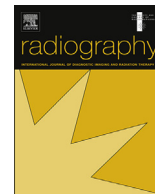




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Review article

Review of the evidence on the use of arbitration or consensus within breast screening: A systematic scoping review[☆]L. Hackney^{a,*}, A. Szczepura^{a,b}, L. Moody^a, B. Whiteman^a^a Coventry University, Priory St, Coventry CV1 5FB, UK^b Hospitals Coventry and Warwickshire NHS Trust, Clifford Bridge Road, Walsgrave, Coventry CV2 2DX, UK

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ABSTRACT

Objectives: A systematic scoping review was undertaken to establish the evidence base on arbitration and consensus in mammography reporting.

Database searches were supplemented with hand searching of peer-reviewed journals, citation tracking, key author searching, grey literature and personal contact with experts. A 3-stage process was utilised to screen a large volume of literature (601) against the inclusion and exclusion criteria. 26 papers were retained.

Key findings: A lack of guidance and underpinning evidence to inform how best to use arbitration or consensus to resolve discordant reads. In particular, a lack of prospective studies to determine effectiveness in real-life clinical settings.

Conclusion: The insufficiency of follow-up or reporting of true interval cancers compromised the ability to conclude the effectiveness of the processes.

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Introduction

An estimated 1.6 million women were diagnosed with breast cancer worldwide in 2012, representing the most common cancer in developed and developing countries.² Cancer Registration statistics (2013)³ confirm that 43.5% of UK female breast cancer cases are diagnosed in the 50–59-age range and 34.3% in the 60–69-age range, with a 6% increase in incidence rates in UK females between 2002–2004 and 2011–2013. The combination of breast cancer prevalence and demographic trends contributed to the founding of the UK National Health Service (NHS) Breast Screening Programme (NHSBSP) in 1988 to facilitate early detection and reduce mortality rates. Although the incidence of breast cancer has continued to rise in the UK over the last decade the mortality rates have fallen.³

In order to increase cancer detection rates different reporting strategies are utilised in various regions of the world. In the United States, single radiologist reporting or single radiologist reporting with Computer Aided Detection (CAD) are commonly employed.⁴

Double reporting by Radiologists specialised in breast screening is the European standard.⁵ Unique to the UK is double reporting undertaken by trained mammographer's (Allied Health Professionals). This was validated in 2012 following an extensive NHSBSP research project (Non-Discordant Radiographer Only Reporting – NDROR).⁶ The principal complexity for reporters is balancing the trade-off relationship of attaining a high sensitivity whilst minimising false positives,⁷ which impact adversely on patient wellbeing⁸ and represent cost implications in time and resources.

Double reporting inherently results in discordant cases, which require resolution. The most common decision methods utilised are arbitration by a third independent reader or some form of consensus review. For the purpose of this review arbitration and consensus definitions are those detailed in Table 1. Complex pathways also exist where both consensus and arbitration are undertaken in the decision-making process.

Until recently, NHSBSP guidance stipulated that the independent third reader or lead of the consensus review must be a medical practitioner. Concerns about the future availability of specialist radiologists have been highlighted in a recent Royal College of Radiologists publication.⁹ This predicts the retirement of 21% of breast radiologists in the next five years, together with a potential 2.2 million increase in women eligible for screening if the current age extension programme is implemented (based on current

[☆] The NHS Breast Screening Programme has recently published guidance on arbitration within a breast screening service. In the UK, delegation of arbitration to radiographers is becoming more common.

* Corresponding author.

E-mail address: lisahackney@me.com (L. Hackney).

Table 1
Definitions used for arbitration and consensus.

Process	Definition
Arbitration	Solitary 3rd reader who made the final decision
Consensus	Group decision making process. Group members discuss and agree to support a decision even if not the “preferent” of each individual

population figures). The NHSBSP arbitration guidance¹ was necessary as it was recognised that, to maintain the current quality standards and avoid delays in patient management, the extension of arbitration duties to non-medics had to be considered.

Whilst there was national momentum for delegation of arbitration to radiographers, there seemed to be little consolidated evidence available on the effectiveness of arbitration versus consensus and whether one strategy produces improved performance in a breast-screening unit. No systematic reviews in this area had been undertaken.

Review aims

The primary aim was to establish what evidence there is to support different models of arbitration or consensus review in breast screening and evaluate the evidence to support the effectiveness of the different models. Specifically, effectiveness was defined in terms of recall rates, cancer detection rate, Positive Predictive Value (PPV) and programme sensitivity/specificity. The review did not aim to address cost-effectiveness.

Method

Literature searches of PubMed, Medline, CINAHL, EMBASE, Scopus, Web of Science and the Cochrane Library were supplemented by a broad Google scholar web search. Hand searching of key peer-reviewed breast and radiology journals, a manual search of reference lists and key author searching was undertaken. Grey literature was sourced by hand searching of conference proceedings and doctoral theses. Personal contact with experts internationally was also undertaken in locating relevant literature.

Table 2
Search terms and variations used.

Exploded terms	Alternative keywords
Breast neoplasm	Breast adj3 (neoplasm* OR carcinoma* OR tumour* OR tumor* OR cancer*)
Mass screening	Breast adj3 (scan* OR screen* OR radiograph* OR imaging OR visualise OR visualize OR exam* OR test* OR mammogra* OR routine* OR check* OR diagnos* OR detect*)
Mammography	Mammogra* adj3 (scan* OR screen* OR visualise OR visualize OR exam* OR test* OR breast*)
Early detection of cancer	
National Health Service Breast Screening Program	OR “NHSBSP” or “UK breast screen* program**” “NHS breast screen* program**”
Negotiating	Arbitration* OR discordant* OR discrepant* OR disparity* OR negotiat* OR disagree* OR conflict* OR differen* OR inconsisten* AND variation* OR consensus* OR uncertain*
Decision making	“Decision mak* OR shared decision making” OR “medical decision making” OR “choice behaviour” OR “problem solving” OR “clinical decision analysis” OR “critical think*” OR “decision aids” OR “Task performance and analysis”
Interpersonal communication	

Table 2 lists the search terms and variations used in the database searches. Concepts of interest^{10,11} were cross-referenced by searching Cochrane reviews for validation.

Inclusion/exclusion criteria

Inclusion and exclusion criteria detailed in **Table 3** related to the intervention and population characteristics but there was no limitation on study design.

Studies published from 1st January 2008 were considered for inclusion in this review, as it would give a 2-year lead in period from when relevant NHSBSP guidance was last revised (2010/2011). Initial searches retrieved small numbers of articles. Therefore, for subsequent searches either the start year was extended to 2005, or no date restriction was applied to ascertain if a seminal piece of work was produced earlier.

Two reviewers independently undertook a three-stage process for filtering the literature retrieved.^{12,13} Reviewer one was a Masters in Research student and consultant radiographer, reviewer two is a Professor of Health Technology Assessment. First stage selection was based on an analysis of the titles and/or abstracts or summaries. In the second screening stage, abstracts were screened for all retained literature, against the agreed inclusion and exclusion criteria. Any disagreement was resolved after retrieval and review of the full text (five articles identified and arbitrated).

In stage three, the full text of all potentially eligible peer-reviewed papers/grey literature items were examined. A third reviewer (clinical research fellow) resolved any disagreements over the eligibility of a particular study (no articles identified). Articles that met the inclusion criteria were documented in a customised data extraction form (S1). Data extracted included:

- Article descriptors: author; year of publication; country where study performed;
- Study context (screening versus diagnostic);
- Sample size;
- Data analysis/metrics;
- Reporting strategy (double reading; blinded or non-blinded reading);
- Use of a test set versus prospective series of patient selection;
- Strategy utilised for discordant results;
- Readers (professions, number acting as arbitrator, years of experience, and specific training in mammogram reading);
- Strengths and weaknesses of the study (to include selection/measurement bias).

The data extraction form enabled raw data from multiple disparate studies to be amalgamated and compared, aiding in pattern recognition and providing a ‘rapid and succinct summary of the literature for review’.¹⁰

Quality assessment for methodological rigour was undertaken using criteria derived from the standardised Critical Appraisal Skills Programme (CASP)¹⁴ questions where appropriate. Quality appraisal was undertaken independently by two reviewers, and in cases of disagreement, a third reviewer was consulted with the aim of reaching consensus through discussion. No weighting or ranking of the papers finally included was undertaken. The findings were summarised in a thematic narrative synthesis.

Results

The PRISMA flow chart in (Fig. 1) details the review process. Details of the included studies, together with extracted data and quality assessment are summarised in S1.

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