# International Platform of Registered Systematic Review and Meta-analysis Protocols

# INPLASY

INPLASY202540101 doi: 10.37766/inplasy2025.4.0101 Received: 28 April 2025

Published: 1 April 2025

# Corresponding author:

Abdulhameed Al Khalaf

absk88@hotmail.com

#### **Author Affiliation:**

Al-Ahsa Family Medicine Academy, Al-Ahsa Health Cluster, Ministry of Health, Saudi Arabia.

# AI at the Frontline: Unmasking Diagnostic Accuracy in Primary Care Triage — A Systematic Review

Alhaddad, H; BuHamad, Z; Bukhamsin, S; BinAmer, F; Alsayed, F; Alahmad, Z; AlKhalaf, A; Alaithan, S; Almulihi, Q.

#### ADMINISTRATIVE INFORMATION

Support - This systematic review is self-funded by the authors.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202540101

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 April 2025 and was last updated on 28 April 2025.

# INTRODUCTION

R eview question / Objective The question posed for systematic review is: What is the diagnostic accuracy of Al-driven triage systems in primary care settings?

Population: Patients undergoing triage in primary care settings are experiencing patient overflow.

Intervention: Al-based triage systems used for symptom assessment and patient prioritization.

Comparison: Usual care triage, performed by healthcare professionals (physicians, nurses, standard triage protocols).

Outcome: To know diagnostic accuracy, Triage efficiency, patient waiting time, provider workload, and patient safety outcomes.

**Rationale** Primary health care systems are increasingly overwhelmed by patient overflow, staff shortages, and rising healthcare costs. Accurate triage is crucial to ensuring patient safety and improving healthcare delivery. Artificial intelligence (AI) technologies offer the potential to enhance triage accuracy, but concerns exist regarding their diagnostic reliability compared to traditional human-led triage methods. This systematic review aims to critically evaluate the diagnostic accuracy of AI-based triage systems in primary care settings to inform clinical practice and guide future AI implementation in frontline care.

**Condition being studied** This systematic review focuses on the triage process in primary care settings, particularly for patients presenting with acute conditions such as respiratory symptoms, fever, or other urgent complaints. The study evaluates the diagnostic accuracy of Al-based triage systems in correctly prioritizing and identifying patients who require urgent care versus those with non-urgent health issues.

# METHODS

Search strategy PubMed, Ovid MEDLINE, EMBASE and GOOGLE SCHOLAR are searched

using a defined search strategy adjusted for each database.

#### Pubmed keywords

("Primary Health Care" [Mesh] OR "General Practice"[Mesh] OR "Family Practice"[Mesh] OR "Community Health Services"[Mesh] OR "primary care" OR "general practice" OR "family medicine" OR "community health") AND ("Triage"[Mesh] OR "triage" OR "patient assessment" OR "urgency assessment" OR "priority setting") AND ("Artificial Intelligence"[Mesh] OR "Machine Learning"[Mesh] OR "Deep Learning" [Mesh] OR "Neural Networks, Computer"[Mesh] OR "Decision Support Systems, Clinical"[Mesh] OR "AI" OR "artificial intelligence" OR "machine learning" OR "deep learning" OR "neural network" OR "algorithm" OR "automated system" OR "computer-assisted" OR "symptom checker" OR "triage tool" OR "decision support tool") AND ("Randomized Controlled Trial"[pt] OR "Cohort Studies"[Mesh]).

**Participant or population** The review will include studies involving patients undergoing triage in primary care settings. Participants are individuals presenting with acute health complaints, experiencing patient overflow situations, and assessed either by Al-based triage systems or traditional human-led triage processes.

**Intervention** The intervention under review is the use of artificial intelligence (AI)-based triage systems for symptom assessment and patient prioritization in primary care settings. These systems utilize algorithms, machine learning, or deep learning models to assist in evaluating the urgency of patient complaints and guiding appropriate healthcare decisions.

**Comparator** The comparator is usual care triage conducted by healthcare professionals, including physicians, nurses, or standard triage protocols without the use of artificial intelligence systems.

**Study designs to be included** This review will include cohort studies and randomized controlled trials (RCTs) that evaluate the diagnostic accuracy and performance of AI-based triage systems compared to usual care in primary care settings.

Eligibility criteria Inclusion Criteria:

Studies evaluating the diagnostic accuracy of Albased triage systems used for symptom assessment and patient prioritization in primary care settings. Studies comparing AI-based triage performance to usual care triage conducted by healthcare professionals (physicians, nurses) or standard triage protocols.

Studies reporting on primary outcomes (diagnostic accuracy, sensitivity, specificity, predictive values) or secondary outcomes (triage efficiency, patient waiting time, provider workload, patient safety outcomes).

Human studies conducted in primary care or preprimary care settings.

Publications in English language.

Exclusion Criteria:

Studies not involving Al-based triage systems (e.g., purely human triage or non-digital tools).

Studies conducted outside primary care settings (e.g., exclusively in emergency departments without linkage to PHC).

Narrative reviews, systematic reviews, expert opinions, letters to the editor, case reports, or commentaries.

Conference abstracts without available full-text data.

Animal studies or laboratory simulations not involving real patient data.

Non-English language publications.

**Information sources** The following electronic databases will be systematically searched: PubMed, Ovid MEDLINE, EMBASE, and Google Scholar. Additionally, hand-searching of reference lists from relevant studies and consultation with experts or stakeholders will be conducted to identify further eligible studies.

**Main outcome(s)** The primary outcome is the diagnostic accuracy of Al-based triage systems in primary care settings, assessed through measures such as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the receiver operating characteristic curve (AUC).

Additional outcome(s) Secondary outcomes include triage efficiency, patient waiting time, provider workload, and patient safety outcomes such as rates of misdiagnosis or adverse events.

Data management All retrieved citations will be imported into Zotero for screening. Six independent reviewers will screen titles and abstracts to identify potentially eligible studies. Selected studies will undergo full-text review to confirm eligibility. Data from included studies will be extracted using a standardized data extraction form designed specifically for this review. Any disagreements during screening or data extraction will be resolved by discussion or consultation with a senior reviewer.All retrieved citations will be imported into Rayyan AI for screening. Six independent reviewers will screen titles and abstracts to identify potentially eligible studies. Selected studies will undergo full-text review to confirm eligibility. Data from included studies will be extracted using a standardized data extraction form designed specifically for this review. Any disagreements during screening or data extraction will be resolved by discussion or consultation with a seniorreviewer.

Quality assessment / Risk of bias analysis The methodological quality of included cohort studies will be assessed using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist. Randomized controlled trials (RCTs) will be assessed using the revised Cochrane Risk of Bias tool (RoB 2). Studies meeting all STROBE checklist criteria will be classified as high quality. Any discrepancies during quality assessment will be resolved through discussion among reviewers or consultation with a senior reviewer.

**Strategy of data synthesis** A systematic qualitative synthesis of the included studies will be conducted following PRISMA guidelines. Study characteristics, AI models applied, triage objectives, and diagnostic performance outcomes will be summarized narratively and in structured tables. If sufficient homogeneity exists among studies regarding AI model types, populations, and outcome measures, a meta-analysis will be considered. Random-effects or fixed-effects models will be applied depending on the degree of heterogeneity. Sensitivity and subgroup analyses will be conducted to explore sources of heterogeneity ifneeded.

**Subgroup analysis** If sufficient data are available, subgroup analyses will be performed based on factors such as the type of AI model used (e.g., machine learning vs. deep learning), healthcare setting (e.g., urban vs. rural primary care centers), patient characteristics (e.g., age groups, presenting symptoms), and comparator type (e.g., physician vs. nurse-led triage). Subgroup analyses will help explore potential sources of heterogeneity and variations in diagnostic accuracy across differentcontexts.

Sensitivity analysis Sensitivity analyses will be conducted to assess the robustness of the results by excluding studies at high risk of bias, studies with small sample sizes, or studies with methodological.

**Language restriction** Only studies published in English will be included in thisreview.

Country(ies) involved SaudiArabia.

**Other relevant information** No additional relevant information. This systematic review protocol has been prepared following PRISMA-P guidelines to ensure transparency and methodologicalrigor.

**Keywords** Artificial intelligence; Al triage; diagnostic accuracy; primary care; symptom assessment; patient prioritization; systematic review; machine learning; deep learning; healthcare triage.

**Dissemination plans** The results of this systematic review will be disseminated through publication in a peer-reviewed scientific journal and presentation at national or international conferences. Additional dissemination may include sharing findings with relevant healthcare institutions and policy makers to support the integration of AI-based triage systems in primarycare.

#### **Contributions of each author**

Author 1 - Hasan Alhaddad. Email: dr.hasan.haddad@gmail.com Author 2 - Zainab Bu Hamad. Email: zainab.b.hamad@gmail.com Author 3 - Sarah Bukhamsin. Email: sarahabukhamsin@gmail.com Author 4 - Fatimah Bin Amer. Email: f.binamer92@gmail.com Author 5 - Fatimah Alsayed. Email: asadfatom2017@hotmail.com Author 6 - Zahraa Alahmad. Email: zahra3ahmad@gmail.com Author 7 - Abdulhameed Al Khalaf. Email: absk88@hotmail.com Author 8 - Sakinah Alaithan. Email: dralaithansukainah@gmail.com Author 9 - Qasem Almulihi. Email: gasem.almulihi@hotmail.com