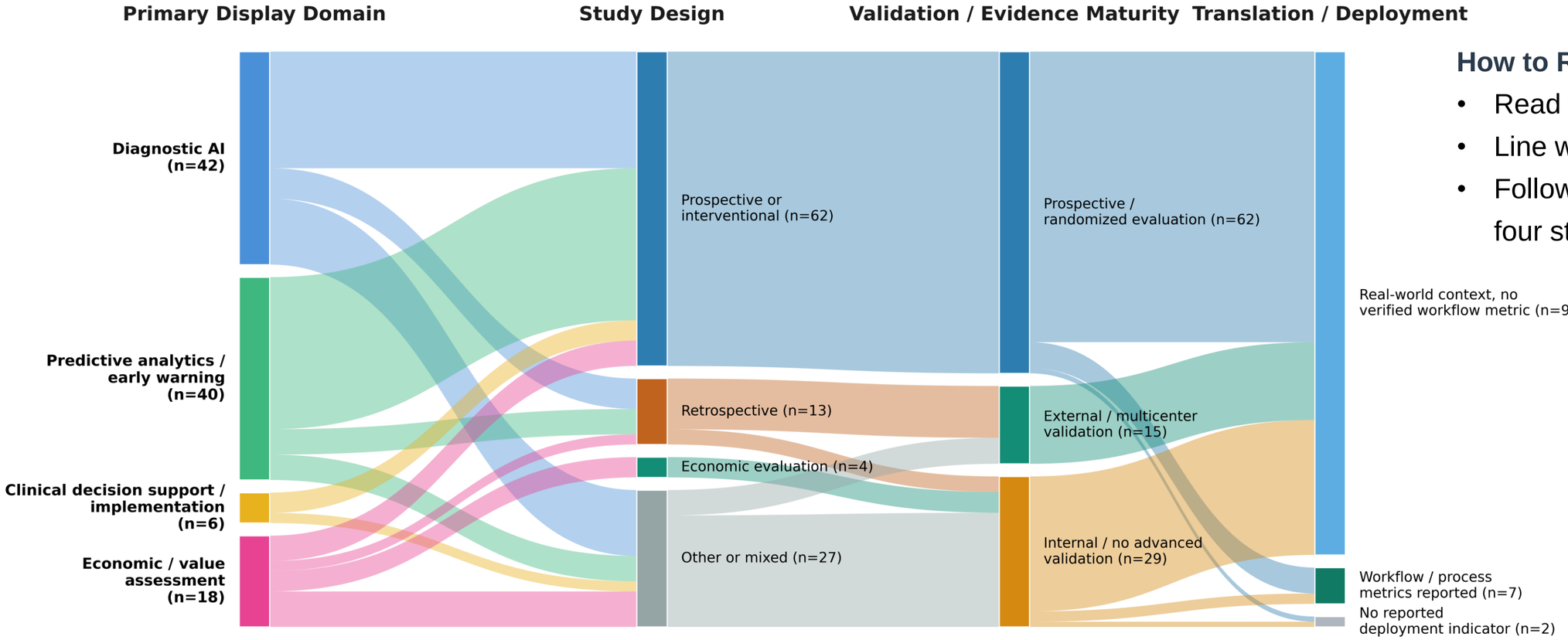
Build the Charting Matrix

Bibliographic details	**Study design / evidence type**	**Application domain(s)**
Validation maturity	**Deployment / real-world context**	**Workflow / process metrics**
Equity / subgroup indicators	**Governance / lifecycle indicators**	**Economic / value characteristics**

Study	Design	AI domain	Validation	Real-world use	Key gap
Study A	Prospective	Predictive + CDS	External	Yes	No workflow metric
Study B	Review	Diagnostic AI	N/A	No	Limited equity reporting

One study = one row. One variable = one column.

How Mature is the Evidence?



How to Read this figure:

- Read from left to right
- Line width = number of records
- Follow one pathway across the four stages

Node colours

- Diagnostic AI
- Predictive analytics / early warning
- Clinical decision support / implementation
- Economic / value assessment
- Prospective or interventional
- Retrospective
- Economic evaluation
- Other or mixed
- External / multicenter validation
- Internal / no advanced validation
- Workflow / process metrics
- Real-world, no verified workflow metric
- No reported deployment indicator

Key Finding

97 records had a real-world context, but only 7 reported a verified workflow or process metric.

The Evidence Gap

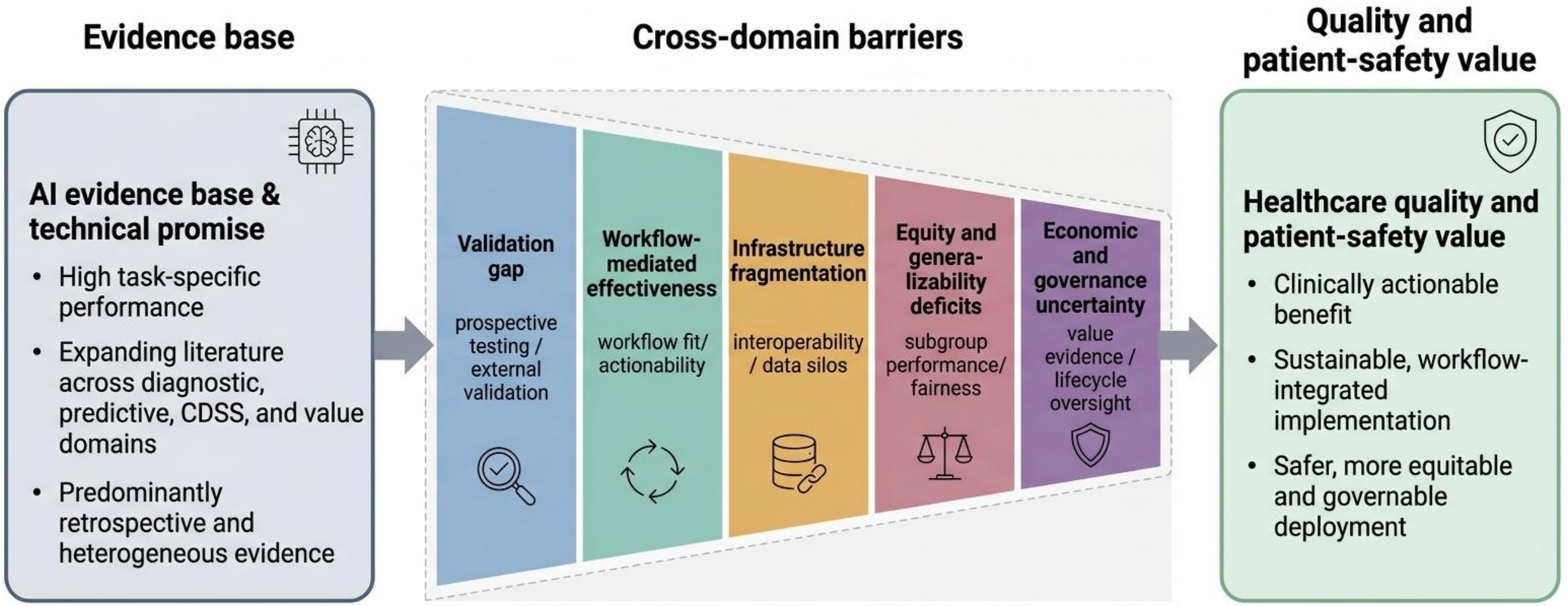
How to Read this figure:

- Columns = AI application domains
- Rows = evidence indicators
- Bubble size = number of records

Key Finding

Workflow and equity evidence was sparse across most application domains.

From Map to Synthesis — Five Cross-Domain Barriers



Good AI performance does not automatically become good healthcare.

Manuscript Structure and Reporting

Manuscript Structure

Introduction

Methods — eligibility (Table 1), sources & search, selection, charting, synthesis

Results — PRISMA flow, characteristics, domain patterns, gaps

Discussion — interpretation, implications, strengths & limitations

Conclusion — what the map means for the field

PRISMA-ScR checklist

Fill it while writing; submit it as Appendix 1

PRISMA-S search documentation

Full strings, dates, limits, exports — Appendix 2

Complete charted corpus

Row-level matrix with links for all 275 records — Appendix 3

The Toolbox

1 Manage References

Zotero

Import, organize, and manage references

2 Screen Records

Rayyan

Title/abstract screening, labels, and conflict review

3 Chart the Evidence

Excel

One record per row, structured coding, formulas, and count checks

4 Analyze and Visualize

Python

Deduplication audit, count checks, PRISMA, Sankey, and bubble map

Other options

EndNote for reference management · Covidence for end-to-end review management · R for analysis and visualization

The tool matters less than a clear workflow, consistent coding, and a complete audit trail.

Multimedia Appendix 1. PRISMA-ScR Checklist

Artificial Intelligence for Healthcare Quality and Patient Safety: A Scoping Review of Diagnostic, Predictive, and Decision Support Applications

Section	Item	PRISMA-ScR Checklist Item	Location in Manuscript
TITLE			
Title	1	Identify the report as a scoping review.	Title page, p. 1. The full title explicitly states "A Scoping Review".
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable) background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions.	Abstract, p 1-2, structured with Background, Objective, Methods, Results, and Conclusions sections.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Introduction p. 2-3, which describes the translational gap in healthcare AI and the need for a cross-domain synthesis, justifying a scoping review approach.
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context).	Review Question under Introduction, p. 3. Explicit questions map AI evidence across diagnostic, predictive, decision-support, and economic or value-assessment domains and identify cross-domain barriers.
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed; and if available, provide registration information including the registration number.	Methods, Protocol, Registration, and Reporting, p. 3. Conducted following JBI methodology and reported per PRISMA-ScR; no protocol was registered.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Methods, Eligibility Criteria, P. 3-5; Table 1, p. 4-5. Criteria are specified using the Population, Concept, Context framework, including the 2017–2026 time frame, English language, and publication status.
Information sources	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Methods, Information Sources and Search Strategy, p. 5-6. Five databases (PubMed/MEDLINE, Scopus, Web of Science Core Collection, IEEE Xplore, CINAHL Plus with Full Text); searches were executed on May 18, 2026 and covered records published from January 1, 2017, to April 30, 2026.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Methods, Information Sources and Search Strategy, p. 5–6; Multimedia Appendix 2. Full search strategies for all five databases are provided in Multimedia Appendix 2.
Selection of sources of evidence	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Methods, Selection of Sources of Evidence, p. 6; Results, Study Selection and Overview, p. 8; Figure 1 and caption, pp. 8–9. Staged rule-based filtering, manual screening, evidence-maturity prioritization, detailed assessment, core corpus, reserve corpus, and exclusions are described.
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team) and any processes for obtaining and confirming data from investigators.	Methods, Data Charting Process and Data Items, p. 6–7; Multimedia Appendix 3. Structured charting fields, primary charting by one reviewer with subset verification, row-level fields, and count-check procedures are reported.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Methods, Data Charting Process and Data Items, p. 6–7; Multimedia Appendix 3. Variables include application domain, study design or evidence type, validation maturity, deployment or real-world context, workflow metrics, equity or subgroup indicators, infrastructure indicators, governance or lifecycle indicators, and economic or value-assessment characteristics.
Critical appraisal of individual sources of evidence	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis.	Methods, Methodological Characterization, p. 7. No formal risk-of-bias appraisal or critical-appraisal scoring was conducted; validation maturity and reporting features were charted descriptively, with TRIPOD+AI and PROBAST used only as descriptive lenses.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Methods, Data Charting Process and Data Items, p 6-7; Methods, Synthesis of Results, p. 7; Multimedia Appendix 3.
			WHO Quality of Care dimensions were used as a deductive scaffold, cross-domain barriers were developed through inductive synthesis, and figure counts were derived from row-level charting fields and count-check procedures.
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Results, Study Selection and Overview, p. 8; Figure 1, p. 8-9. In total, 43,394 records identified, 27,665 records screened, 377 reports selected for detailed assessment, 275 records retained in the core charting corpus, 99 retained in the reserve corpus, and 3 excluded.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Results, Study Characteristics and Evidence Landscape, p. 9-10; Table 2, p. 9; Figure 2, p. 10; Multimedia Appendix 3. Characteristics of the 275-record core charting corpus are summarized in the text and visualizations, with the complete row-level charting matrix provided in Multimedia Appendix 3.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable; no formal risk-of-bias appraisal or critical-appraisal scoring was conducted, consistent with scoping review methodology. Validation maturity was charted descriptively in Methods, Methodological Characterization, p. 7 and Results, Study Characteristics and Evidence Landscape, p. 9-10.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Results, Application-Domain Evidence Patterns, p. 10-11; Table 2, p. 9; Multimedia Appendix 4; Multimedia Appendix 3. Illustrative records are summarized in Multimedia Appendix 4, and the complete row-level charting matrix for the 275-record core corpus is provided in Multimedia Appendix 3.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Results, Cross-Domain Translation Barriers, p. 12-15; Table 3, p. 12-13; Figure 3, p. 14; Discussion, Principal Findings; Figure 4, p. 15. Charting results are summarized across
			barriers, with Table 3 defining the barriers, Figure 3 showing indicator visibility, and Figure 4 presenting the conceptual synthesis.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Discussion, Principal Findings and Interpreting the Five Barriers, p 15-18. Summarizes evidence across domains and links to objectives.
Limitations	20	Discuss the limitations of the scoping review process.	Discussion, Strengths and Limitations, p 19-20. Limitations include lack of prospective registration; no formal medical librarian or information-specialist consultation; single-primary-reviewer screening and charting with subset verification and no fully independent duplicate screening or duplicate data extraction; prioritization-based screening with eligible studies possibly retained in the reserve corpus; rapid charting based partly on titles, abstracts, and metadata with targeted manual verification; English-language restriction; absence of supplementary search methods; and no formal risk-of-bias appraisal or meta-analysis, consistent with scoping review methodology.
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Discussion, Conclusions, p 20. Five structural barriers; the constraint on clinical value is structural rather than technical; prerequisites for responsible adoption.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Funding section, p 21. The scoping review was supported by Canada's IDRC (Grant No. 109981-001), IDRC and FCDO (Grant No. 110554-001), and additional named grants, and the funders' roles are described. Funding sources of the individual included studies were not charted.

Appendix 2

Multimedia Appendix 2. Five-Database Search Strategy, Export Audit, Deduplication, and Screening Flow

1. Purpose and scope

This appendix documents the five-database search, the export and import audit trail, the local deduplication workflow, the staged screening workflow, and the traceability of the final core charting corpus. It is provided to support transparent reporting of the search strategy in line with the PRISMA-S extension and to allow each search component to be reproduced. Searches were executed on 2026-05-18 and covered records published from January 1, 2017, to April 30, 2026.

2. Databases searched and record counts before deduplication

Database	Platform	Search field/mode	Date range	Language	Document/content type	Hits
PubMed/MEDLINE	PubMed	MeSH Major Topic + title/abstract	2017-01-01 to 2026-04-30	English	Editorials, comments, letters, news, and animal-only records are excluded by the filter	16,561
Scopus	Scopus	TITLE-ABS-KEY	2017-01-01 to 2026-04-30	English	Article + Review (main) and Conference Paper (supplementary)	15,145
Web of Science Core Collection	Web of Science	Topic Search (TS)	2017-01-01 to 2026-04-30	English	Article + Review	7,163
IEEE Xplore	IEEE Xplore	Document Title + Abstract	2017-01-01 to 2026-04-30	English	Conferences, Journals, Early Access; books/magazines/standards/courses excluded	3,141
CINAHL Plus with Full Text	EBSCOhost	Title + Abstract	2017-01-01 to 2026-04-30	English	No source-type restriction at the search stage	1,384
Total						43,394

3. Publication-type filtering across databases

Publication-type exclusions were implemented differently across databases because publication-type indexing and export fields are not equivalent across platforms. PubMed/MEDLINE provides controlled publication-type tags, so editorials, comments, letters, and news records were excluded directly in the PubMed query. In Scopus, Web of Science, IEEE Xplore, and CINAHL, equivalent publication-type exclusions were not applied at the search-string stage because field definitions and indexing were less consistent across platforms. Instead, noneligible publication types were handled uniformly during the staged screening workflow, which excluded editorials, commentaries, letters, news items, books, errata, retracted publications, and short conference abstracts without sufficient methods or results.

4. Supplementary search sources

Forward-citation chasing and the International HTA Database were considered as supplementary search sources but were not implemented as logged formal search sources for this review. They are therefore not described as part of the formal five-database search corpus. Background and consensus references identified outside the formal search were used only for contextual discussion and are distinguished from the charted evidence corpus throughout the manuscript.

5. Export and import audit

Identified-record counts for the PRISMA flow use database hit counts. Local deduplication used parsed and imported records. The only retained discrepancy between identified and parsed records was a documented 37-record difference in the Scopus main-search export and import.

Database/source	Hits	Parsed/imported	Difference	Notes
PubMed/MEDLINE	16,561	16,561	0	Exported in three non-overlapping segments due to export size limits.
Scopus	15,145	15,108	-37	Main article/review search imported 37 fewer records than database hits; discrepancy retained in audit log.
Web of Science	7,163	7,163	0	Database hit count used for PRISMA identification.
IEEE Xplore	3,141	3,141	0	RIS citation export with citation and abstract fields when available.
CINAHL Plus with Full Text	1,384	1,384	0	EBSCOhost full-result RIS export.
Total	43,394	43,357	-37	The 37-record difference corresponds to the Scopus export/import discrepancy.

6. Database-specific export segmentation

6.1 PubMed/MEDLINE export segments

Segment	History query	Hits	Export file
1	#1 AND (2017/01/01 : 2021/12/31)	4,964	PubMed_MEDLINE_2017_2021.nbib
2	#3 NOT #2	5,334	PubMed_MEDLINE_2022_2024_nooverlap.nbib
3	#4 NOT (#2 OR #5)	6,263	PubMed_MEDLINE_2025_2026_JanApr_nooverlap.nbib
Total		16,561	Segment total equals full-range hit count

6.2 Scopus export batches

Batch	Document type	Year(s)	Hits
Main 2017	Article; Review	2017	196
Main 2018	Article; Review	2018	307
Main 2019	Article; Review	2019	446
Main 2020	Article; Review	2020	626
Main 2021	Article; Review	2021	791
Main 2022	Article; Review	2022	970
Main 2023	Article; Review	2023	1,212
Main 2024	Article; Review	2024	1,781
Main 2025	Article; Review	2025	3,202
Main 2026	Article; Review	2026	2,025
Main total	Article; Review	2017- 2026	11,556
CP supplementary	Conference paper	2017- 2026	3,589
Scopus total	Article; Review; Conference paper	2017- 2026	15,145

6.3 Web of Science export batches

Year	Hits	Year	Hits
2017	81	2022	613
2018	131	2023	759
2019	200	2024	1,019
2020	325	2025	2,288
2021	492	2026	1,255
Total			7,163

6.4 IEEE Xplore and CINAHL export notes

IEEE Xplore was exported as RIS citation files with citation and abstract fields when available. The final post-filter result count and the imported count were both 3,141. CINAHL Plus with Full Text was exported as a single RIS file using the EBSCOhost full-result export; the database hit count and imported count were both 1,384.

7. Complete search strategies

7.1 PubMed/MEDLINE (search date 2026-05-18)

```
( ("Artificial Intelligence"[Majr] OR "Machine Learning"[Majr] OR
    "Deep Learning"[Majr] OR "Neural Networks, Computer"[Majr] OR
    "artificial intelligence"[tiab] OR "machine learning"[tiab] OR
    "deep learning"[tiab] OR neural network*[tiab] OR
    "large language model"[tiab] OR "large language models"[tiab] OR
    "foundation model"[tiab] OR "foundation models"[tiab] )
AND
  ("Quality of Health Care"[Majr] OR "Patient Safety"[Majr] OR
    "Decision Support Systems, Clinical"[Majr] OR
    "patient safety"[tiab] OR "quality of care"[tiab] OR
    "healthcare quality"[tiab] OR "health care quality"[tiab] OR
    "clinical decision support"[tiab] OR "medical error"[tiab] OR
    "medical errors"[tiab] ) )
AND ("2017/01/01"[dp] : "2026/04/30"[dp])
AND english[la]
NOT (animals[mh] NOT humans[mh])
NOT (editorial[pt] OR comment[pt] OR letter[pt] OR news[pt])
```

7.2 Scopus main search (Article + Review)

```
TITLE-ABS-KEY (
  ( "artificial intelligence" OR "machine learning" OR "deep learning" OR
    "neural network" OR "neural networks" OR "large language model" OR
    "large language models" OR "foundation model" OR "foundation models" )
  AND
  ( "patient safety" OR "quality of care" OR "healthcare quality" OR
    "health care quality" OR "clinical decision support" OR
    "medical error" OR "medical errors" OR "medication error" OR
    "medication errors" ) )
AND PUBYEAR > 2016 AND PUBYEAR < 2027
AND ( LIMIT-TO ( DOCTYPE , "ar" ) OR LIMIT-TO ( DOCTYPE , "re" ) )
AND LIMIT-TO ( LANGUAGE, "English" )
```

7.3 Scopus supplementary search (Conference Paper)

```
TITLE-ABS-KEY (
  ( "artificial intelligence" OR "machine learning" OR "deep learning" OR
    "neural network" OR "neural networks" OR "large language model" OR
    "large language models" OR "foundation model" OR "foundation models" )
  AND
  ( "patient safety" OR "quality of care" OR "healthcare quality" OR
    "health care quality" OR "clinical decision support" OR
    "medical error" OR "medical errors" OR "medication error" OR
```

Appendix 3 Charting Matrix

Record_No	Screening_id	DB	Title	Authors	Year	Journal Name	Publication Type	DOI_URL	PMID	Primary_source_URL_fo
1	JMIR-00006	CINAHL	Integrating Artificial Intelligence into Breast Cancer Histopathology: Toward Improved Diagnosis and Pro	Faa, Gavino; Lai, Eleonora; Cau, Flaviana; Coghe, Ferdinando; Rugge,	2026	Cancers	JOUR	https://doi.org/10.3390/cancers18071184		https://doi.org/10.3390/cancers18071184
2	JMIR-00045	CINAHL	Artificial Intelligence Algorithms for Insulin Management and Hypoglycemia Prevention in Hospitalized P	Faulds, Eileen R.; Rayan, Melanie Natasha; Mlachak, Matthew; Dung	2026	Diabetology	JOUR	https://doi.org/10.3390/diabetology7010019		https://doi.org/10.3390/diabetology7010019
3	JMIR-00056	CINAHL	AI-driven clinical decision support systems: Revolutionizing medication selection and personalized drug th	Khude, Hrishikesh; Shende, Pravin	2025	Advances in Integrative Medicine	JOUR	https://doi.org/10.1016/j.aimed.2025.100529		https://doi.org/10.1016/j.aimed.2025.100529
4	JMIR-00082	CINAHL	The role of artificial intelligence in wound care: applications, evidence and future directions.	Chadwick, Paul	2025	Wounds International	JOUR			https://woundsinternational.com/journal-articles/t
5	JMIR-00093	CINAHL	Artificial intelligence in emergency department triage: a scoping review on workload reduction and patient	Kim, Seoyoung; Nam, Soo-Hyun; Lee, Jungmin	2025	Journal of Korean Biological Nursing Science	JOUR	https://doi.org/10.7586/jkbns.25.045		https://doi.org/10.7586/jkbns.25.045
6	JMIR-00095	CINAHL	Integrating Artificial Intelligence into Perinatal Care Pathways: A Scoping Review of Reviews of Applicati	El Arab, Rabie Adel; Al Moosa, Omayma Abdulaziz; Albahrani, Zahra	2025	Nursing Reports	JOUR	https://doi.org/10.3390/nursrep15080281		https://doi.org/10.3390/nursrep15080281
7	JMIR-00125	CINAHL	Investigating the Role of Artificial Intelligence in Pediatric Emergencies: A Narrative Review.	Sadeghinasab, Javad; Atarodi, Zeynab	2025	Journal of Pediatrics Review	JOUR	https://doi.org/10.32598/jpr.13.2.1244.1		https://doi.org/10.32598/jpr.13.2.1244.1
8	JMIR-00737	IEEE Xplore	A Novel Interpretable Deep-Learning-Based System for Triage Prediction in the Emergency Department: A	K. -C. Leung; Y. -T. Lin; D. -Y. Hong; C. -L. Tsai; C. -H. Huang; L. -C	2021	2021 IEEE International Conference on Systems, M	CONF	https://doi.org/10.1109/smc52423.2021.9658729		https://doi.org/10.1109/smc52423.2021.9658729
9	JMIR-01404	IEEE Xplore	A Framework for Automated Diagnosis and Management of Autoimmune Disorders with Neural Network	L. Natrayan; S. Socrates; G. B. Bharathi; S. Aluvala	2024	2024 International Conference on Advancements in	CONF	https://doi.org/10.1109/assic60049.2024.10507903		https://doi.org/10.1109/assic60049.2024.10507903
10	JMIR-01704	IEEE Xplore	Systematic Literature Review on Knowledge Graph for Clinical Decision Support Systems	E. Hazmi; G. Besbes; S. B. A. B. Lamine; N. B. B. Saoud; H. Baazaoui	2025	2025 IEEE International Conference on Big Data (B	CONF	https://doi.org/10.1109/bigdata66926.2025.11401112		https://doi.org/10.1109/bigdata66926.2025.11401
11	JMIR-01715	IEEE Xplore	AI Powered Decision Support Systems for Healthcare Enhancing Diagnosis and Treatment with Deep Lea	M. R. Kale; A. H. Mutlag; S. P; N. H. Al-Muraad; H. S. Mahdi; S. Mu	2025	2025 International Conference on Intelligent Compu	CONF	https://doi.org/10.1109/icicke65317.2025.11136681		https://doi.org/10.1109/icicke65317.2025.1113668
12	JMIR-01918	IEEE Xplore	Lightweight Seizure Prediction via Cross-Modal Knowledge Distillation from Multi-Channel to Single-Cha	X. Zhang; J. Chen; K. Ye; Y. She; X. Xu; L. Zhong	2025	2025 17th International Conference on Signal Proce	CONF	https://doi.org/10.1109/icspsp66615.2025.11347741		https://doi.org/10.1109/icspsp66615.2025.1134774
13	JMIR-02047	IEEE Xplore	The Role of AI-Driven Support Systems in Reducing Nurse Turnover: A Systematic Review of Effectiven	S. Y. Lee; E. X. Tan	2025	2025 14th International Conference on Information	CONF	https://doi.org/10.1109/cita66455.2025.11198744		https://doi.org/10.1109/cita66455.2025.11198744
14	JMIR-02066	IEEE Xplore	Advanced Breast Cancer Diagnosis Using MoEffNet: Integrating EfficientNet Features and Expert Networ	N. Jashwanth; N. Thanuja	2025	2025 2nd International Conference on Software, Sys	CONF	https://doi.org/10.1109/ssitcon66133.2025.11342017		https://doi.org/10.1109/ssitcon66133.2025.113420
15	JMIR-02193	IEEE Xplore	Uncertainty-Aware Ensemble Learning for Cardiovascular Risk Assessment: A Comparative Study with C	A. A. A. Akilandeswari	2025	2025 9th International Conference on Electronics, C	CONF	https://doi.org/10.1109/iceca66444.2025.11383284		https://doi.org/10.1109/iceca66444.2025.1138328
16	JMIR-02265	IEEE Xplore	Heart Failure in the Obese Population: Overcoming Diagnostic Barriers with Artificial Intelligence-Driven	D. R. Kumar; M. A. Shamsudeen	2025	2025 International Conference on Recent Innovation	CONF	https://doi.org/10.1109/icriset64803.2025.11252431		https://doi.org/10.1109/icriset64803.2025.112524
17	JMIR-02767	IEEE Xplore	RBXRT++: A New Data-Driven Approach for Detecting Alzheimer's and Cognitive Decline	M. M. T. G. Manik; R. Rahman; A. F. Tasnim; S. I. Nilima; S. Yeasmi	2025	2025 5th International Conference on Electrical, Co	CONF	https://doi.org/10.1109/icecet63943.2025.11472184		https://doi.org/10.1109/icecet63943.2025.1147218
18	JMIR-03049	IEEE Xplore	A Deep AI–Orchestrated Ensemble Architecture for End-to-End Pharmacy Automation with Error-Aware	M. Stephen; T. Mary Mathew	2026	2026 5th International Conference on Sentiment An	CONF	https://doi.org/10.1109/icsadl67539.2026.11451897		https://doi.org/10.1109/icsadl67539.2026.1145189
19	JMIR-03218	IEEE Xplore	Prediction of Anesthesia Depth and Early Detection of State Transitions Using EEG-Derived Features	T. Schmierer; T. Li; D. Wu; Y. Li	2026	IEEE Transactions on Instrumentation and Measure	JOUR	https://doi.org/10.1109/tim.2026.3659621		https://doi.org/10.1109/tim.2026.3659621
20	JMIR-03413	PubMed/MEDLINE	Radiomics for precision medicine: Current challenges, future prospects, and the proposal of a new framew	Ibrahim, A; Primakov, S; Beuque, M; Woodruff, H C; Halilaj, I; Wu, G	2021	Methods (San Diego, Calif.)	Journal Article; Research Support, Non-U.S. Gov't; Review	https://doi.org/10.1016/j.ymeth.2020.05.022	32504782	https://doi.org/10.1016/j.ymeth.2020.05.022
21	JMIR-03582	PubMed/MEDLINE	Improved patient satisfaction and diagnostic accuracy in skin diseases with a Visual Clinical Decision Supp	Breitbart, Eckhard W; Choudhury, Kohelia; Andersen, Anders Daniel,	2020	PloS one	Journal Article; Research Support, Non-U.S. Gov't	https://doi.org/10.1371/journal.pone.0235410	32726308	https://doi.org/10.1371/journal.pone.0235410
22	JMIR-03802	PubMed/MEDLINE	A Real-Time Early Warning System for Monitoring Inpatient Mortality Risk: Prospective Study Using El	Ye, Chengyin; Wang, Oliver; Liu, Modi; Zheng, Le; Xia, Minjie; Hao, S	2019	Journal of medical Internet research	Journal Article; Research Support, Non-U.S. Gov't	https://doi.org/10.2196/13719	31278734	https://doi.org/10.2196/13719
23	JMIR-04401	PubMed/MEDLINE	Predicting two-year survival versus non-survival after first myocardial infarction using machine learning an	Wallert, John; Tomasoni, Mattia; Madison, Guy; Held, Claes	2017	BMC medical informatics and decision making	Comparative Study; Journal Article	https://doi.org/10.1186/s12911-017-0500-y	28679442	https://doi.org/10.1186/s12911-017-0500-y
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25	JMIR-05377	PubMed/MEDLINE	Development of a clinical decision support system for severity risk prediction and triage of COVID-19 pa	Wu, Guangyao; Yang, Pei; Xie, Yuanliang; Woodruff, Henry C; Rao, X	2020	The European respiratory journal	Journal Article; Multicenter Study; Research Support, Non-U.S. Gov't	https://doi.org/10.1183/13993003.01104-2020	32616597	https://doi.org/10.1183/13993003.01104-2020
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27	JMIR-06276	PubMed/MEDLINE	Predictive Analytics for Identification of Patients at Risk for QT Interval Prolongation: A Systematic Revi	Tomaselli Muensterman, Elena; Tisdale, James E	2018	Pharmacotherapy	Journal Article; Systematic Review	https://doi.org/10.1002/phar.2146	29882591	https://doi.org/10.1002/phar.2146
28	JMIR-06277	PubMed/MEDLINE	Development of an Artificial Intelligence-Based Automated Recommendation System for Clinical Laborato	Islam, Md Mohaimenul; Yang, Hsuan-Chia; Poly, Tahmina Nasrin; Li,	2020	JMIR medical informatics	Journal Article	https://doi.org/10.2196/24163	33206057	https://doi.org/10.2196/24163
29	JMIR-06544	PubMed/MEDLINE	A systematic review on artificial intelligence in robot-assisted surgery.	Moglia, Andrea; Georgiou, Konstantinos; Georgiou, Evangelos; Satava,	2021	International journal of surgery (London, England)	Journal Article; Systematic Review	https://doi.org/10.1016/j.ijsu.2021.106151	34695601	https://doi.org/10.1016/j.ijsu.2021.106151
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31	JMIR-07836	PubMed/MEDLINE	Clinical Requirements of Future Patient Monitoring in the Intensive Care Unit: Qualitative Study.	Poncette, Akira-Sebastian; Spies, Claudia; Mosch, Lina; Schieler, Mon	2019	JMIR medical informatics	Journal Article	https://doi.org/10.2196/13064	31038467	https://doi.org/10.2196/13064
32	JMIR-07962	PubMed/MEDLINE	A Prospective Observational Study to Investigate Performance of a Chest X-ray Artificial Intelligence Dia	Sun, Ju; Peng, Le; Li, Taihui; Adila, Dyah; Zaiman, Zach; Melton, Gen	2021	ArXiv	Journal Article; Preprint	https://doi.org/10.1101/2021.06.04.21258316	34099980	https://doi.org/10.1101/2021.06.04.21258316
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35	JMIR-08052	PubMed/MEDLINE	The use of artificial intelligence to optimize medication alerts generated by clinical decision support systen	Graafsma, Jetske; Murphy, Rachel M; van de Garde, Ewoudt M W; K	2024	Journal of the American Medical Informatics Assoc	Journal Article; Scoping Review	https://doi.org/10.1093/jamia/ocae076	38641410	https://doi.org/10.1093/jamia/ocae076
36	JMIR-08181	PubMed/MEDLINE	Interpretability of Clinical Decision Support Systems Based on Artificial Intelligence from Technological a	Xu, Qian; Xie, Wenzhao; Liao, Bolin; Hu, Chao; Qin, Lu; Yang, Zheng	2023	Journal of healthcare engineering	Journal Article; Research Support, Non-U.S. Gov't; Systematic Review	https://doi.org/10.1155/2023/9919269	36776958	https://doi.org/10.1155/2023/9919269
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41	JMIR-08473	PubMed/MEDLINE	A 12-hospital prospective evaluation of a clinical decision support prognostic algorithm based on logistic r	Lupei, Monica I; Li, Danni; Ingraham, Nicholas E; Baum, Karyn D; Be	2022	PloS one	Journal Article; Observational Study; Research Support, Non-U.S. Gov't;	https://doi.org/10.1371/journal.pone.0262193	34986168	https://doi.org/10.1371/journal.pone.0262193
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46	JMIR-09444	PubMed/MEDLINE	Perceptions of primary care patients on the use of electronic clinical decision support tools to facilitate hea	He, William; Chima, Sophie; Emery, Jon; Manski-Nankervis, Jo-Anne,	2024	Patient education and counseling	Journal Article; Systematic Review	https://doi.org/10.1016/j.pec.2024.108290	38714007	https://doi.org/10.1016/j.pec.2024.108290
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63	JMIR-12597	PubMed/MEDLINE	Clinical decision support system using hierarchical fuzzy diagnosis model for migraine and tension-type he	Yin, Ziming; Li, Heng; Han, Xun; Ran, Ye; Wang, Zhichen; Dong, Zhac	2024	Frontiers in neurology	Journal Article	https://doi.org/10.3389/fneur.2024.1444197	39318875	https://doi.org/10.3389/fneur.2024.1444197
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A benchmark of expert-level academic questions to assess AI capabilities.	

3D-MICE: integration of cross-sectional and longitudinal imputation for multi-analyte longitudinal clinical data.

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Abstract

OBJECTIVE: A key challenge in clinical data mining is that most clinical datasets contain missing data. Since many commonly used machine learning algorithms require complete datasets (no missing data), clinical analytic approaches often entail an imputation

Thank you!

Q & A