



## Original article

## Patterns of care for ductal carcinoma in situ of the breast: Queensland's experience over a decade



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## ABSTRACT

**Objectives:** To review management of ductal carcinoma in situ (DCIS) of the breast in Queensland, with reference to breast conserving surgery (BCS) and adjuvant radiation therapy (RT). In addition, we examined the incidence of invasive breast cancer recurrence and factors predictive of invasive recurrence.

**Materials and methods:** A retrospective review of the Queensland Oncology Repository identified women with resected DCIS (TisN0) ± adjuvant RT between 2003 and 2012. Time to invasive breast cancer recurrence was analysed using the Kaplan Meier method. Median follow-up was 4.9 years.

**Results:** 3038 women had surgery. 940 (31%) had mastectomy and 2098 (69%) underwent BCS. Of 2098 women having BCS, 1100 (52%) received BCS alone and 998 (48%) received adjuvant RT. The use of RT significantly increased over the decade from 25% to 62% ( $p < 0.001$ ). Clinicopathological factors associated with RT use on multivariate analysis included age  $\leq 70$ , higher socioeconomic status, larger tumour size, higher nuclear grade and surgical margins  $\leq 5$  mm. Invasive breast cancer recurrence at 5 years was 1.7% [95% CI 1.0–3.0] in RT group versus 2.8% [95% CI 2.1–3.8] in BCS alone group. Factors associated with increased risk of invasive recurrence on multivariate analysis were age  $< 40$  and surgical margins  $\leq 2$  mm. **Conclusion:** The use of adjuvant RT in Queensland significantly increased between 2003 and 2012. Selection of patients for RT was based on clinicopathological factors associated with higher recurrence risk. Although longer follow-up is required, the selective use of radiation therapy after BCS is associated with a low rate of invasive breast cancer recurrence at 5 years.

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### 1. Introduction

The incidence of DCIS has risen following the introduction of breast screening programs [1]. The age-standardised rate for DCIS in Australia in 2010 was 15.3 cases/100 000 females [2].

DCIS is a non-fatal, pre-malignant condition and it is estimated that between 40% and 70% of untreated DCIS lesions will progress to invasive breast cancer over time [1]. Consequently, treatment of DCIS is recommended in order to prevent progression to invasive breast cancer.

Complete surgical excision with the best possible cosmetic

result is the initial recommended management, with the majority of women in Australia undergoing BCS [3,4].

Adjuvant breast RT following BCS for DCIS, has been shown in multiple randomised studies to significantly reduce DCIS and invasive recurrence across all subgroups of patients [5–10]. A Cochrane review showed ipsilateral recurrence at 5 years reduced from 15–20% to 5–9%. In those patients that recurred, 50% were recurrent DCIS and 50% were invasive disease [11].

Although there is evidence that there is a significant reduction in recurrence in all subgroups of patients receiving adjuvant RT after BCS, RT is associated with a risk of acute and late effects. The degree and severity of late effects are difficult to quantify given the use of new technology in RT and the latency of side effects [6,12–14]. There may also be a subset of patients, with DCIS that is more indolent with lower recurrence risk [15,16] and for whom treatment with BCS with or without adjuvant RT may be

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overtreatment. Hence, there remains controversy regarding which patients, if any, can be managed with BCS alone in order to spare potential toxicity of RT and by omission of RT potentially provide health economic benefits.

This retrospective population based study was undertaken to examine the patterns of care of patients diagnosed with breast DCIS and undergoing surgery in Queensland between the years 2003 and 2012 with a specific focus on those receiving BCS with or without adjuvant RT. In addition, we examined the invasive recurrence patterns to determine if adjuvant radiation therapy impacted on outcomes. The third aim was to identify features associated with local invasive breast cancer recurrence in this cohort.

## 2. Methods

Queensland women with histologically proven DCIS aged >20 years between 2003 and 2012 and who underwent mastectomy or BCS with or without RT were eligible for this study. Patients with prior or simultaneous diagnosis of invasive breast cancer were excluded. Follow up for this cohort was to December 2013.

Data were taken from the Queensland Oncology Repository (QOR). The QOR is a state-wide cancer patient database that links cancer diagnosis data with mortality data and treatment data from Queensland public and private hospitals. The data in QOR are routinely matched and linked as a part of a state-wide quality assurance initiative. This study was approved by the Princess

Alexandra Human Research Ethics Committee.

Histological grade data in QOR are electronically coded for invasive breast cancers but not for DCIS. DCIS nuclear grade, surgical margins and necrosis were abstracted from scanned pathology reports in the QOR. Other tumour characteristics such as tumour size were extracted directly from QOR. RT treatment details were imported electronically into QOR from the public and private RT centres in Queensland. Any gaps found in RT electronic data in QOR were filled by manually reviewing individual patient records at local centres.

Recurrence is reported to the QOR for both DCIS and invasive disease. However, recurrent DCIS is not recorded as a separate event. Invasive cancer is recorded as a separate event. We were unable to extract DCIS recurrence data for this reason. Invasive breast cancer recurrence was defined as any invasive breast cancer occurring in the ipsilateral breast more than 6 months after the initial diagnosis and treatment of DCIS. Patients within the cohort were categorised by their relative remoteness of residence based on the Australian Standard Geographical Classification (ASGC). Data were aggregated to an urban and rural dichotomy, where urban areas comprise the metropolitan areas of South-East Queensland including Brisbane, the Gold and Sunshine Coasts and Ipswich, along with Townsville. The remainder of the state falls into the rural category. Socio-economic status (SES) was based on place of residence using the Socio-Economic Indices for Areas (SEIFA) [17]. Aggregation into affluent (top 20% of population), disadvantaged (bottom 20%) and middle (remaining 60%) was conducted prior to

**Table 1a**  
Clinicopathological variables associated with type of surgery.

	DCIS treatment	Mastectomy	BCS	% BCS
	n	n	n	
<b>DCIS cohort</b>	<b>3038</b>	<b>940</b>	<b>2098</b>	<b>69%</b>
<b>Median age</b>	59 yrs	58 yrs	59 yrs	
<b>Age Group</b>				
20–39	88	41	47	53%
40–49	551	222	329	60%
50–59	957	252	705	74%
60–69	945	270	675	71%
70–79	417	127	290	70%
80+	80	28	52	65%
				<b>p-value &lt; 0.001</b>
<b>Socioeconomic status</b>				
Affluent	528	142	386	73%
Middle	1914	600	1314	69%
Disadvantaged	596	198	398	67%
				<b>p-value = 0.014</b>
<b>Remoteness</b>				
Urban	2071	594	1477	71%
Rural	967	346	621	64%
				<b>p-value &lt; 0.001</b>
<b>Median tumour size (mm)</b>	<b>16</b>	<b>38</b>	<b>12</b>	
<b>Tumour size</b>				
≤10 mm	1024	118	906	88%
11–20 mm	727	152	575	79%
>20 mm	1144	635	509	44%
Not recorded	143	35	108	76%
				<b>p-value &lt; 0.001</b>
<b>Nuclear grade</b>				
Low	363	52	311	86%
Intermediate	971	268	703	72%
High	1666	607	1059	64%
Not recorded	38	13	25	66%
				<b>p-value &lt; 0.001</b>
<b>Necrosis</b>				
Present	2084	737	1347	65%
Absent	624	130	494	79%
Not recorded	330	73	257	78%
				<b>p-value &lt; 0.001</b>

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