



Original article

Documenting patterns of breast reconstruction in Australia: The national picture



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ABSTRACT

Introduction: Differences in national health data collection systems preclude accurate assessments of how much breast reconstruction (BR) is performed in Australia. This paper aims to quantitatively document and visually map the national prevalence and distribution of BR, using the best available evidence.

Materials and methods: Quantitative analysis and spatial mapping of hospital-level data on BR prevalence in all six Australian states and two mainland territories. Data was extracted on 3786 women, under the care of members of Breast Surgeons of Australia and New Zealand Incorporated, who had mastectomy for breast malignancy with or without post-mastectomy BR in 2013.

Results: Analysis revealed a national BR rate of 18.3%. Statistically significant differences in BR uptake ($p < .0001$) were found between jurisdictions [χ^2 (df = 7) = 284.29], with BR more likely in younger women [χ^2 (df = 14) = 395.62] and in private hospitals ($\chi^2 = 63.99$) and less likely in remote areas [χ^2 (df = 4) = 66.49].

Conclusion: Analysis of this substantial subset of Australian women requiring mastectomy for breast cancer has demonstrated significant variation in provision or uptake of BR across four important variables. As BR has been shown to provide long-term survivorship benefits for the growing number of women living longer following mastectomy for breast cancer, there is an urgent need to ensure BR is accessible and affordable for all women who choose this option.

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Introduction

Having the option of breast reconstruction (BR) has a positive impact on women with breast cancer [1–3]. Findings from a systematic review of international studies suggested that around 50% of women who are offered BR would take up the offer [4]. Although a range of problems with data collection coverage and procedure identifiers preclude a reliable estimate of BR prevalence and distribution [5], BR rates in Australia are known to be low and highly variable. National estimates remain around 12% [6,7], while some

specialist breast centres in Australia report rates over 40% [8]. Interrogation of the Australian Institute of Health and Welfare & Cancer Australia data from 2009 to 2010 [9] revealed an estimated BR rate of 16% [5]. These Australian figures compare with estimates of 21% in the United Kingdom (UK) [10] and 26% in the United States of America (USA) [11].

The value of BR in women who have undergone mastectomy for breast cancer has been recognised in clinical recommendations from Australia [12], Europe [13], the USA [14] and the UK [15]. Causes of suspected variations require further investigation [7] to promote equitable access to BR services. Accurate and timely information is needed to enable national planning of BR services.

Materials and methods

Using 12 months of data (January–December 2013) from the Breast Surgeons of Australia and New Zealand Incorporated

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(BreastSurgANZ) Quality Audit (BQA) database [16] and geo-spatial software, we documented BR procedures across Australia. Data on the number of BR procedures were obtained for each of the 185 hospitals where the 250 Australian full members of BreastSurgANZ were involved in the management of 3786 women having mastectomy for early stage breast malignancy—ductal carcinoma in situ (DCIS) and invasive cancer. The database covers approximately 70–80% of surgically-treated new breast malignancies in Australia each year.

Of the 692 women who had mastectomy in 2013 and subsequent BR, 679 (98%) were performed at the time of mastectomy (immediate BR or IBR) with insertion of expanders or direct to implant. Of these, 65 cases did not have radiotherapy status reported, 15 women were recommended to have radiotherapy but declined, and 171 cases (25%) had radiotherapy. Thirteen cases were identified as delayed BR (DBR) with no other surgery performed at the time of mastectomy. Five of the DBRs were performed in 2013 (one requiring radiotherapy), while eight were performed in 2014; three of these women had radiotherapy and one was recommended to have radiotherapy but declined. Time between mastectomy and DBR ranged from 3 to 13 months.

De-identified patient data was then mapped by jurisdiction, according to reconstruction by age categories, the proportion of public versus private hospitals offering BR and remoteness of patients' home address. The association between BR uptake and these variables were examined using Chi-squared (χ^2) tests of independence. The mapping was performed by a specialist geo-spatial group at the University of Adelaide (see Acknowledgements and Notes).

Results

Breast reconstruction rates

Table 1 shows the reconstruction rate, based on the BQA data, for each of the six states and two territories and nationally. It demonstrates the significant variation between jurisdictions. However, these results need to be interpreted carefully, as the two territories and Tasmania have small numbers of BR patients. The national BR rate for women treated by BreastSurgANZ surgeons is 18.3%. Differences in BR rates between jurisdictions was significant: χ^2 (df = 7) = 284.29, $p < .001$.

National distribution of BR services

The majority of the Australian population live on the coastline [18]. Fig. 1a demonstrates the population distribution of women aged 20 and over—the potential breast cancer population—across Australia. While the highest densities are concentrated in the capital cities and other coastal areas, sizeable populations exist

further inland, particularly in the larger states. These areas include mid and northern Western Australia, the north-eastern tip of the Northern Territory, and the northern and lower-mid regions of Queensland. Fig. 1b illustrates the location of the 102 hospitals where women who were under the care of members of BreastSurgANZ underwent BR in 2013. The vast majority of these hospitals are clustered within the capital cities.

BR uptake by age

Fig. 2 illustrates mastectomy and BR numbers by age. It shows that BR is most common between the ages of 40–55 and falls sharply from age 70. The smaller categories (20–24 and 25–29; and 90–100+) were combined to allow adequate numbers in each category for χ^2 analysis, which found a statistically significant difference in reconstruction rates across age groups: χ^2 (df = 14) = 395.62; $p < .001$.

BR uptake by private versus public hospital status

Fig. 3 shows that, based on the BQA data, the majority of BR is performed in private hospitals, except in South Australia, where more occurs in the public sector. Seventy-two percent of women in this cohort had their BR performed in a private hospital ($\chi^2 = 63.99$; $p < .001$).

BR uptake by remoteness

Remoteness in Australia is determined by the Accessibility/Remoteness Index Australia Plus (ARIA+), as shown in Fig. 4. ARIA+ is a continuous varying index with values ranging from 0 (high accessibility) to 15 (high remoteness), and is based on road distance measurements from over 12,000 populated localities to the nearest service centres in five size categories based on population size (see Fig. 4).

Table 2 shows the numbers and percentages of mastectomy and BR performed in the five categories used by the ABS to categorise ARIA+. It also contains numbers and percentages of women aged 20 or over living in each region and the BR rate per category. It illustrates that 78% of women who receive BR live in highly accessible areas. The percentage of women aged 20 or more closely parallels the mastectomy rate in each remoteness category, while the reconstruction rate drops from 22% in Category 1 to between 10 and 12.2% in other categories. This difference was found to be statistically significant: χ^2 (df = 4) = 66.49; $p < .001$.

Discussion

Overall this study methodology revealed a national BR rate of 18.3%, but there is significant variation between jurisdictions, across the age groups of patients, between public and private hospitals and between ARIA+ locations. Our findings have policy and practice implications for surgeons and governments.

Table 1
State, territory and national BR rates, 2013.

State/territory	Females aged 20+ (n, 2013)	Median age	Mastectomy Patients (n)	Reconstruction Patients (n)	Reconstruction rate (%)
NSW	2,914,258	48	1276	230	18.0%
VIC	2,278,559	47	838	236	28.2%
QLD	1,777,810	47	777	54	6.9%
SA	670,035	50	463	45	9.7%
WA	952,500	46	348	94	27.0%
ACT	148,955	44	40	24	60.0%
TAS	201,711	51	27	3	11.1%
NT	80,941	41	17	6	35.3%
AUSTRALIA	9,025,572	47	3786	692	18.3%

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