



Can Australian radiographers assess screening mammograms accurately? Biennial follow-up from a four year prospective study and lesion analysis



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ABSTRACT

Introduction: Globally, the role of the radiographer is changing; some countries have developed advanced roles with specific scopes of practice. Other countries, like Australia, are in the process of this change. This paper demonstrates the abilities of Australian radiographers in mammogram screen reading, highlighting some of their specific difficulties with different lesion types.

Method: Six experienced radiographers participated in a prospective study, screen reading 2000 mammograms each between 2010 and 2011. This paper looks at the results of those same women at biennial re-screen. Analysis of the results included validation of normal results by negative follow-up screens and new cancers at biennial review; there is also analysis on the types of lesions detected and missed.

Results: After biennial review, three cancers in 2013/2014 had been marked as abnormal by one radiographer two years prior, which increased her sensitivity from 64% to 85%. Sensitivity for the radiologists decreased from the assumed 100% to 95%. Radiographers appeared to be skilled in detection of calcifications and architectural distortions but had difficulty with non-specific densities.

Conclusion: This study demonstrates the potential for Australian radiographers to enhance the accuracy of screen reading programs.

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Introduction

The Australian health care system has a high standard of care and quality of service, but it is struggling to meet the ever-increasing demands of an ageing population.¹ The increase in service demand will be dependent on a reduced health workforce, which will exacerbate the enormous pressure that some health workers are presently subject to; this in turn increases the risk of clinical error.^{1,2} In the radiography profession there are some areas where the skills of radiographers could be better utilised, and one of these areas is mammography. Screening programs historically have struggled with a shortage of radiologists^{3–5} and with radiographer recruitment and retention.^{1,2}

Other countries such as the USA and some European countries have established advanced practice roles with specific scopes of practice including mammography screen reading.^{6–8} A change in career structure was well received by the radiography profession in the UK; they have a four tier system incorporating radiographer assistants, radiographer practitioners, advanced practice radiographers and at the highest level, consultant radiographers.⁶

The Australian Inter-Professional Advisory Team (IPAT) released a document in 2012 which recommended that the Australian Institute of Radiography (AIR) create a framework for a status of Advanced Practitioner within the radiography profession.⁹ An advanced practitioner would be able to fulfil some of the duties normally undertaken by radiologists; this would also help alleviate the radiologist workload.^{6,10} In the field of screening mammography, some of the skills identified as possible advanced practice roles include mammogram screen reading and interventional techniques (biopsies and hookwire localisations).¹¹ The scope of radiographers in the UK has widened over the last decade¹² and

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radiographers in the UK now report and provide services independently from radiologists, providing high quality care through excellent clinical practice and leadership.^{13,14}

With the AIR now poised to redesign the structure of professional radiography, Australian radiographers have shown that they are prepared to undertake further study to increase their knowledge, preferring to enhance their careers via clinical roles rather than managerial positions.^{15,16}

Research into the capabilities of Australian mammography radiographers is ongoing, with four retrospective studies published within the last five years.^{17–20} The first Australian prospective study was completed in 2013, and has resulted in two papers; the first one reports on the performance results of six radiographers in a BreastScreen Australia (BSA) program, comparing their results with those of the radiologists.²¹ The cancers detected during the study were all biopsy-proven and women returned to screening at that time were assumed to be cancer-free. Follow-up was needed to measure whether any second round cancers had been indicated by the radiographers during the exercise. This paper presents the final results, after biennial follow-up and also investigates the types of lesions and breast tissue that was prevalent in the mammograms read and cancers missed by the radiographers.

Methodology

Ethics approval was provided by both the University of Newcastle and Hunter New England Area Health (HREC H-352-1206).

Participants

Six experienced radiographers participated in a prospective study, between 2010 and 2013. The radiographers were aged between 45 and 65 years and had worked in mammography for a minimum of 10 years. The radiographers read 2000 mammograms each, as this number is the annual minimum required for radiologists in BSA as detailed in Appendix P of the National Accreditation Standards (NAS).²² Most radiographers aimed to read a set amount per month (100–200) but this varied according to other commitments. All mammograms were read using a Sectra digital Picture Archiving System (PACS) with 10 megapixel Barco monitors. This equipment was in the normal screen reading area used by the radiologists, with appropriate lighting and viewing conditions.

There were approximately 16 radiologists with a minimum of 10 years screen reading experience during this time, 6 of these also participated in assessment clinics. They read all mammograms available and at times that were convenient for them (usual practice), from local and remote sites.

Further information on the method and resources used for this trial are detailed in a previous paper with the first stage results.²¹ The radiographers' results were compared to the combined radiologist outcome, as a reference standard to assess performance criteria. If a radiographer reported a lesion as 'suspicious' and it had not been recalled by the radiologists, it was referred to the designated radiologist for his opinion. This occurred twice.

An author-developed in-house training package on image assessment²³ had been made available to the radiographers between a pilot and full retrospective study, between 2007 and 2009^{17,18}; no formal training was provided.

Follow-up methodology

Follow up on the 9348 women screened in 2010/2011 was conducted at rescreen between September 2012 and December 2013. In particular, the database was checked for all cancers detected. The principal researcher also checked the biennial

outcomes of the women suggested 'recall' by the radiographer readers in 2010/2011. This was to determine whether the radiographers had detected any abnormality at that time which had not been recalled by the radiologists, but proved to be a cancer. There were 48 cancers detected in this group of women; all other negative 2010/2011 results were validated to be normal in 2013/2014 with the exception of three which are discussed in results.

Difficulties of detection

The images in this study included considerable variety of breast sizes, volumes and breast density; all these factors impact on the efficacy of, and level of difficulty associated with, screen reading accuracy.^{24,25} The lesions recalled also ranged from very subtle to very obvious, which meant that each radiographer's level of difficulty was different. This final stage analyses the different lesions and types of tissue within which those lesions were situated, ranging from mostly fatty to dense glandular tissue. The density of the breast tissue was subjectively viewed by the lead author, using guidance from the Breast Imaging Reporting Data System (BIRADS).²⁶ Density of the tissue was categorised into one of four types:

- A. Predominantly fatty
- B. Scattered fibro-glandular elements
- C. Heterogeneously dense
- D. Extremely dense

Lesions are classified into 6 categories using the Australian BreastScreen Information System (BIS):

- Circumscribed mass with or without calcification
- Stellate lesion
- Architectural distortion
- Calcifications
- Non-specific density
- Other (may include skin lesions, lymph nodes)

Results

In the first stage results, the number of mammograms assessed by individual radiographers varied slightly, depending on availability and a number of excluded images (technical recalls and symptomatic letters), resulting in 9348 individual mammograms. The majority (9197) of these women returned in 2013 (Fig. 1). There had been 61 women with cancers detected in 2011 so those women

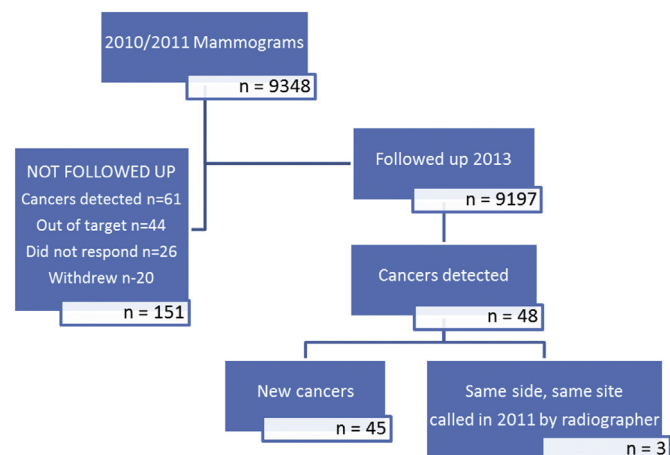


Figure 1. Follow up in 2013 of mammograms read in 2010/2011.

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