

CADTH Reference List

Artificial Intelligence for the Measurement of Breast Density

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Key Messages

- Thirty-five non-randomized studies were identified regarding the accuracy of artificial intelligence or machine learning automated breast density assessment software for identifying dense breasts.
- Two non-randomized studies were identified regarding the clinical utility of artificial intelligence or machine learning automated breast density assessment software for identifying dense breasts.

Research Questions

1. What is the accuracy of artificial intelligence or machine learning automated breast density assessment software for identifying dense breasts?
2. What is the clinical utility of artificial intelligence or machine learning automated breast density assessment software for identifying dense breasts?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the international HTA database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were artificial intelligence and breast density. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2016 and March 12, 2021. Internet links were provided, where available.

Selection Criteria

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed.

Results

Thirty-five non-randomized studies¹⁻³⁵ were identified regarding the accuracy of artificial intelligence or machine learning automated breast density assessment software for identifying dense breasts, 2 of which also reported findings for the clinical utility of artificial intelligence or machine learning automated breast density assessment software for identifying dense breasts.^{21,25} No health technology assessments, systematic reviews,

Table 1: Selection Criteria

Criteria	Description
Population	Individuals suspected of breast related conditions due to dense breasts
Intervention	Breast density measurement performed using AI or ML software (e.g., AI-aided automated density assessment of breast images with mammography, mammography with tomosynthesis, or MRI)
Comparator	Conventional breast density measurement determined by a radiologist performed without AI or ML software (e.g., mammography with tomosynthesis, ultrasound, or MRI that is not AI-aided)
Outcomes	Q1: Accuracy (e.g., classification of breast density measurement into 1 of the 4 BI-RADS categories, agreement between AI-aided software and radiologist for breast density classification) Q2: Clinical utility (e.g., appropriate referral for further screening, assessment of breast cancer risk, identification of breast cancer, quality of life, quality assurance [e.g., standardization of measurement approach, breast positioning])
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies

AI = artificial intelligence; BI-RADS = Breast Imaging Reporting and Data System; ML = machine learning; MRI = MRI.

or randomized controlled trials were identified regarding the accuracy or clinical utility of artificial intelligence or machine learning automated breast density assessment software for identifying dense breasts.

Additional references of potential interest that did not meet the inclusion criteria are provided in Appendix 1.

References

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

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Appendix 1: References of Potential Interest

Non-Randomized Studies

Alternative Comparator

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Alternative Population – Dense Breasts Not Specified

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No Comparator

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Alternative Outcome

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Review Articles

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