The Breast (2006) **15**, 769–776

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THE BREAST

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ORIGINAL ARTICLE

Rural–urban differences in the presentation, management and survival of breast cancer in Western Australia

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Received 25 January 2006; received in revised form 19 April 2006; accepted 19 April 2006

KEYWORDS
Breast cancer;
Geographical differences;
Rural;
Urban;
Inequality;
Survival

Summary From all women diagnosed with invasive breast cancer in 1999 in Western Australia, rural and urban women were compared with regard to mode of detection, tumour characteristics at presentation, diagnostic investigations, treatment and survival. Women from rural areas with breast cancer ($n = 206$, 23%) were less likely to have open biopsy with frozen section ($P < 0.001$), breast-conserving surgery ($P < 0.001$), adjuvant radiotherapy ($P = 0.004$) and hormonal therapy ($P = 0.03$), and were less likely to be treated by a high caseload breast cancer surgeon ($P < 0.001$). Adjusting for age and tumour characteristics, rural women had an increased likelihood of death within 5 years of breast cancer diagnosis (HR 1.62, 95% CI 1.10–2.38). This difference was not significant after adjustment for treatment factors (HR 1.36, 95% CI 0.90–2.04).

Introduction

People living in rural areas have less access to health care and facilities, and incur higher costs, compared with their urban counterparts.[1] Recent studies have indicated that rural women diagnosed

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doi:10.1016/j.breast.2006.04.001

with breast cancer have a later stage of cancer at diagnosis,[2,3] undergo fewer diagnostic investigations,[4] are less likely to have breast-conserving surgery[5,6] and radiotherapy,[7] and are less likely to be treated by a high caseload surgeon[8] than women living in urban areas. Research has shown mixed results regarding the likelihood of rural women undergoing mammographic screening compared with urban women.[9,10] Australian statistics show similar mortality rates for breast cancer in urban and rural areas.[1,11]

Approximately 30% of Western Australia's (WA's) population lives in rural or remote areas. All breast cancer screening, diagnostic and treatment services are available in the capital city, Perth. Some of these services are also available in regional centres, and mobile mammography units provide screening in rural and remote areas.

This study used data from all women diagnosed with breast cancer in WA in 1999 to investigate whether differences exist between women living in urban and rural areas in the presentation, investigation, primary treatment and 5-year survival from breast cancer.

Methods

The methods for this study have been described previously[12,13] and are briefly summarised here.

Case ascertainment

A list of patients diagnosed with breast cancer in 1999 was supplied by the WA Cancer Registry. Notification of all cancers diagnosed, other than non-melanocytic skin cancer, is compulsory in WA. Histopathology reports were collected for each woman, if available.

Collection of data

A trained research nurse completed a pre-coded form for each woman identified. The form included information regarding demographic characteristics, surgeon's name, hospital record number, date of presentation and method of detection, diagnostic investigations and primary management undertaken. After 5 years, cases were matched by the Cancer Registry to mortality records for WA and the date of death was recorded for women who had died in the 5 years since their diagnosis.

Definition of variables

Analyses were limited to women with invasive breast cancer; in situ tumours were excluded. Area of residence was determined from the postcode of the woman's usual residence. Postcodes less than 6200, representing the greater Perth metropolitan region, were considered urban, while those greater than 6200 were rural. This accords with methods used by the Health Department of WA. Tumour size and lymph node status were anatomically defined. That is, based on measurements documented in the pathology reports. Diagnostic investigations refer to diagnostic mammography, breast ultrasound, fine needle aspiration biopsy, core biopsy and open biopsy with or without frozen section.

Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS Version 12.0).[14] Continuous variables were summarised using means and standard deviations, and differences between urban and rural women were assessed using *t*-tests. Two-sided *P*-values were used for all analyses. Highly skewed continuous variables were transformed to their natural logarithm before analysis. Frequency tables and cross-tabulations were used to summarise categorical variables, and differences between urban and rural women were assessed using χ^2 tests. Kaplan–Meier survival curves were used to illustrate the survival distributions of urban and rural populations. Cox regression analysis was used to test for differences in survival distributions between groups. Hazard ratios and their 95% confidence intervals (95% CI) were used to quantify these differences.

Ethical approval

Both the University of WA Ethics Committee and the Health Department of WA's Confidentiality of Health Information Committee approved the protocol for the study. In addition, ethics approval was gained from all relevant hospitals.

Results

There were 1025 women diagnosed with invasive breast cancer in 1999 and notified to the WA Cancer Registry. Of these 899 (88%) were included in the analysis. Cases were excluded if the tumour was not an incident tumour but had recurred in 1999, if the tumour was secondary from somewhere other