

## Patient-reported outcomes following breast reconstruction surgery in a public hospital: use of the Breast-Q questionnaire

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### Abstract

**Aim** To assess patients' quality of life and satisfaction with individual outcomes following breast reconstructive surgery, using the BREAST-Q<sup>®</sup> questionnaire.

**Methods** The BREAST-Q questionnaire was used to collect information on patients' satisfaction in various domains following breast reconstructive surgery. The questionnaire answers were entered into the Qscore Excel template. Scores for each domain were obtained and different comparison groups were analysed for statistical significance.

**Results** Overall, patients showed above average satisfaction in majority of the domains. No statistically significant difference in satisfaction was seen with breast or overall outcome when compared by type or timing of reconstruction; presence or absence of significant complication; and completed or ongoing surgery. However, some difference in satisfaction with medical and office staff by ethnicity was evident, with Europeans being more satisfied than Māori or other ethnicities.

**Conclusion** The BREAST-Q questionnaire is a valuable tool to provide patient satisfaction information on breast reconstruction. Our retrospective audit shows that our patients are currently satisfied with their breast and outcomes overall. We will now use this tool prospectively to assess our patients' progress and satisfaction, and improve our service delivery for our future patients.

In New Zealand, breast cancer is the most common cancer in women, accounting for 28.4% of cancer in 2009 (the latest year for which data are available).<sup>1-3</sup> Breast reconstruction is aimed at improving the quality of life or wellbeing of patients.

There is no survival benefit between breast conservation therapy (BCT), mastectomy alone and mastectomy with reconstruction.<sup>4,5</sup> In fact, as with any elective surgery, reconstruction brings with it the risk of complications. Despite this, many women choose the option of breast reconstruction for a wide variety of reasons, including enhancement of their body image, confidence, femininity and quality of life (QOL) following mastectomy.

It has been shown that breast reconstruction has a positive effect on the psychological wellbeing of women with breast cancer.<sup>6</sup> Traditionally, surgical outcomes in plastic surgery were centred on the provider's perspective, evaluating objective clinical measures such as complications and morbidity, and cosmetic outcomes by considering photographic analyses.<sup>7-9</sup> However these measures are recognised as not sufficient to assess the quality and effectiveness of breast reconstruction.<sup>10</sup>

Recently, QOL outcomes from a patient's perspective have become a more important issue to consider.<sup>8,9,11</sup>

The BREAST-Q<sup>®</sup> questionnaire is a newly developed, reliable, validated and clinically meaningful patient-reported outcome measuring tool, created by Memorial Sloan-Kettering Cancer Centre in 2006 to help surgeons and patients evaluate and appreciate patients' satisfaction and QOL with different surgical techniques of breast reconstruction.<sup>8</sup> In other words, it is used to provide essential information about the impact and effectiveness of breast reconstructive surgery from the patient's perspective.<sup>12</sup>

The breast reconstruction BREAST-Q questionnaire has both pre and postoperative versions. The questionnaire can be used to compare the outcomes of different surgical options; to assess changes in individual patients over time; to provide surgeons with valuable insights into the patient's concerns; and to improve problems identified by patients in the clinical practice, among other things.<sup>8</sup> To this end, the Department of Plastic, Reconstructive and Hand Surgery at Middlemore Hospital, Counties Manukau District Health Board (CMDHB) has purchased the reconstruction modules to administer to our breast reconstruction patients.

These questionnaires assesses 6 domains with 11 sections, being:

- Satisfaction with breast;
- Satisfaction with outcome;
- Psychosocial wellbeing;
- Sexual wellbeing;
- Physical wellbeing: chest;
- Physical wellbeing: abdomen;
- Satisfaction with nipples;
- Satisfaction with information;
- Satisfaction with surgeon;
- Satisfaction with medical staff; and
- Satisfaction with office staff.

It is scored by the associated QScore programme, which transforms the raw data into a scale of 0 to 100, where a higher score suggests a better QOL or satisfaction.<sup>13</sup>

We wish to use the knowledge gained and feedback provided by the BREAST-Q to assess our results, improve our service delivery and increase our patient satisfaction.

## Methods

The project was screened by the Health and Disability Ethics Committee online process and was deemed to not require ethical approval. The postoperative reconstruction BREAST-Q questionnaire was administered to patients who have received any breast reconstruction surgery in our department in 2011 and 2012. Potential participants were identified from departmental operative records.

Comparative data on the number of patients undergoing mastectomy per year was obtained from the Auckland Breast Cancer Register held by the Auckland District Health Board, which records every patient diagnosed with breast cancer in the Auckland region.<sup>14</sup>

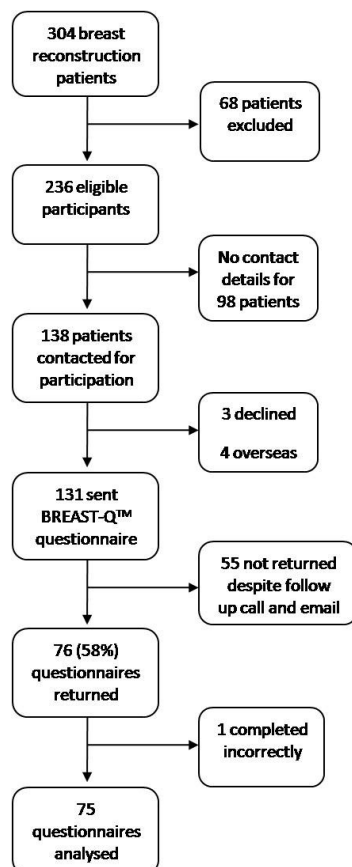
Of the 304 reconstruction patients identified from our database, there were 236 eligible participants by the following inclusion criteria:

- Female gender.
- Mastectomy secondary to breast cancer or for prophylactic purposes.
- Primary reconstructive surgery received more than 6 months ago but no longer than 5 years ago.
- Exclusion criteria included:
  - BCT or partial mastectomy.
  - Significant reconstructive surgery performed outside of our department.
  - Non-English speaking.
- Presence of breast cancer metastasis.
- Secondary or subsequent reconstructive surgery.

Of these, 98 participants were excluded because they were unable to be contacted after multiple attempts of calling their home and mobiles numbers provided in the database.

Out of 138 patients who could be contacted, 131 agreed to complete the questionnaire. At the completion of the study period, 76 questionnaires had been returned, giving a response rate of 58%, as seen in Figure 1.

**Figure 1. Recruitment of patients to BREAST-Q study**



Additional data on age, a reason for mastectomy, type(s) of reconstruction surgery and any recorded complications were collated. For the purposes of our data analysis, patients were classified into different sub-groups to analyse whether treatment differences contribute to their overall satisfaction levels.

These groups were based on type of reconstruction; completed treatment or ongoing treatment; ethnic groups as per Census definition (self-reported ethnicity); presence or absence of major complications related to the reconstructive surgery; and timing of reconstructive surgery (immediate [at the time of the mastectomy] or delayed). Patients were categorised into the completed treatment group if breast reconstruction was finished to satisfaction of surgeon and patient. This generally included creation of suitable breast mounds, as well as nipple reconstruction and subsequent nipple micropigmentation (tattooing) unless the patient had declined these additional surgeries.

If further breast surgery was planned, the patient was categorised into the ongoing treatment group. Major complications were defined as those requiring in-patient treatment or further surgery for management. Some patients who underwent bilateral reconstruction were excluded from the relevant sub-group analysis if the surgery performed or the timing of the surgery differed between breasts. This is due to the fact that the BREAST-Q questionnaire is designed to look at overall outcomes but not differences between individual breasts.

Responses from the 75 valid questionnaires were entered into the QScore Excel (Microsoft Corp., USA) template and analysed by the QScore programme, which automatically transforms the raw data into summary scores ranging from 0 (very dissatisfied) to 100 (very satisfied) for each of the 11 sections.

Statistical analysis was performed using GraphPad InStat v3.10 software (GraphPad Software, Inc., California, USA). The mean, standard deviation and number of participants in different groups were calculated and groups were compared by unpaired two-tailed t-testing or one way analysis of variance (ANOVA) testing as appropriate. A p value of  $\leq 0.05$  was considered statistically significant. Graphed results are shown as mean  $\pm$  standard error of the mean (SEM).

## Results

Over the previous 5-year period, 2760 women in the Auckland region underwent mastectomy surgery, an average of 552 per year. The average age of the patients undergoing mastectomy was 56 years (range: 22–95).<sup>14</sup> By comparison, our breast reconstruction patients were younger, with an average age of 49 at the time of mastectomy and 50 at the time of reconstruction (range: 33–67) as per Table 1.

**Table 1. Age of reconstructive surgery patients compared with all mastectomy patients in the Auckland region**

Age range (years)	Age of all mastectomy patients in Auckland (2006–2011)*	Age of study participants (from study database 2011–2012)		
	At the time of mastectomy (%)	At the time of mastectomy (%)	At the time of reconstruction (%)	At the time of study participation (%)
20–29	12 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
30–39	214 (7.8%)	11 (14.7%)	7 (9.3%)	1 (1.3%)
40–49	753 (27.3%)	27 (36.0%)	27 (36.0%)	24 (32.0%)
50–59	729 (26.4%)	27 (36.0%)	31 (41.3%)	35 (46.7%)
60–69	539 (19.5%)	10 (13.3%)	10 (13.3%)	15 (20.0%)
70+	515 (18.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
<b>Total</b>	<b>2760 (100%)</b>	<b>75 (100%)</b>	<b>75 (100%)</b>	<b>75 (100%)</b>
Average	56	49	50	53
Range	22–95	33–67	33–67	35–69

\* Data from Auckland Breast Cancer Registry, Auckland District Health Board.

The majority of our patients were of New Zealand European origin (70.7%), with 10.7% identifying as Māori (see Table 2).

**Table 2. Ethnicity of study participants**

<b>Ethnicity</b>	<b>Number of participants (%)</b>
New Zealand European	53 (70.7%)
Other European	8 (10.7%)
New Zealand Māori	8 (10.7%)
Others	6 (8.00%)
<b>Total</b>	<b>75 (100%)</b>

Surgery was performed in an immediate fashion in the majority of patients (70.7%, see Table 3) and reconstruction was performed by autologous methods in slightly over half of the patients (54.7%, see Table 4).

**Table 3. Timing of reconstructive surgery**

<b>Timing of reconstruction</b>	<b>Number of participants (%)</b>
Delayed	16 (21.3%)
Immediate	53 (70.7%)
Combination	6 (8.0%)
<b>Total</b>	<b>75 (100%)</b>

**Table 4. Type of reconstructive surgery**

<b>Type of reconstruction</b>		<b>Number of participants (%)</b>
Prosthetic		34 (45.3%)
Autologous	DIEP flap	10 (13.3%)
	TRAM flap	22 (29.3%)
	Latissimus dorsi flap	9 (12.0%)
<b>Total</b>		<b>75 (100%)</b>

DIEP=deep inferior epigastric artery perforator flap; TRAM=transverse rectus abdominus myocutaneous flap.

Only 24 patients (32%) had completed their reconstructions at the time of the study, with 51 (68%) still requiring further surgery for completion. 14 patients were identified as having a major complication associated with their surgery (18.7%).

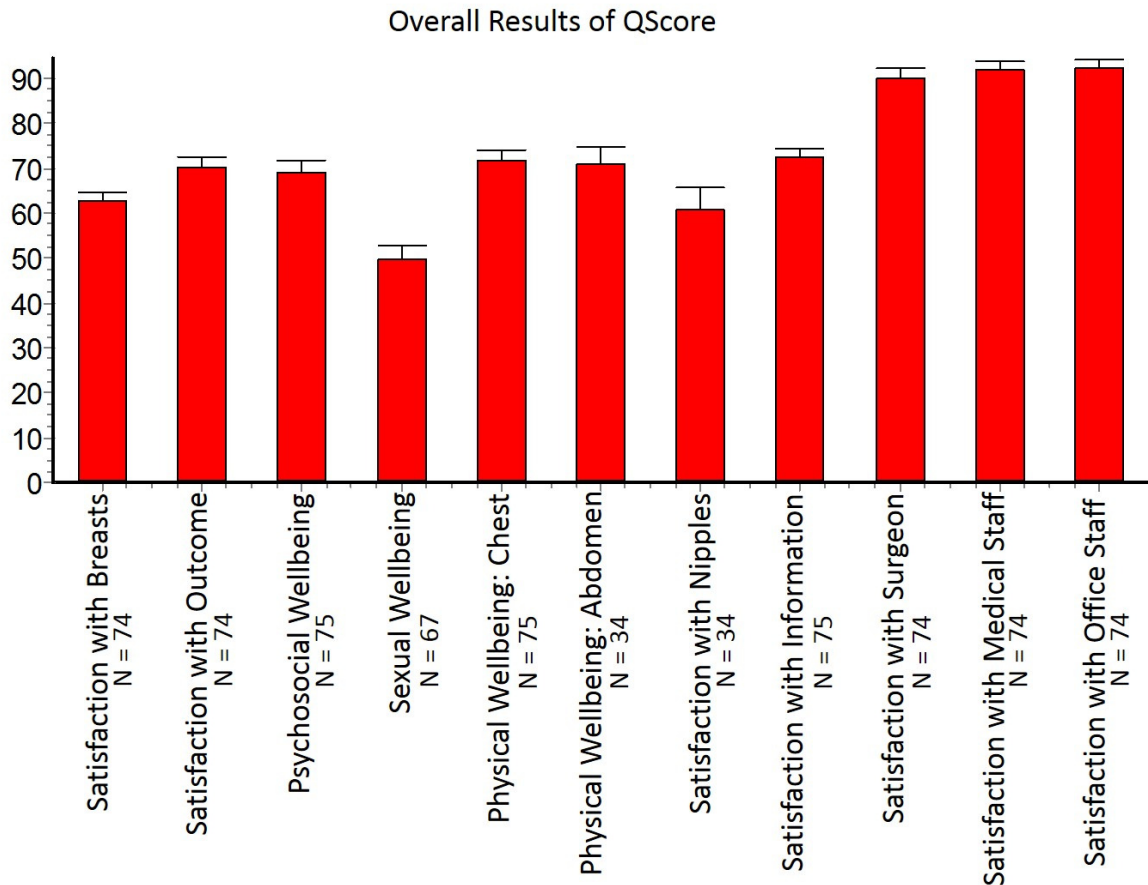
Overall, the patients reported good levels of satisfaction with breasts and overall satisfaction with outcome of their surgery, which scored 62.6 and 70.3 respectively (Figure 2).

Most scores were between 60 and 75. In majority of the domains, almost all participants provided a satisfaction score (i.e. N=74 or 75). However decreased response was seen in three domains—sexual wellbeing, physical wellbeing (of abdomen) and satisfaction with nipples (N=67, 34 and 34, respectively).

The lowest satisfaction was 49.8 for sexual wellbeing, while high satisfaction scores of above 90 were evident in domains of satisfaction with surgeon, medical staff and office staff. Also, satisfaction did not seem to vary with age.

When grouped by decade (30–39, 40–49, 50–59, 60–69), mean values for satisfaction with breasts and satisfaction with outcome showed no significant difference with one way ANOVA testing ( $p=0.37$  and  $p=0.81$  respectively).

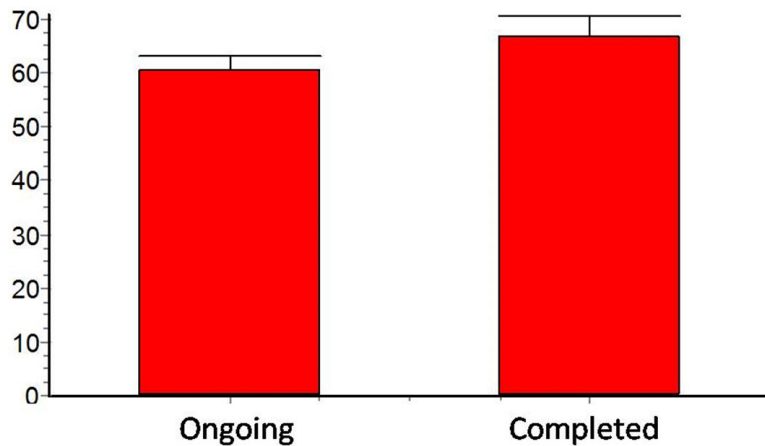
**Figure 2. Overall results from QScore analysis**



0=very dissatisfied; 100=very satisfied;  $\pm$  SEM.

In sub-group analysis, patients who had completed their surgery seemed to report a higher level of satisfaction with breasts than those having ongoing surgery (67 vs 60.6 respectively, Figure 3) as well as higher satisfaction with outcome (73.6 vs 68.9 respectively), but these differences were not statistically significant ( $p=0.156$  and  $p=0.38$  respectively).

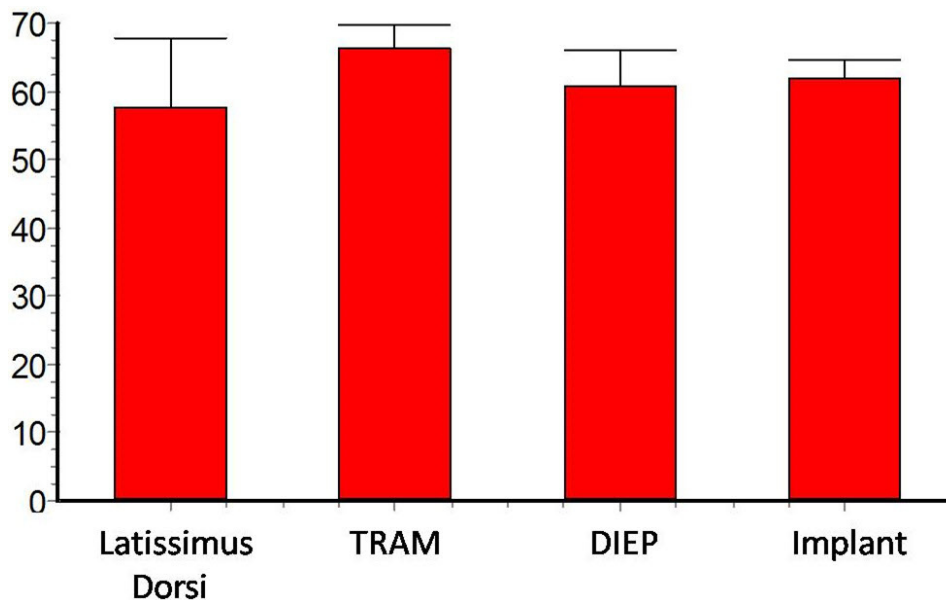
**Figure 3. Satisfaction with breasts by stage of treatment**



0=very dissatisfied; 100=very satisfied; ± SEM.

When the results were analysed on the basis of the type of reconstruction performed, there were no significant differences between groups with respect to satisfaction with breasts (Figure 4), satisfaction with outcome, psychosocial or sexual wellbeing. Also, the presence of a major complication did not significantly alter the patients' satisfaction with outcome, or satisfaction with surgeon, medical or office staff, compared to patients without a complication.

**Figure 4. Satisfaction with breasts by type of reconstruction**

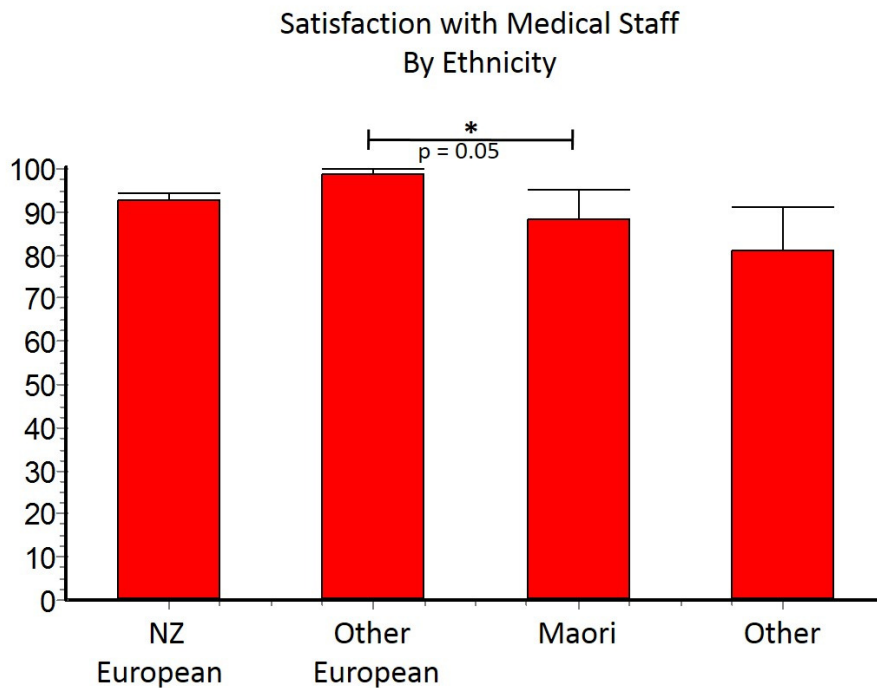


0=very dissatisfied; 100=very satisfied; ± SEM.

Analysing the timing of reconstruction was somewhat hampered by the small number of patients in the delayed reconstruction group. The immediate reconstruction cohort seemed to have higher average scores for sexual wellbeing and physical wellbeing of the chest, with mean values of 72.0 and 53.0 respectively, compared to 61.3 and 40.2 in the delayed group. However, p values were not significant (0.09 and 0.06, respectively).

Some significant differences were seen between the ethnic groups with regards to their satisfaction with medical and office staff. Overall, Europeans were more satisfied than other ethnicities. With regards to satisfaction with medical staff, Other Europeans were much more satisfied (mean of 98.9) compared to New Zealand Māori (mean of 81.0,  $p = 0.05$ ). See Figure 5.

**Figure 5. Satisfaction with medical staff by ethnicity**

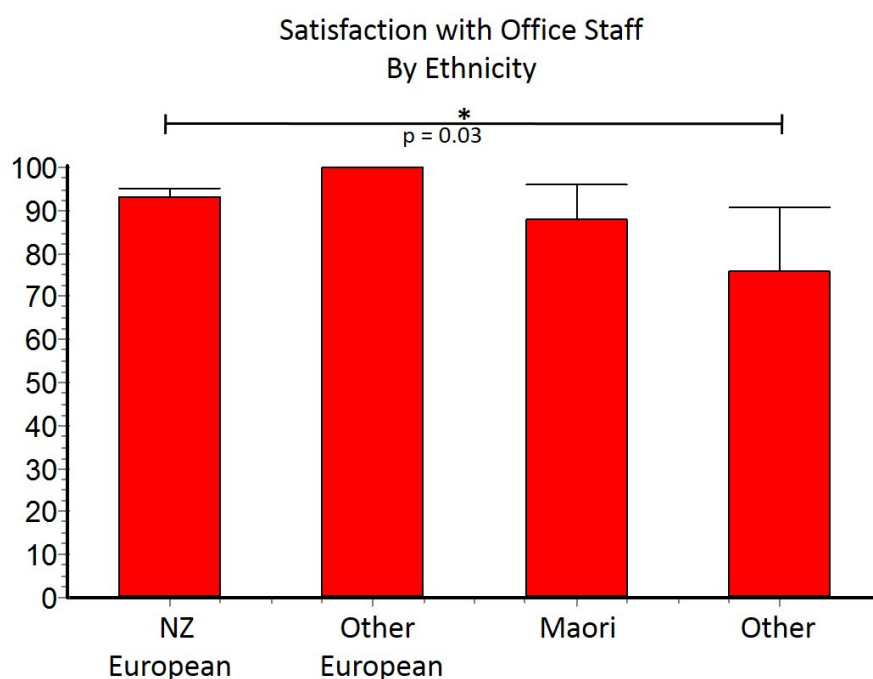


0=very dissatisfied; 100=very satisfied;  $\pm$  SEM.

Similarly, New Zealand Europeans reported a much higher satisfaction with office staff than other ethnic participants (93.2 vs 76.0 respectively,  $p = 0.03$ ). See Figure 6.



**Figure 6. Satisfaction with office staff by ethnicity**



0=very dissatisfied; 100=very satisfied;  $\pm$  SEM.

## Discussion

Breast cancer is commonly treated by either BCT or mastectomy, with or without adjuvant chemotherapy and radiotherapy. A proportion of women who undergo mastectomy will desire breast reconstruction to restore body image and improve quality of life following mastectomy.<sup>1</sup>

Breast reconstruction QOL studies vary in their conclusions regarding the benefits of the operation. In a recent systematic review, most of the studies identified did not find any statistically significant differences in QOL between people who had mastectomy alone and mastectomy with reconstruction.<sup>15</sup>

However, one key limitation to these studies is unavoidable selection bias. Therefore we are limited to assessing the outcomes of patients who self-select to electively undergo reconstructive surgery, without the benefit of a “control” cohort.

Interestingly, research has shown that patient satisfaction also seems unrelated to aesthetic outcome, with the majority of the patients who expressed dissatisfaction having aesthetic results that were rated good to excellent by surgeons.<sup>7</sup>

This affirms the importance of assessing patient reported outcomes using a validated, quality of life tool such as BREAST-Q questionnaire, because “care cannot be of high quality unless the patient is satisfied”.<sup>16</sup>

Saulis and colleagues found that poor satisfaction with reconstruction correlated with patients’ dissatisfaction with preoperative counselling about the reconstructive options

and the process of care, rather than patients' perception of their overall aesthetic result.<sup>17</sup> This emphasises the importance of thorough pre-operative counselling, as well as assessing and exploring patients' satisfaction from the preoperative period onwards.

According to the Auckland Breast Cancer Register, between 2006 and 2011 an average of 552 mastectomies were performed annually in the Auckland region.<sup>14</sup> Unfortunately, the rate of reconstruction performed in Auckland for the same time period is difficult to quantify. There is no unifying database to capture all breast reconstruction patients.

Over the 2-year period of our study, our department performed 304 breast reconstruction surgeries, being an average of 152 per annum. Therefore the rate of breast reconstruction surgery performed by plastic surgeons in the public health system over this period was approximately 27.5% of all mastectomy patients. However, the actual rate of reconstruction in the region may be different, as our study did not include patients who had their reconstructions performed by surgeons other than plastic surgeons employed by CMDHB, or any reconstructions performed in the private healthcare sector and also because the Auckland Breast Cancer Register may not 100% complete.

According to the 2006 Census data, the most recent statistics available, 11.1% of the population in Auckland identified as Māori.<sup>18</sup> While these data are somewhat historic, the fact that 10.7% of our reconstruction patients identify as Māori seems to imply an appropriate, proportional representation for our region.

Our results showed good to very good scores in almost all domains, with the lowest satisfaction in sexual wellbeing and the highest scores in satisfaction with surgeon, medical staff and office staff. No significant difference was found in satisfaction with breast or outcome overall when compared by type or timing of reconstruction; presence or absence of significant complication; age at time of reconstruction or completed compared with ongoing treatment.

These results are in keeping with the literature. Alderman and colleagues found similar level of satisfaction between patients who had autologous tissue reconstruction and prosthetic reconstruction,<sup>19</sup> and two other studies have also showed no significant differences between different methods of reconstruction.<sup>2,20</sup>

Analysing our results by timing of surgery was hampered by the small number of patients in the delayed group. However, a study from 2001 concluded that there is no strong evidence to indicate immediate reconstruction is superior to delayed reconstruction.<sup>21</sup>

A recent Cochrane review on the topic found some evidence to support the view that immediate reconstruction had psychological benefits, an overall better aesthetic outcome and decreased complication rates,<sup>1</sup> which may contribute to patient satisfaction in other areas. But the review itself admitted to having limited data to draw these conclusions.

Regarding the outcomes of patients with major complications, our results are in line with a 2008 review of breast reconstruction outcomes, which found that satisfaction did not correlate with development of a complication.<sup>7</sup>

When looking at the effect of completion of the reconstructive process, our average values for Satisfaction with Breast and Satisfaction with Outcome were higher in our completed treatment group than the ongoing surgery group, but the difference was not statistically significant. This is likely due to the small number of participants in our completed treatment group.

The trend towards increased satisfaction with surgical completion is in keeping with the findings of Elders and colleagues, who concluded that the major determinant of aesthetic satisfaction came from completion of the procedure.<sup>6</sup>

The only significant differences were in the categories of Satisfaction with Office and Medical Staff when analysed by ethnicity. Overall, Europeans were more satisfied.

These results must be interpreted in the context of the small number of patients in some of the subgroups. Indeed, one of the limitations of this study is the small numbers in some sub-groups.

Other limitations include the possibility that majority of patients who consented and returned the questionnaire were the more satisfied patients. Given the limited number of returned questionnaires compared with the possible number of eligible women for this study, the results may not be generalizable across all breast reconstruction patients.

Additionally, as it was a retrospective survey study, recall bias could have existed, as patients tried to remember the details of their reconstruction. It has been shown that the reconstructive surgery becomes less important in patients' lives as time passes.<sup>22</sup> Also, many patients expressed their desire to complete the questionnaire with word answers rather than numbers, providing anecdotes related to their reconstructive surgery, which BREAST-Q is not designed to capture.

The BREAST-Q questionnaire is very good at identifying areas that patients are satisfied or dissatisfied but it does not tell us exactly what the patients would like the health service providers to improve on. Thus it may be worthwhile to consider carrying out a qualitative study to obtain a bigger picture of patients' satisfaction level with possible improvement ideas from patients' perspective.

Our long-term goal is to fully implement the BREAST-Q tool by administering both pre- and post-operative questionnaires to all our future breast reconstruction patients at set post-operative time points in a prospective fashion. We anticipate that this will allow us to more accurately assess the results of our surgery, from our patients' point of view.

Better quality information regarding our patients' opinion of their treatment and outcome will allow us to improve our service. We need reliable, reproducible data to allow comparisons of outcomes, not just within our department but also across all service providers, to ensure equitable access to high quality breast reconstructive surgery throughout New Zealand.

## **Conclusions**

In the past 2 years, the rate of publicly funded reconstructions has equated to 27.5% of the patients undergoing mastectomy in the Auckland region. Our reconstructive cohort is younger on average than the mastectomy cohort.

Our patients are generally satisfied with the surgical outcomes regardless of the type or timing of their reconstruction, the presence or absence of a major complication and whether their treatment has been completed or is on-going.

This study has demonstrated that the assessment of patient satisfaction and quality of life with a PRO tool such as the BREAST-Q questionnaire is a valuable source of information for service providers following breast reconstruction surgery.

As the BREAST-Q was originally designed to compare preoperative and postoperative satisfaction levels, our ongoing plan is to use the BREAST-Q prospectively from the first preoperative appointment.

Our goal is to improve our service and therefore our patients' satisfaction scores in all domains. We will analyse our results over the next several years to follow surgical outcomes from our patients' perspectives and to track satisfaction or potential areas for improvement.

**Competing interests:** Nil.

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**Acknowledgements:** The authors acknowledge Counties Manukau District Health Board for funding Ryan Cha to undertake this research through allocation of a Summer Studentship. Thanks are also given to all the patients who agreed to participate.

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