Towards Artificial Intelligence-enabled person-centred care in breast imaging - A Scoping Review

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Artificial Intelligence: Publications

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<td>Breast Imaging</td>
<td>Mammography</td>
<td>Morphology or Physiology</td>
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<td></td>
<td>Tomosynthesis</td>
<td>No Personalised care and follow-up</td>
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<td>CEDM</td>
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Aim

To overview Artificial Intelligence developments for breast imaging focused on providing person-centred diagnosis and treatment
Method

• A scoping review in accordance with the Joanna Briggs Institute methodology for scoping reviews published after 2016 English or in French

• Six databases: MEDLINE, Embase, CINAHL, Web of science, IEEE explore and arxiv

• Combination of keywords and Medical Subject Headings terms (MeSH) related to breast imaging and AI

• No keywords or MeSH terms related to patients, or the PCC concept => noise

• 3 independent reviewers assessed articles
• 79 studies met the criteria
• Studies were published across 18 countries, with the majority in United States of America (30 out of 79) and China (21 out of 79).
  ➢ Technological development

• AI algorithms using mainly retrospective study designs, small and local samples.
  ➢ AI algorithms in stage of internal validity
Seven themes relating to the AI-enabled person-centred care in BI were identified

- Individualised risk prediction/growth and prediction/false negative reduction (58%),
- Treatment assessment (16%),
- Unnecessary biopsies reduction (8%),
- Tumors type prediction (5%)
- Patients' preferences (4%)
- Specific populations (1%)
- Other issues (9%).
Data set variation:

- Ages varying between 15-92 years
- Male patients (n=3)
- Different countries (n=1)
- Different ethnicities included (n=3)
- Breast density (n=3)
- Vendors and machines (n=9)
- Modalities (n=6)
- Types/subtypes of cancer (n=6)
Features used in the algorithm

14 studies used other features than images

More features need to be considered
Introduction Method Results & Discussion Conclusion

- Data set variation
  - Only few studies have combined data
  - Little diversity in the sample
  - AI tools advantage: ability to integrate data from various sources
  - Opportunity for improvement
  - Multitude of imaging modalities are available and integrated in the diagnosis and follow-up of breast diseases
  - Taking into account the variations in individuals => PCC

Reference:
"One-size-fits-all" - guidelines versus new focused strategy for specific groups of individuals according to:

- Genetic
- Phenotype
- Environmental characteristics
- Radiomics (Images of different modalities data)
- Pathology (biopsy data)
- Clinical data
- Patient preferences

Integrate AI may lead the path to personalized-care eg: Personalized screening
The use of AI for person-centred care is mainly focused on risk and cancer prediction and disease management.

Lack of studies related to patients experience during image acquisition, positioning, compression, optimisation of quality/dose received or faster acquisition.

Few studies integrate different data sources and patient characteristics.
Thank you for your attention

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References


