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A Scoping Review of patient and public trust and acceptance of artificial intelligence (AI) in breast imaging

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Abstract

Objective: The objective of this scoping review is to synthesise the current body of knowledge regarding patient and public trust and acceptance of Artificial Intelligence (AI) in breast imaging. Specifically, it aims to identify factors that influence these perceptions and identify gaps in the literature for future research.

Introduction: The implementation of AI in breast imaging has demonstrated the potential for improved diagnostic accuracy and faster outcomes, but its success depends heavily on patient and public trust and acceptance. Despite the growing prevalence of AI in healthcare, concerns regarding data privacy, reliability, and transparency may affect how it is perceived. This review will map the existing literature to provide insight into these factors.

Inclusion criteria: This scoping review will consider studies focused on patients undergoing breast imaging and the general public's perspectives on AI in breast imaging. The concept involves trust and acceptance of AI in this medical application, while the context includes any setting where breast imaging occurs. Studies addressing healthcare professionals' views without including patient or public perspectives, as well as those not using AI, will be excluded.

Methods: A comprehensive search strategy (to be conducted in October 2024) will include databases such as Medline,
CINAHL, APA PsychInfo and EMBASE, along with grey literature. Studies published in English will be included, and the review will follow the JBI methodology. Two reviewers will independently screen and extract data, with discrepancies resolved by a third reviewer. A thematic analysis will be used to synthesise the findings.

Troubleshooting

Introduction

1 Breast imaging services face growing pressure with the combination of increased requests and predicted reductions to workforce. Artificial intelligence (AI) has the potential to alleviate these pressures, increase efficiency and as a result, improve outcomes, but ensuring patient understanding may be a concern for clinicians. Patients are involved in increasingly complex decision making and may seek greater understanding of how a diagnosis or referral has been reached. The importance of being seen as trustworthy and accepted is recognised by those regulating AI technology, with potential to impact uptake and adoption. The use of AI in healthcare, particularly in breast imaging, has grown rapidly due to its potential to enhance diagnostic accuracy, reduce radiologist workload, and improve patient outcomes (1, 2).

However, AI implementation is dependent on the trust and acceptance of patients and the general public. AI technologies raise ethical concerns about data privacy, transparency, and the reliability of decision-making algorithms, all of which can affect the level of trust patients place in these technologies. Public perception of AI-driven medical interventions can vary widely based on factors like awareness, familiarity, and perceived risks, which makes understanding these perspectives essential for successful implementation. Without patient trust and public acceptance, the full potential of AI in breast imaging may not be realised(3, 4). Given the complexity and interdisciplinary nature of AI in breast imaging, a scoping review is the most appropriate method to map the existing body of knowledge and highlight gaps in research. By synthesising this information, the review will provide insight into the current understanding of trust and acceptance, identify key factors influencing these attitudes, and offer a foundation for future studies to address unanswered questions.

A preliminary search of MEDLINE, the Cochrane Database of Systematic Reviews, and JBI Evidence Synthesis found no scoping reviews or systematic reviews currently addressing this topic. This review will therefore provide a unique contribution to the literature by mapping the breadth of research on trust and acceptance of AI in breast imaging.

Objective: The objective of this scoping review is to assess the extent of the literature on patient and public trust and acceptance of AI in breast imaging and identify the key factors influencing these attitudes.

Review question(s)

2 1. What is the current level of patient and public trust in AI in breast imaging?

2. What factors influence trust and acceptance of AI in breast imaging?
3. What concerns do patients, and the public have regarding the use of AI in breast imaging?
4. What strategies have been proposed to improve trust and acceptance of AI in breast imaging?

Inclusion criteria

3 **Participants**

The review will include patients who have undergone or are undergoing breast imaging (mammography, MRI, ultrasound etc.). Additionally, the public or individuals who are potential uses of AI-assisted breast imaging technologies. Participants who are under 18, studies that focus on healthcare professionals (radiologists, technologists, or physicians) and other types of imaging/medical procedures (lung, heart, or brain imaging) will be excluded.

Concept

The primary focus is on trust and acceptance of AI in breast imaging. This includes studies that explore attitudes, perceptions, concerns, and experiences related to the use of AI technologies in breast imaging. Studies focussing on imaging technologies that do not utilise AI will be excluded.

Context

The context includes any setting where breast imaging is conducted including hospital, clinics, community health centres and research settings. The focus is on breast imaging technologies that incorporate AI algorithms for diagnosis, detection or treatment planning. Papers not in these settings will be excluded.

Types of sources

This scoping review will consider both experimental and quasi-experimental study designs including randomised controlled trials, non-randomised controlled trials, before and after studies and interrupted time-series studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies will be considered for inclusion. This review will also consider descriptive observational study designs including case series, individual case reports and descriptive cross-sectional studies for inclusion. Qualitative studies will also be considered that focus on qualitative data including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, action research andfeminist research.
Conference abstracts and letters will be excluded.

Methods

4 The proposed scoping review will be conducted in accordance with the JBI methodology for scoping reviews (5).

Search strategy

The search strategy will aim to locate both published and unpublished studies. A three-step search strategy will be utilised in this review. First an initial limited search of MEDLINE and CINAHL was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy for Medline, CINAHL, APA PsychInfo and EMBASE. The search strategy, including all identified keywords and index terms, will be adapted for each included database and/or information source. The reference list of all included sources of evidence will be screened for other relevant studies.

Searches will be conducted in EMBASE (via Ovid), CINAHL (via EBSCO), Medline (Via OVID), PsycINFO (via EBESCO). Databases and will use Boolean operators to link between and within groups of terms reflecting the population of interest (e.g. patient, public), the setting (e.g. breast imaging), the 'intervention' (e.g. artificial intelligence) and the outcomes (e.g. trust, acceptance). Sources of unpublished studies and grey literature to be searched include Google scholar, Proquest, Trip, Open access theses and dissertation, NHS England, cancer charity websites. The first 100 papers will be included from these. Only studies published in English will be included. There will be no limitations regarding date of publication.

Study/Source of evidence selection

Following the search, all identified citations will be collated and uploaded into EndNote 21.4.0.20467 (Clarivate Analytics, PA, USA) and duplicates removed. Following a pilot test, titles and abstracts will then be screened by two or more independent reviewers for assessment against the inclusion criteria for the review. Potentially relevant sources will be retrieved in full, and their citation details imported into the JBI System for the Unified Management, Assessment and Review of Information (JBI SUMARI) (JBI, Adelaide, Australia) (6). The full text of selected citations will be assessed in detail against the inclusion criteria by two or more independent reviewers. Reasons for exclusion of sources of evidence at full text that do not meet the inclusion criteria will be recorded and reported in the scoping review. Any disagreements that arise between the reviewers

at each stage of the selection process will be resolved through discussion, or with an additional reviewer/s. The results of the search and the study inclusion process will be reported in full in the final scoping review and presented in a PRISMA flow diagram (5).

Data extraction

Data will be extracted from papers included in the scoping review by two or more independent reviewers using a data extraction tool developed by the reviewers. The data extracted will include specific details about the participants, concept, context, study methods and key findings relevant to the review question/s.

Qualitative: A data extraction form will be developed, using Excel to record the following:

- Study characteristics: author, year, location, population
- Research aim
- Methodology (e.g.interviews, focus groups)
- Themes related to trust and acceptance of AI
- Quotations or narrative descriptions that reflect perceptions of AI, concerns, or barriers to trust
- Outcomes related to public attitudes, concerns, or areas of confidence in AI technology.

Quantitative: Astandardised data extraction form will be used, developed in Excel, to record:

- Study characteristics: author, year, location, population size
- Study design (e.g., cross-sectional, cohort
- Outcome measures related to trust, acceptance, perceived usefulness, and ease of use of AI
- Statistical measures (e.g., means, percentages, standard deviations, confidence intervals, p-values) relating to trust and acceptance of AI.

The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included evidence source. Modifications will be detailed in the scoping review. Any disagreements that arise between the reviewers will be resolved through discussion, or with an additional reviewer/s. If appropriate, authors of papers will be contacted to request missing or additional data, where required.

Data analysis and presentation

The data will be analysed thematically to identify key factors influencing trust and acceptance of AI in breast imaging. Results will be presented in both narrative and tabular formats, with a narrative summary describing how the results relate to the review's objectives.

Qualitative:

Thematic Analysis

- Apply a thematic analysis approach following Braun and Clarke's (2006) method.
- Familiarisation: Read through the qualitative data multiple times to gain a sense of key themes.
- Coding: Assign initial codes to relevant pieces of data (e.g., sentiments regarding trust, data security, perceived competence of AI in diagnosis).
- Theme Development: Group similar codes to identify overarching themes such as trust in technology, the role of clinicians, privacy concerns, and accuracy.
- Theme Refinement: Check themes against the extracted data and adjust as needed to ensure consistency and coherence.
- Sub-themes may also be developed to highlight nuances, such as different types of trust (e.g., trust in AI vs. trust in human-AI collaboration).

Data Presentation

- **Textual Narrative Synthesis:** Present findings in a narrative format, describing key themes and patterns that emerged from the data.
- **Tables and Diagrams:** Include tables summarising the studies (author, year, population, key themes) and figures showing thematic maps or relationships between key factors influencing trust and acceptance of AI.
- **Quotations:** Use verbatim quotes to support the thematic findings, providing a rich description of participants' perspectives.

Quantitative:

Descriptive Statistics: Summarise key study characteristics and patient/public attitudes using descriptive
statistics, such as frequencies, percentages, means, and medians.

Use software such as SPSS or R to compute basic descriptive summaries.
Meta-analysis (if appropriate): If the studies are sufficiently homogenous in terms of their outcome measures, conduct a meta-analysis.

Calculate pooled estimates of trust and acceptance scores and assess heterogeneity using the I^2 statistic.
Subgroup Analysis: Analyse data by subgroups (e.g., age, gender, education level) to explore variations in trust and acceptance of AI.

Correlation Analysis: If possible, calculate correlation coefficients (e.g., Pearson's or Spearman's) to assess relationships between trust/acceptance and other variables such as prior experience with

technology or exposure to breast imaging.

Data Presentation

Summary Tables: Present descriptive statistics and pooled estimates in summary tables, detailing each study's population, methodology, and main results regarding trust and acceptance of AI.

Graphs and Charts: Use bar charts, pie charts, or forest plots to illustrate key quantitative findings, such as the proportion of participants who trust AI versus those who do not.

Narrative Summary: Complement the tables and figures with a brief narrative summary of the key quantitative findings, highlighting any trends or significant differences between studies or
subgroups.

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Appendices

Appendix I: Search strategy

MEDLINE (Ovid)

Search conducted in October/2024

	A
	exp *Patients/
	Public
	female/
	exp *Trust/
	Acceptance
	exp *Attitude/
	Perception*

	A
	exp *Judgment/
	Concern*
	Understand*
	Confidence.mp.
	exp *Knowledge/
	Aware*
	exp *Artificial Intelligence/
	"AI"
	exp *Machine Learning/
	exp *Image Processing, Computer-Assisted/
	"Breast imaging"
	"Breast MRI"
	"Breast CT"
	Mammogra*
	"Digital breast tomosynthesis"
	(breast adj2 screening).
	"breast cancer"
	"Breast ultrasound"

	A
	1 or 2 or 3
	4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13
	14 or 15 or 16 or 17
	18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
	26 and 27 and 28 and 29
	Limit 30 to English

943
papers retrieved