# Interventions to improve patient experience in mammography: a scoping review protocol

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## ABSTRACT

**Objective:** The objective of this review is to map the global evidence on interventions aiming to enhance the patient experience during mammography examination.

**Introduction:** Mammography is the examination of choice to detect breast cancer, which is the most common malignant condition among women globally. However, this examination can cause psychological distress, discomfort, and pain for patients. To limit these negative experiences, and to promote patient engagement in diagnostic and screening examinations, some interventions have been tested in clinical practice. Each intervention has key differing features that need to be explored in a scoping review. This mapping will help inform mammography professionals and researchers.

**Inclusion criteria:** This review will consider studies that focus on women, men, transgender, nonbinary, or intersexual persons undergoing diagnostic or screening mammography. It will consider studies evaluating interventions and reporting data on the patient experience. These interventions may, for instance, be related to the information provided, breast compression, relaxation, medication, or physical environment. The review will also describe the outcomes related to patient experience (eg, anxiety, pain, discomfort).

**Methods:** The search strategy will aim to find published and unpublished studies and will be conducted in MEDLINE, Embase, CINAHL, PsycINFO, Cochrane Central Register of Controlled Trials, Web of Science, and ProQuest Dissertation and Theses. Furthermore, three registries will be searched for ongoing studies. This review will be conducted following JBI methodology, utilizing the three-step search strategy with two independent reviewers performing study selection and data extraction. The results, frequencies, and conceptual categories will be presented in a tabular and narrative summary.

**Scoping review registration:** Open Science Framework (https://osf.io/fn865/)

**Keywords:** breast imaging; intervention; mammography; satisfaction; stress

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## Introduction

Worldwide, breast cancer is the most common malignant condition among women, with an estimated 2.1 million new cases diagnosed in 2018.[1] Mammography is the imaging examination of choice to detect breast cancer at an early stage.[2] The aim of mammograms is twofold: i) to diagnosis, in the event of a suspected lesion following clinical symptoms or for follow-up of breast pathologies (diagnostic mammography); and ii) to screen for breast cancer in asymptomatic women invited and integrated into a screening program (screening mammography). By allowing the detection and, consequently, the treatment of tumors at an earlier stage, a screening mammogram can reduce the mortality by about 20%.[3] For this reason, mammographic screening is recommended by the US Preventive Services Task Force[4] and the European Commission[2] on a biennial basis for asymptomatic women aged 50 to 74 years.

In men, the incidence of breast cancer is low, around one case per 100,000 men per year, but it has been

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rising for the past few decades in countries such as the USA and the UK.[5] In this population, screening mammography is not recommended; nevertheless, in cases with clinical symptoms, such as gynecomastia or palpable breast mass, a diagnostic mammogram may be performed.[5] Furthermore, transgender and intersexual people may also be at risk of breast cancer, mainly due to the use of exogenous hormones, and thus may require a mammography examination.[5]

About 39 million mammography procedures were performed in 2018 in the USA.[6] Mammographic examinations require breast compression performed with a compression paddle to hold the breast,[7] keep it still, and reduce its thickness.[8] Breast compression has the advantage of minimizing the radiation dose delivered.[9] Moreover, adequate positioning and compression of the breast are important to optimize image quality, such as reducing blurring caused by the patient's motion, fuzziness, and artifacts that may be misinterpreted as pathological asymmetries.[9] Images with adequate diagnostic quality can negate the need for additional radiological examinations or even a breast biopsy,[10] improving patient experience by reducing the associated stress.[11]

Breast compression may cause pain and discomfort.[12] This is significantly higher in persons with dense breasts or breasts treated with conserving therapy when compared to the untreated breast.[13] The pain felt during mammograms may also result from the positioning against the cold and sharp edges of the equipment.[14] Furthermore, pain can be perceived as higher when a patient has a poor screening experience, often due to an examiner's inadequate professional attitude or lack of knowledge about the examination.[13] A painful experience is of concern, as it significantly affects ongoing participation in the screening program.[15]

Furthermore, patient stress can be increased by extended waiting times to obtain results, the loss of dignity during the examination, the medical environment, or an inadequate breast position during screening.[14] In this context, anxiety has been defined as a harmful component of mammography examinations.[16] Pain and anxiety are, therefore, contributing factors to a poor experience during mammography examination, so it is critical they are managed by the implementation of clinical interventions to enhance the quality of health care services.

An increasing number of studies focusing on interventions to enhance the overall patient satisfaction and comfort during mammography examinations have been published. These strategies differ in their characteristics, outcomes, and health care providers involved. Examples of evaluated interventions are providing information/education,[17,18] giving women control of the compression of their breasts,[19] administering medication,[20] and performing a clinical breast examination in addition to mammography.[21] The studied outcomes are satisfaction,[19-21] anxiety,[17,18] discomfort,[20] and pain.[19]

The objective of this scoping review is to examine the state of the evidence (ie, quantitative, qualitative, mixed methods research) on evaluated interventions designed to improve patient experience (eg, satisfaction, anxiety, pain) in diagnostic and screening mammography.

A preliminary search of MEDLINE, Cochrane Database of Systematic Reviews, *JBI Evidence Synthesis*, PROSPERO, and Open Science Framework was conducted. A systematic review of seven randomized controlled trials, published in 2008, found few strategies that were effective in reducing pain and discomfort during screening mammography[22] and emphasized the need for more research on this topic. Additionally, one in-progress systematic review[23] and one published scoping review[24] were identified. The systematic review by Shang *et al.*[23] will examine interventions to reduce anxiety, and has a much narrower focus than our proposed scoping review. It proposes to consider only women and screening mammography; the interventions are limited to psychological and/or behavioral and medicine treatment. The primary proposed outcome is anxiety, and the authors will only include studies that used the State Trait Anxiety Inventory survey.[23] The study design of the articles included will be randomized controlled trials only.

Regarding the published scoping review by Bui *et al.*,[24] it only considered one outcome proposed in our study (anxiety). Furthermore, we note that articles we have identified in our primary search relative to this outcome were not included in the review.[17,18]

This preliminary search shows that the available reviews are limited in scope as they deal only with one or two dimensions, and do not address all features critical to the patient experience. For instance, as previously mentioned, pain and anxiety are interrelated emotional states that, together, help define the overall patient experience and, therefore, the

likelihood to attend another mammography examination. As a result, information on relevant interventions is dispersed over multiple articles and a holistic overview on the topic is needed.

This review will comprehensively map studies evaluating interventions in mammography practice and their features, including the type of interventions, populations of interest, study design, and outcomes reported. Mapping the global evidence will provide an in-depth understanding of the diversity of existing evaluation studies of interventions, and will contribute to advancing the knowledge of health/education professionals and researchers.[25-27] This scoping review will also provide insights into the evidence gaps on this topic.

## Review questions

- What interventions designed to improve the patient experience in mammography have been evaluated, and what are their characteristics?
- What types of study designs were used?
- For what purposes (screening and/or diagnostic) were the interventions tested?
- Which professionals (eg, radiographers, radiologists, secretaries) were involved?
- Who were the care recipients (eg, women, men)?
- What outcomes (eg, satisfaction, pain, discomfort) have been reported, and in which manner (eg, outcome scale)?
- What interventions published in clinical trial registries are currently being studied?
- What are the gaps in current knowledge that need to be addressed?

## Inclusion criteria

### *Participants*

This scoping review will consider studies that include adult ($\geq$ 16 years) women, men, transgender, nonbinary, or intersexual persons undergoing diagnostic or screening mammography. Studies referring to patients with augmented or reconstructed breasts following mastectomy will be also eligible. There will be no exclusion criteria based on previous history of cancer or comorbidities.

### *Concept*

Studies describing any interventions within the mammography department will be considered for inclusion. This allows us to consider the full patient care approach within the department, from entry to discharge, and to focus on the interventions that can more directly contribute to improve patient experience throughout the examination. For instance, they may be related to:

- patient-staff interaction (eg, communication, information);
- staff education (eg, knowledge, skills);
- breast compression and positioning (eg, self-compression, compression force, Eklund maneuver);
- patient preparation for mammography (eg, naked vs. gown, removal of jewelry);
- examination procedure (eg, waiting time, examination time, clinical breast examination);
- physical environment (eg, dressing room, decoration, music, lightning) and equipment;
- relaxation techniques and analgesic care (eg, medication, breathing techniques, hypnosis).

This scoping review will also identify and map outcomes related to the patient experience, including stress, discomfort, or pain. If these studies explore health care professional perspectives or other clinical outcomes (such as diagnostic image quality), they will also be reported.

### *Context*

Studies from all types of mammography departments will be considered (clinical centers or mobile units; private or public; screening or diagnostic settings), without geographical or cultural limitation.

### *Types of sources*

This scoping review will consider both experimental and quasi-experimental study designs, including randomized controlled trials, non-randomized controlled trials, before-and-after studies, and interrupted time-series studies. Outcomes relating to patient experience and professional perspectives may have been evaluated, for instance, by surveys, interviews, or focus groups. Accordingly, quantitative as well as qualitative data from the previously mentioned study designs will be considered. All types of reviews (eg, systematic reviews) will be excluded.

## Methods

The proposed scoping review will be conducted in accordance with the JBI methodology for scoping reviews and will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses

extension for Scoping Reviews (PRISMA-ScR) reporting guidelines[25,28] and Arksey and O'Malley's framework, which exemplifies the use of scoping reviews for evaluation studies of interventions.[26,27] This scoping review is registered in Open Science Framework (https://osf.io/fn865/).

### Search strategy

The search strategy aims to identify both published and unpublished studies. An initial limited search of MEDLINE (Ovid) and Embase (Elsevier) was undertaken to find 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 via Ovid (see Appendix I). The filter for identifying intervention studies complements this strategy.[29] The research equation was developed with the help of a scientific librarian, and independently controlled by another scientific librarian. The search strategy, with all identified keywords and index terms, will be adapted for each electronic database included in the review. The reference lists of all included sources of evidence will be screened for additional studies.

Studies published after 2000 will be included, given the major developments in mammographic equipment and the introduction of digital systems in clinical practice since then.[6] Indeed, technological progress, whether related to ergonomics, design, or image acquisition systems in digital mammography, have profoundly changed the management of patients and, consequently, their experiences. There will be no limitation based on the language of publication.

The databases to be searched include MEDLINE (Ovid), Embase (Elsevier), CINAHL (EBSCO), PsycINFO (Ovid), The Cochrane Central Register of Controlled Trials (CENTRAL), and Web of Science. Sources for the search of unpublished studies will include ProQuest Dissertation and Theses. Electronic databases were selected because of slightly different and complementary specialties, such as nursing and allied health, biomedical sciences, or psychological science; they cover different aspects of our subject, from technical (eg, breast compression) to psychological (eg, relaxation) factors. The following registries will also be searched for ongoing clinical trials: The US National Institutes of Health (ClinicalTrials.gov), The World Health Organization International Clinical Trials Registry Platform, and the International Standard Randomized Controlled Trial Number.

### Study selection

Following the search, all identified citations will be collated and uploaded into EndNote v.X20 (Clarivate Analytics, PA, USA) and duplicates removed. Three reviewers with knowledge and experience in literature reviews and/or mammography practice will be involved in study selection. The three reviewers will conduct a pilot exercise to test a set of documents for inclusion. Once agreement is reached, titles and abstracts will be screened by two independent reviewers for assessment against the inclusion criteria for the review. Potentially relevant sources will be retrieved in full, and their full text will be assessed in detail against the inclusion criteria by two independent reviewers. Reasons for exclusion of studies 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. The results of the search and the study inclusion process will be reported in the final scoping review and presented in a PRISMA flow diagram.[30]

### Data extraction

Data will be extracted from papers included in the scoping review by two independent reviewers using a data extraction table developed by the reviewers. The data extracted will include details relevant to the review questions, including the participants, concept, context, study methods, and outcomes.

A draft extraction table is provided in Appendix II. The draft data extraction tool will be modified and revised as necessary during the process of data extraction, and 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. Authors of papers will be contacted to request missing or additional data, where required.

### Data analysis and presentation

The findings will be presented in tabular and diagrammatic format in a manner that aligns with the overall objective of the scoping review, which is to

map evaluated interventions that improve the patient experience during mammography. The table and graph will highlight the interventions that constitute the main element of our study, but will also present other key information concerning professionals, patients, study designs, settings, and outcomes. Accordingly, we will present frequencies and conceptual categories. A narrative summary will accompany the tabulated/diagrammatic results and will describe how they relate to the review questions. This synthesis will also highlight any literature gaps.

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## Appendix I: Search strategy

*MEDLINE (Ovid)*
Date searched: March 18, 2022

| Search | Query | Records retrieved |
|---|---|---|
| 1 | exp mammography/ or (mammograph* or "breast screening" or "breast cancer screening" or mammogram* or "breast tomosynthesis").ab,ti,kf. | 46,753 |
| 2 | pain/ or exp pain measurement/ or pain.ab,ti,kf. or painfull.ab,ti,kf. | 758,098 |
| 3 | exp patient satisfaction/ or exp "patient acceptance of health care"/ or patient comfort/ or Anxiety/ or Stress, Psychological/ | 463,897 |
| 4 | ((patient$1 or wom#n$1 or client$1 or man$1 or men$1 or female or male or transgender$1 or transexual$1 or intersex* or nonbinar* or people or person$1) adj3 (anxiety or perception$1 or satisf* or experience$1 or attitude$1 or expectation $1 or involve$1 or involvement or engagement or dissatisfaction$1 or worr* or stress or comfort or discomfort)).ab,ti,kf. | 472,066 |
| 5 | 2 or 3 or 4 | 1,536,194 |
| 6 | 1 and 5 | 4398 |
| 7 | randomized controlled trial.pt. | 561,669 |
| 8 | controlled clinical trial.pt. | 94,744 |
| 9 | multicenter study.pt. | 317,557 |
| 10 | pragmatic clinical trial.pt. | 2063 |
| 11 | non-randomized controlled trials as topic/ | 1047 |
| 12 | interrupted time series analysis/ | 1549 |
| 13 | controlled before-after studies/ | 690 |
| 14 | (randomis* or randomiz* or randomly or groups or trial or multicenter or multi center or multicentre or multi centre or intervention? or effect? or impact? or controlled or control group? or (before adj5 after) or (pre adj5 post) or ((pretest or pre test) and (posttest or post test)) or quasiexperiment* or quasi experiment* or pseudo experiment* or pseudoexperiment* or evaluat* or time series or time point? or time trend? or repeated measur*).ti,ab. | 12,067,595 |
| 15 | or/7-14 | 12,178,168 |
| 16 | exp animals/ | 25,243,065 |
| 17 | humans/ | 20,268,609 |
| 18 | 16 not (16 and 17) | 4,974,456 |
| 19 | review.pt. | 2,953,307 |
| 20 | meta analysis.pt. | 155,140 |
| 21 | news.pt. | 211,539 |
| 22 | comment.pt. | 955,551 |
| 23 | editorial.pt. | 598,524 |
| 24 | cochrane database of systematic reviews.jn. | 15,811 |
| 25 | comment on.cm. | 955,498 |
| 26 | (systematic review or literature review).ti. | 222,126 |
| 27 | or/18-26 | 9,401,416 |
| 28 | 15 not 27 | 8,670,143 |
| 29 | 6 and 28 | 2414 |
| 30 | limit 29 to yr = "2000 -Current" | 1927 |

## Appendix II: Draft data extraction tool

| | |
|---|---|
| Study citation details (eg, author/s, date, title, journal, volume, issue, pages) | |
| Country in which the study was conducted | |
| Purpose | |
| Study design | |
| Context (eg, screening, diagnostic) | |
| Population (eg, sample size, age, sex) | |
| Concept: type of strategies (eg, relaxation techniques, breast compression) | |
| Concept: strategies characteristics (eg, provider, duration) | |
| Outcomes (eg, distress, pain, image quality) | |