What are the appropriate thresholds for High Quality Performance Indicators for breast surgery in Australia and New Zealand?

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1. Introduction

Breast cancer surgical management and multidisciplinary care has evolved rapidly over the past 5–10yrs and there are numerous local and international guidelines which recommend best practice and some that indicate standards for care [1]. The Breast Surgeons of Australian & New Zealand Inc. (BreastSurgANZ) Quality Audit (BQA) was originally established in 1999 and is a bi-national surgical audit documenting the care breast cancer patients receive. The BQA has been mandatory for all full members of BreastSurgANZ since 2010. Since 2004 the BQA has included key performance indicators (KPIs) (see Table 1), which reflect factors important for the best survival outcomes. The KPIs are automatically generated from data entered and give real time feedback to the individual surgeon. If rates of KPIs are below the recommended standards, then the surgeon needs to review his/her practice and explain the discrepancy. In 2017 6 new High-Quality Performance Indicators (HQPIs) were introduced (see Table 2). These HQPIs were developed to indicate important aspects of contemporary management that have a major impact on quality of life outcomes. They are evaluating areas that are often highlighted as essential parts of best practice and recommendations by expert groups [2,8].

A process of BreastSurgANZ oversighting the memberships’ compliance with KPIs, termed the “Outliers Process”, has been
difficult to implement but remains a goal of the society. HQPIs are new, and, in the process of introducing them BreastSurgANZ is currently piloting the software used for their assessment as new data points had to be introduced for HQPIs 4 and 5.

The aim of this study was to interrogate the BQA to evaluate the memberships' compliance at various suggested thresholds for the 4 evaluable HQPIs being implemented. In addition, comparison to global standards has been included to inform the thresholds that will eventually be set for the HQPI. It is important that these thresholds reflect international best practice and not just meet a standard that is arbitrarily set. Whilst achieving adequate performance at high levels for KPIs is mandatory for breast surgeons because they reflect improved survival, achieving high rates with HQPIs may be considered aspirational for many. However, in wealthy countries like Australia and New Zealand patients have the right to expect consistent and contemporary care in a range of locations despite geographic and resource issues. It is expected that with time higher rates of compliance with HQPI will occur and with time and improvements in training the recommended thresholds should rise as standards of care improve.

### 3. Results

The BQA detailed data from 361 members who had entered 31,698 cases of invasive breast cancer and 3761 cases of in situ cancer. This included 240 low volume; 89 medium volume; 23 high volume; and 9 very high-volume members.

### 4. Discussion

#### 4.1. Why do we need quality indicators?

Performance indicators have become an international tool to measure the quality of healthcare delivery and its improvement [3]. An effective performance indicator should be a standardized, evidence-based measure of health care quality, agreed upon by an expert panel, that can be used with hospital data to track clinical performance and outcomes [4,5]. In breast cancer management not only has there been reported significant variation in care between hospitals for patients with similar pathology [6], but there has also been reported significant variance between actual practice and optimal recommended care [7]. Breast cancer performance indicators have been introduced internationally to record the level of adherence to recommended practice and to detect and reduce these variances [7,8].

#### 4.2. HQPI 1: rate of immediate breast reconstruction post mastectomy for DCIS

Ductal carcinoma in situ (DCIS) is a precursor lesion of invasive disease [10] and when it is so extensive as to require mastectomy there are no “disease related” reasons why IBR cannot be offered. Various levels of compliance at a range of thresholds can be seen in Fig. 1 but at our proposed threshold of 40% only 30% of members achieved that rate and disturbingly 38% of members had ≤ 5% rate. The higher the caseload the greater the percentage of surgeons achieving the threshold, with up to 78% for very high-volume surgeons compared to only 19% of low volume surgeons. The

### Table 1

Key performance indicators.

| No. | KPI | Quality threshold |
|-----|-----|-------------------|
| 1.  | Percentage of invasive cases undergoing breast conserving surgery referred for radiotherapy | 85% or more |
| 2.  | Percentage of oestrogen positive invasive cases referred for hormonal therapy | 85% or more |
| 3.  | Percentage of invasive cases undergoing axillary surgery | 90% or more |
| 4.  | Percentage of in situ cases undergoing breast surgery without axillary clearance | 90% or more |
| 5.  | Percentage of high-risk invasive cases undergoing mastectomy referred for radiotherapy | 85% or more |
| 6.  | Percentage of high-risk cases referred for chemotherapy | 90% or more |

### Table 2

High quality performance indicators.

| Suggested Quality threshold |
|-----------------------------|
| 1                           | Rate of immediate breast reconstruction for in situ breast cancer patients requiring mastectomy | 40% or more |
| 2                           | Rate of immediate breast reconstruction for invasive breast cancer patients requiring mastectomy | 20% or more |
| 3                           | Rate of breast conservation for tumour =< 2 cm | 70% or more |
| 4                           | Rate of involvement of a breast case nurse in management of the patient | 90% or more |
| 5                           | Rate of discussion of patients at a multidisciplinary meeting | 90% or more |
| 6                           | Rate of use of neo-adjuvant chemotherapy in women =< 50yo | 15% or more |

### 2. Methods

Data was retrieved from the BQA database on 16/4/19 for cases reported between 2012 and 2016 for HQPI 1, 2, & 3 and 2018 for HQPI 6 using search algorithms listed in Appendix A. Data is not yet available for HQPI 4 & 5 (see Table 2) thus will not be included. For the purposes of this study, surgeons who performed less than 50 cases annually were deemed low volume; between 51 and 100 medium volume; 101–150 breast procedures annually, were considered high volume; and 18 members performed >151 cases annually and were considered very high volume. Surgeon compliance with a range of threshold standards was evaluated. Expected standards were based on METeOR—the Australian repository for metadata standards [2]. To date no formal threshold standards have been adopted by BreastSurgANZ. This formal research will inform final decisions.
European EUSOMA guidelines recommend a similar rate of 40% [11] and some member nations have published their audit results. For example, data analysis from the Dutch NABON (National Breast Cancer Organisation) Breast cancer audit [12] demonstrated that IBR was performed in 41% of patients with DCIS. They found that IBR rates were increased due to hospital organisational factors (hospital type/volume, number of weekly MDTs, attendance of plastic surgeon at weekly MDT meetings). They also noted that there was a significant rate difference for IBR if at a cancer specific hospital compared to a district hospital (Odds Ratio (OR) 6.1) and those with a plastic surgeon (2.5 plastic surgeons per 100 diagnoses) compared to those hospitals with no or limited access to plastic surgeons (OR 3.26) [12]. Therefore, our target threshold of 40% is globally comparable. More needs to be done by BreastSurgANZ and individual members to improve our IBR rate for DCIS such as improving access to oncoplastic trained breast surgeons and/or plastic surgeons and resources, facilitating patients who live in remote areas without resources to be able to travel to receive reconstruction if that is their preference.

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4.4. **HQPI 3: rate of breast conservation surgery for tumours <2 cm in size**

Multiple prospective randomised trials over the past decades have demonstrated that patient survival after undergoing breast conserving surgery (BCS) is equivalent to mastectomy in the treatment of invasive breast cancer [23–25]. Internationally the breast conservation rate has been used to compare cancer care among various geographical areas and centres, race or socioeconomic status, fellowship-trained versus general surgeons etc [26,27]. Tan et al. concur that a threshold of 70% best represents the evidence [25] and this corresponds with ESMO guidelines [28]. Our finding of an overall 64% of the membership achieves that BCS rate (see Fig. 3), low volume surgeons are below this at a rate of 58% but with higher volume surgeons achieving better rates up to 89% for very high-volume surgeons. Reasons for this could include surgeon factors, patient factors or tumour factors. For example, US reviews have found that selection bias by surgeons preferring mastectomy, with 71% of patients reporting they weren’t offered a clear choice [29] and 56% of surgeons believing the treatments were not equal [30]. Other concerns reported in the literature include cosmetic outcomes and patient insurance status for limiting BCS rates [31,32]. Analysis of the SEER database also suggests that tumour biology influences surgical decision making with grade I hormone receptor positive/HER2-tumours having a BCS rate of 72.2% vs triple negative cancers 34.6% and HER2+ cancers [33–35]. Our data was not reviewed for the molecular biology and in the Australia and New Zealand setting of universal healthcare, insurance status is thought to less likely influence decision making. There are issues with access to radiotherapy facilities for rural and remote patients in a vast, sparsely populated country. Therefore, it is likely that surgical selection bias and cosmetic outcomes are more likely to be contributing to under-performing of BCS overall and in lower volume surgeons. These issues are likely encountered less often in higher volume centres with oncoplastic skills, hence the higher rates with higher case load members.

4.5. **HQPI 4. rate of involvement of a breast care nurse in management of the patient**

With the improvement in detection and management of breast cancer, there has been a significant survival increase. In Australia the 5 year survival rate was 72% between 1984 and 1988, compared to 90% in 2009–2013 [36]. With the increasing number of survivors, there is a higher need for accessible and quality post-treatment medical and psychosocial care [37,38]. It is well documented that many patients lack information regarding their pathology and management; and feel they do not receive sufficient practical or emotional support from their health professionals [39–41]. The specialist breast care nurse (BCN) was introduced in Australia in the 1990s to assist in co-ordinating services, provide information and psycho-social support [42]. BCNs usually have oncology nursing experience, as well as a post graduate Diploma of Breast Care Nursing. The BCN can reduce medical staff workloads; with patients sometimes preferring to consult with a BCN over the general practitioner [43]. Current reviews have shown that patients highly value the BCN [43–46]. High levels of involvement of a BCN in care should be achieved in Australia and New Zealand. The current recommendation is >90% of cases but to date no data is available to monitor this.
4.6. HQPI 5: rate of discussion of cases at MDT

In Australia, multi-disciplinary team (MDT) meeting has been considered best practice to facilitate coordinated cancer care [47]. The MDT should include at least a surgeon, medical oncologist, radiation oncologist, pathologist, radiologist and breast care nurse [48]. The development of the MDT meetings has strong evidence indicating the improved outcomes to patient care and greater cooperation and communication between the involved medical departments [49,50]. The largest comparative cohort study performed in Scotland [50] indicated an 11% reduction in breast cancer mortality upon the introduction of MDT care. Further studies in Europe have shown higher cancer survival rates in areas with MDTs compared to those without [51,52]. The discussion of breast cancer patients at a multidisciplinary meeting is a common key performance indicator internationally [11,18,53–55] with European standards setting a target of 90% of cases. Although the BQA had insufficient data to confirm Australasian rates of MDT discussion other Australian reports suggest that most patients are discussed [47,48] and that those decisions are implemented in over 90% of cases [56]. High levels of MDT review should be achieved in Australia and New Zealand. The current recommendation is >90% of cases.

4.7. HQPI 6: rate of use of neo-adjuvant chemotherapy (NACT) in women < 50 years

Clinical trials have demonstrated that there is no difference between overall survival or recurrence rates between neoadjuvant and adjuvant chemotherapy [57]. Furthermore, with the advent of molecular subtyping of breast cancers and HER2 directed therapy there is a preference to give chemotherapy in the neoadjuvant setting now for those relevant subtypes and tumour characteristics where chemotherapy is clearly indicated [57]. Known benefits range from downstaging large tumours and improving operability to facilitating BCS and better management of the axilla [57–59] evaluating response rate and demonstrating resistance in some patients for further adjuvant treatment [60]. The NSABP B-18 study & early breast cancer trialists collaborative group also suggested that NACT has improved overall survival in women aged <50 years [57,62,63] which is again likely related to triple negative molecular subtypes which have a greater preponderance in younger women [61,64]. Threshold standards for use of NACT have thus been set to 85% in the Scottish guidelines [18] and ESMO guidelines recommend it as the standard of care for all appropriate patients [28]. Dutch reports suggest rates of 84.5% of stage III patients receiving neoadjuvant systemic therapy [65]. However, the BQA threshold of 15% seems significantly lower than international recommendations (see Fig. 4) and even at that level only 36% of members are achieving this goal. This is not explained by unit specialisation as very high-volume surgeons are only achieving a rate of 29%. Possible reasons for this could include high volume surgeons are more likely to utilise complex oncoplastic techniques to facilitate breast conservation in large tumours. Also, that NACT would not alter patient choice for mastectomy and reconstruction [30]. The American National Cancer Database (NCDB) reviewed 354,204 patients of which 16.7% underwent neoadjuvant chemotherapy [66]. This demonstrated that receipt of neoadjuvant chemotherapy was associated with larger tumour size (cT1 7%, cT2 25% and cT3 58%), more advanced nodal disease (cN0 11%, cN1-3 38%) and an overall 11% reduction in mortality.
39%) and appropriately with a younger patient, age < 50 years 21% vs > 50 years 14% [66]. Therefore, the proposed threshold of 15% seems too low and BreastSurgANZ should set a higher threshold and strongly encourage members to increase their use of NACT.

5. Limitations

The BQA database is the only such audit of breast cancer data in Australasia however not all surgeons performing breast surgery are members and despite the membership requirement it is likely that not all members enter all their cases. It is possible that with 66% of surgeons included having a case volume of ≤ 50 cases per year diluting achievement rates. Thus, threshold rates per surgeon volume are more accurate reflection of clinical practice. The data fields on NACT were only more recently added to the BQA so there was only a limited amount of data for HQPI 6, hence this data set is smaller than the others.

6. Conclusion

Performance indicators are used globally in breast cancer management to measure the quality of care delivered and to encourage higher standards and better outcomes. The six HQPI’s set by the BreastSurgANZ are the same or similar to factors evaluated in other countries and specialist consensus groups in the UK and Europe and reviews from the USA. Member surgeons are overall achieving lower rates of IBR, particularly for invasive cancer and very low rates for use of NACT in women ≤ 50yrs of age, with higher volume surgeons performing better. However, both thresholds should be set to a higher standard to meet international levels. Even with these proposed threshold standards too many member surgeons are underperforming, particularly when compared to international standards in rates of IBR for DCIS, rates of NACT in young women and BCS for tumours ≤ 2 cm in size. Improvements need to be made and factors such as providing broad education on the patient benefits of achieving or exceeding the HQPIs to BreastSurgANZ members, training more oncoplastic breast surgeons and/or breast specialised plastic surgeons and lobbying health services to provide resources are all clearly important. Repeating this audit a few years after commencing formal HQPI reporting and including all 6 HQPIs is mandatory to track and further promote improvements in care.

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Declaration of competing interest

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