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The effect of individual radiographers on rates of attendance to breast screening: a 7-year retrospective study

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AIM: To establish whether individual radiographers had significantly different rescreening rates whilst controlling for other known confounding factors.

MATERIALS AND METHODS: Women aged 50–69 years were identified from a state-wide screening database at their first screening attendance during the study period (2007–2013). The radiographer performing this index screen and potential confounding factors were recorded and subsequent screening behaviour was assessed. Clients with abnormal screens and those known to have died during the time period were excluded. A univariate analysis of the data from 160,028 women was assessed using the chi-square test to compare those women who attended their next mammography with non-re-attenders. Logistic regression was used to calculate the likelihood of "re-attendance success" across a range of variables. The probability of re-attendance for 11 randomly selected radiographers was determined from the logistic regression model, whilst controlling for other variables.

RESULTS: Comparison of non-re-attenders (n=49,698) with 110,330 (69%) women attending the next round of screening revealed significant differences, including radiographer (Wald statistics=1188, $p<0.000$) even when all other known factors were controlled.

CONCLUSION: This large, population-level study demonstrates that individual radiographer factors appear to influence a women's decision to return for their next screening round. Further research is required to identify reasons for differing rescreen rates and provide education and retraining of individual radiographers as appropriate.

Introduction

Breast cancer remains the second greatest cause of cancer death amongst women in Australia. There is much debate and controversy regarding the balance of benefit and harms of screening programmes, with estimates of relative risk reduction for breast cancer mortality ranging from 26%[1]–15%.[2] A meta-analysis based on the UK screening programme reported a 20% relative risk reduction in breast cancer mortality countered by an estimate of excess incidence of up to 19%.[3]

It remains undisputed that for any screening programme to be a success, population uptake must be both initially high and maintained throughout subsequent screening

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rounds.[4] In Western Australia, women considered at standard risk are screened biennially and higher-risk women are screened annually. During the study period women aged 50–69 years were invited to attend screening. The participation targets for women screened by the state-wide screening programme are for ≥75% of women aged between 50–69 years to have their first rescreen within 27 months and for ≥90% to attend subsequent rescreens.[5] Audit data from 2015 indicates that targets are not currently being met with only 45.9% of women attending first re-screens and 73.5% re-attending subsequent screening rounds. The reasons why women fail to attend screening are broad, including nationality, ethnicity, socioeconomic status, level of education, body mass index (BMI), prior screening behaviour, distance to screening centre, fears about pain, embarrassment, and radiation, and previous negative screening experiences.[6–8] Qualitative studies suggest that a women's intention to attend subsequent screening rounds may be influenced by interaction with staff at the time of the screening mammogram[9,10] and that the radiographer can affect the client's experience of pain.[11]

To the authors' knowledge, there is no published evidence assessing whether the individual radiographer performing the screening mammogram affects the likelihood of the woman attending subsequent screening rounds. This present audit was undertaken to establish whether individual radiographers had significantly different rescreening rates whilst controlling for other known confounding factors.

Materials and methods

Ethics board approval for a retrospective audit study was obtained. Screening data from the screening database from the period 2007–2013 was extracted. This information provided a unique number for both the client and their radiographer, the rescreening interval of the woman (annual or biennial), a range of demographic and clinical information including age, Aboriginal and Torres Straits Islander (ATSI) status, country of birth, previous history of breast or ovarian cancer, and postcode of residence.

Women who were outside the mammography screening programme's target age range of 50–69 years, were known to have died during the study period, or whose re-screen date fell outside the study period were excluded. Each eligible woman was only considered once, subsequent screening episodes were excluded.

The raw data were grouped into cohorts and country of origin was divided into Australia/New Zealand, Europe, and Other. Postcode of residence was used to assign a region of residence (north metropolitan, south metropolitan, south-west, and rural and remote) and quintile of socioeconomic indexes for areas (SEIFA) disadvantage index was calculated based on the 2011 Australian Bureau of Statistics Census.[12]

The primary outcome measure was "re-attendance success". For women on the biennial screening programme re-attendance success was defined as returning for the next screening mammogram within 23–27 months from the index screen, and within 11–15 months from the index screen for those on the annual programme. The woman's first mammogram during the study period was identified as the index event. Although the index screen was the first screen within the study period for many women, this may not represent their first screening mammogram. Demographic data described above, along with the radiographer performing this index mammogram were recorded. Clients were then categorised as a re-attendance "success" or "failure" based on their subsequent behaviour. Failure included both those who failed to attend on time (i.e., re-screened, but outside the defined time frame for the next screening round) and those who failed to re-attend at all within the study period.

Statistical methods

Comparison of demographic information for clients who successfully re-attended the next screening round was compared with those failing to re-attend using chi-square analysis as shown in Table 1. Logistic regression was used to calculate the likelihood of re-attendance success and the possible independent impact of the index-screen radiographer, client age, rescreen interval, Aboriginality, country of birth, region of residence, socioeconomic disadvantage, and history of previous breast or ovarian cancer diagnosis. For a randomly selected cohort of 11 radiographers, the probability that their clients attended the next round of screening was calculated from the logistic regression model. Client complaints made against each radiographer in the subset of 11 radiographers were considered as a proportion of total screens performed during the study period. All statistical calculations were performed using SPSS v24 software.

Results

Study population

During the study period of January 2007 to December 2013, the screening database held a total of 609,314 examinations from 252,824 individual women. Of these, 79% were aged in the screening target age group of 50–69 years (480,282 screenings; 201,621 women) and had an average 2.38 screenings across the 7 years. Further restricting the study cohort to include only the woman's first screening event resulted in 160,028 screening episodes for the same number of women (see Table 1).

The screening mammograms were performed by 66 radiographers employed by the state screening programme, although the number working annually varied from 35 to 41 (see Table 2).

Demographics and re-attendance success

In the study population, the vast majority of clients (78%) lived in the metropolitan area of greater Perth and over half (61%) originated from Australia or New Zealand. Very few

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