THE EFFECT OF IMAGE QUALITY ON RECALL RATES
IN A BREASTSCREENING PROGRAM

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DECLARATION

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“The point at which the learner becomes satisfied with or indifferent to his attained level of competence defines the ultimate level of ability for that person. An attitude towards work that includes continual self-criticism, progressive problem solving and continual re-investment in improvement is the description of a profession, where expertise, accountability, autonomy and authority are interrelated.” (1)
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ABBREVIATIONS

ACR - American College of Radiography
ACS - American Cancer Society
AEC - Automatic Exposure Control Device
BI-RADS - Breast Imaging-Reporting and Data System
BRCA - Breast Cancer Susceptibility Gene
BSA - BreastScreen Australia
BSE - Breast Self Exam
CAD - Computer-Aided Detection
CC - Cranio-Caudal Mammography View
CI - Confidence Interval
DCIS - Ductal Carcinoma In Situ
DES - Diethylstilbestrol
DMIST - Digital Mammographic Imaging Screening Trial
EAR - Excellent, Adequate, Repeat
ER - Estrogen Receptor
FDA - Food and Drug Administration
FNA - Fine Needle Aspiration
HBS - Hunter Region & Wyong Shire BreastScreen (Hunter BreastScreen)
HER2 - Human Epidermal Growth Factor Receptor 2
NHSBSP - National Health Service Breast Screening Programme
HRT - Hormone Replacement Therapy
kVp - Kilovoltage Peak
mAs - Milliamperere-Seconds
MLO - Medio-Lateral Oblique Mammography View
MRI - Magnetic Resonance Imaging
NAS - National Accreditation Standards
NCI - National Cancer Institute
OD - Optical Density
OR - Odds Ratio
PET - Positron Emission Tomography
PGMI - Perfect, Good, Moderate, Inadequate
PIAA - Physician Insurers Association of America
PNL - Posterior Nipple Line
QA - Quality Assurance
RR - Relative Risk
SID - Source Image Distance
TDLU - Terminal Duct Lobular Unit
TNM - Tumour (T), Lymph Node Involvement (N) and Any Distant Metastases (M)
UK - United Kingdom
USA - United States of America
ABSTRACT

Introduction: Between 6-10% of women attending breast screening are recalled to investigate an unclear area on the mammogram. Image quality is known to affect image interpretation and it has been suggested that the number of recalls could be reduced with improved image quality.

Aim: This study aimed to investigate the effect image quality has on recall rates, to assess reader consistency using the PGMI classification system and to establish factors leading to recall.

Materials and Methods: A six member panel assessed 904 sets of images (698 recalled; 206 non-recalled) through a BreastScreening Program during three separate phases (pilot, main and non-recall). The pilot study was conducted without additional training in PGMI. Levels of agreement and Kappa statistics were calculated to assess intra- and inter-consistency. The percentage of and reasons for inadequate images was calculated; while a case-control study was conducted to establish factors increasing the likelihood of a client being recalled.

Results: The level of agreement between panel members significantly increased from the pilot to the main study (45.5% to 57.7%) before decreasing slightly for the non-recall (57.7% to 52.2%). Overall, 3.3% of the 904 sets of images were classed as inadequate; the most common PGMI reason was exposure (31%); the left MLO was considered the most common inadequate projection (30%), with more privately produced (66%) images considered inadequate compared to public images (34%). Inadequate image quality did not hinder the cancer detection rates. The case-control component demonstrated current and previous HRT use, increased breast density, better image quality and images being taken at a public site all contributed to a client being recalled.

Conclusion: The results of this study demonstrated that inadequate image quality was not a major factor leading to recall; although twice the number of recalled images were considered inadequate compared to the non-recalled images. The use of the PGMI classification system is highly subjective, with low levels of agreement amongst users. The use of HRT, breast density, imaging site and image quality all contribute to a client being recalled.