Physical Rehabilitation: A Gap in Care Following all Types of Breast Cancer Surgery.

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Research Article

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Abstract

Purpose: To investigate the access to and content of physical rehabilitation received by women after different types of breast cancer surgery.

Methods: On-line survey of 632 Australia women (59.8 years SD 9.6) grouped according to their last reported breast cancer surgery: (i) breast conserving surgery (BCS; n=228), (ii) mastectomy (n=208; MAST), and (iii) breast reconstruction (BRS; n=196). Respondents retrospectively reported the physical rehabilitation education and treatment they received for six physical side-effects. Chi square of analysis of the percentage of respondents who received any form of physical rehabilitation for each physical side-effect amongst the three groups. Tabulation of the percentage of the entire cohort (n=632) that had lymph nodes removed, post-operative complications, or pre-existing musculoskeletal issues who received any form of physical rehabilitation as part of standard post-operative care.

Results: No significant difference was found in the percentage of respondents who received any form of physical rehabilitation across the three groups, except for the physical side-effects of lymphoedema and breast support issues. Substantial variation was found in the percentage that received physical rehabilitation across the different physical side-effects. Physical rehabilitation for shoulder issues and lymphoedema was received by 75% and 70% of respondents respectively as part of standard care, compared to scar and torso issues and physical discomfort disturbing sleep, where less than 50% received ***any form*** of physical rehabilitation.

Conclusion: Access to physical rehabilitation is poor following all types of breast cancer surgery, with gaps in the physical rehabilitation provided for specific physical side-effects.

Introduction

The physical side-effects of breast cancer surgery can provoke major long-term health and quality of life issues for many women following breast cancer surgery [1–13]. In fact, up to 60% of women report moderate-to-very-high incidence and severity scores for physical side-effects across multiple body regions, 6 months following all types of breast cancer surgery. These physical side-effects are perceived to limit the ability of up to 60% of women to participate in physical activity and resume pre-diagnosis work, sport, and daily tasks [14]. Women who have had lymph nodes removed, post-operative complications, or pre-existing physical issues before surgery tend to suffer from more frequent and severe physical side-effects [15–21].

Targeted and early intervention physical rehabilitation and education have been found to be effective in alleviating or resolving many of the physical side-effects associated with breast cancer surgery and treatment [3, 21–36]. Only a few studies, however, have investigated the *translation* of this physical rehabilitation research into *clinical practice*. The authors of these studies have reported substantial variation in the percentage of women who received physical rehabilitation treatment and education. For example, after mastectomy and breast conserving surgery, 82% of women reported that they were

provided with information on shoulder and arm exercises, but less than 50% of these women received this information from a physiotherapist [17]. More than 90% of women with metastatic breast cancer who had either a mastectomy or breast conserving surgery were found to have physical impairments that would, at least in part, be ameliorated by standard rehabilitation measures, and yet less than a third of these women received any rehabilitation treatment [37]. After breast reconstuction surgery, less than 50% of women reported that they were referred to physiotherapy [26]. This research suggests that translation of physical rehabilitation research into clinical practice is limited and might vary after different types of breast cancer surgery. Access to physical rehabilitation within clinical practice following different types of breast cancer surgery, however, is yet to be systematically investigated. Although the need for physical rehabilitation for shoulder issues after breast conserving surgery might be less than after mastectomy and reconstructive surgery, the reported similarity in incidence and severity of most of the other physical side-effects across all types of breast cancer surgery [3, 14] suggests that the need for physical rehabilitation for many other physical side-effects would be similar.

Most physical rehabilitation research following breast cancer surgery has focused on the physical side-effects related to shoulder issues and lymphoedema [3, 21–30, 35]. Physical side-effects relating to breast support, scar, or torso issues or physical discomfort disturbing sleep have not commonly been investigated. A high percentage of women, however, report experiencing a moderate-to-very-high incidence and severity of these issues at 6 and 12 months following all types of breast cancer surgery [14]. We therefore speculate that these physical side-effects are not commonly included in the content of physical rehabilitation education and treatment provided to women in clinical practice, although the content delivered in clinical practice after different types of breast cancer surgery is yet to be investigated.

Greater understanding of the physical rehabilitation provided to women after all types of breast cancer surgery could lead to improvements in its access and content. This, in turn, could limit the duration, progression, and impact of the physical side-effects on physical activity, sport, work, and daily tasks for women following all types of breast cancer surgery. Improved physical recovery could also have positive flow-on effects on the quality of life, financial, and emotional status of women, as well as decrease their risk of cancer reoccurrence through increased levels of physical activity [3, 12, 18, 21, 25, 38–40]. Given the increasing number of women diagnosed with breast cancer, at a younger age [41], and the high 10-year survival rate, it is vital that we maximize physical recovery to enable all women to live well with breast cancer.

The aim of the study was to systematically investigate the access to, and content of physical rehabilitation education and treatment provided to women after breast conserving surgery, mastectomy, and breast reconstruction surgery. This will provide insight into the standard of physical rehabilitation care provided to women after different types of breast cancer surgery, determine the access for women who have a higher risk of developing more frequent and severe physical side-effects, and determine whether the commonly experienced physical side-effects are included in rehabilitation programs. We hypothesized that access to physical rehabilitation education or treatment would vary according to the type of breast cancer surgery and that a higher percentage of women would receive physical

rehabilitation for shoulder issues and lymphedema compared to for scars, torso and breast support issues, and physical discomfort disturbing sleep.

Methods

Participants

Women who had previously had any type of breast cancer surgery were invited to complete an anonymous online survey advertised on breast cancer specific websites across Australia (Breast Cancer Network Australia, Register4, Reclaim Your Curves, and local breast cancer support groups). Consent was provided by clicking an “I agree” button after the Participant Information Sheet. The study was approved by the University Human Research Ethics Committee approved (HE15/453).

On-line survey

Respondents retrospectively reported whether they received any form of physical rehabilitation education or treatment (YES/NO) for six physical side-effects (scars, shoulder, or torso issues (i.e. pain, decreased range-of-motion, or muscle strength), lymphedema, sleep discomfort, and bra discomfort). Examples of various forms of education/treatment were provided as a guide (e.g. exercises checked or demonstrated in follow-up treatment sessions by a health professional, a pamphlet/handout of exercises provided, instructions with no written instructions, no information, or treatment provided). A YES response was recorded if any form of education or treatment was ticked and a NO response was recorded for “*no information or treatment provided*”. Respondents who had an autologous breast reconstruction were also asked whether they received any education/treatment for any donor site issues. The physical side-effects were determined from previous research of commonly reported physical side-effects [14, 18], previous physical rehabilitation intervention studies [3, 21, 22, 24], and semi-structured interviews with women who had breast cancer surgery (n = 12) and clinicians treating women with breast cancer (n = 12).

Respondents were then asked whether their education/treatment was provided as part of standard care, sourced independently, or not given at all. Participant characteristics of age, cancer surgery and treatments, and whether they had lymph nodes removed, post-operative complications, or pre-existing musculoskeletal issues were also collected. Face validity was conducted by Breast Cancer Network Australia, Register4, regional breast cancer support groups, three clinicians, and three women with breast cancer. The survey took approximately 10 minutes to complete and was open for 10 months (July 2017 to April 2018). It was published on Qualtrics (v0217; Provo, UT) and of the 729 women who visited the link to the site, 625 completed the survey (85.7% completion rate).

Statistics

The respondents were grouped according to their last reported type of breast cancer surgery; (i) breast reconstruction surgery (BRS), (ii) mastectomy (MAST), or (iii) breast conserving surgery (BCS). The percentage of women who reported “YES” to receiving any form of education/treatment for each of the physical side-effects was tabulated and compared amongst the three groups using Chi square tests. The

percentage of the entire cohort (n = 632) that had lymph nodes removed, post-operative complications, or pre-existing musculoskeletal issues who received any form of physical rehabilitation as part of standard post-operative care or sourced it independently was also tabulated. All statistical tests were conducted using SPSS Statistics v26.0 for Windows (IBM® Inc., Armonk, USA) with the alpha level set at $P < 0.05$.

Results

Participants

Characteristics of the 632 respondents are displayed in Table 1. There were no significant differences amongst the groups except for the mean age, which was significant younger in the BRS group compared to the MAST and BCS groups and post-operative complications, which were higher in the MAST group compared to the BRS and BCS groups.

Table 1
Participant characteristics (n = 632).

Characteristic	BRS (n = 196) N (%)	MAST(n = 208) N (%)	BCS (n = 228) N (%)
Age†			
<50 years	43 (21.9)	25 (0.5)	20 (8.8)
50 + years	153 (78.1)	182 (12.2)	208 (91.2)
Missing data	0	1	0
Postcode			
Metropolitan	144 (73.5)	128 (62.7)	154 (68.1)
Regional	52 (26.5)	76 (37.3)	72 (31.9)
Missing data	0	4	2
Health System Type			
Public	53 (27.5)	64 (30.9)	42 (18.8)
Private	140 (72.5)	143 (69.1)	182 (81.2)
Missing data	3	1	4
Time Post Surgery			
1–5 years	113 (58.9)	102 (18.8)	92 (40.4)
6–10 years	50 (26.0)	66 (30.0)	86 (37.7)
>10 years	39 (15.1)	38 (31.9)	50 (21.9)
Missing data	4	2	0
Laterality of Surgery			
Unilateral	99 (50.5)	156 (75.0)	224 (98.2)
Bilateral	97 (49.5)	52 (25.0)	4 (1.8)
Lymph nodes removed			
Yes	147 (75.0)	171 (82.2)	179 (78.5)
No	49 (25.0)	37 (17.8)	49 (21.5)
Radiation Treatment			
Yes	100 (51.0)	104(50.2)	219 (96.9)
No	96 (49.0)	103 (48.8)	7 (3.1)

Characteristic	BRS (n = 196) N (%)	MAST(n = 208) N (%)	BCS (n = 228) N (%)
Missing data	0	1	2
Post-operative complication*			
Yes	94 (48.0)	126 (60.6)	93 (40.8)
No	102 (52.0)	82 (39.4)	135 (59.2)
Type of Breast Reconstruction			
Implant	99 (50.5)		
Autologous	97 (49.5)		
Timing of Breast Reconstruction			
Same time	58 (29.6)		
Delayed	138 (70.4)		

BRS: breast reconstruction surgery; MAST: mastectomy; BCS: breast conservation surgery.

† The breast reconstruction surgery group overall were significantly younger than both the mastectomy and breast conserving surgery group ($p < 0.001$).

* Includes infections, seromas, necrosis, and other identified complications.

Access to physical rehabilitation

The percentage of respondents who reported “YES” to having received any form of physical rehabilitation education and treatment was not significantly different amongst the groups for any of the physical side-effects except lymphedema and breast support issues (Table 2). A significantly lower percentage of the BRS group, who had an immediate breast reconstruction, received physical rehabilitation for breast support issues compared to those who had a delayed breast reconstruction (Table 3).

Table 2
Percentage of respondents who reported to have received any form of physical rehabilitation education/treatment for each physical side-effect overall and for each of the surgery groups.

	% Respondents who received treatment			
Physical Side Effect	**Overall**	**BRS**	**MAST**	**BCS**
	N = 632	*N = 196*	*N = 208*	*N = 228*
Scar issues[1]	45.5	53.2	47.3	37.5
Shoulder issues[1]	74.8	75.8	82.7	66.5
Torso issues[1]	43.4	46.2	48.1	36.6
Lymphedema	66.7	24.6*	86.1	85.3
Breast support issues	68.4	66.7	86.5	53.1*
Physical sleep discomfort	25.6	27.4	19.7	29.5
Donor site issues[2]	n/a	56.8	n/a	n/a

BRS: breast reconstruction surgery; MAST: mastectomy; BCS: breast conservation surgery.

[1] Scar, shoulder, and torso issues include pain and decreased range of motion or muscle strength.

[2] Donor site pain was only completed by the breast reconstruction surgery group for autologous reconstructions (N = 95) and, therefore, could not be compared amongst the three groups.

* Statistically significant difference between groups (i.e. a higher percentage of respondents received treatment in both other groups).

Table 3
Percentage of BRS group (n = 196) divided into sub-groups of Immediate versus Delayed Breast Reconstruction Surgery who reported to have received any form of physical rehabilitation education/treatment for each physical side-effect.

	% BRS group who received any form of physical rehabilitation education/treatment	
Physical Side Effect	**Immediate surgery** *N = 58*	**Delayed surgery** *N = 138*
Scar issues[1]	53.6	53.1
Shoulder issues[1]	73.2	76.9
Torso issues[1]	46.4	46.2
Lymphedema	17.2	27.7
Breast support issues	50.0*	73.8
Physical sleep discomfort	25.0	28.5
Donor site issues	43.3	43.1

BRS: breast reconstruction surgery.

[1] Scar, shoulder and torso issues include pain and decreased range of motion or muscle strength.

*Statistically significant difference (i.e. higher percentage of respondents received no treatment for bra support issues if surgery was immediate versus delayed).

Less than 40% of respondents received any form of physical rehabilitation education and treatment as part of their standard care. Furthermore, the percentage of respondents who sourced their physical rehabilitation independently for each physical side-effect was equivalent or greater to the percentage who received it as part of standard care (Table 4). Less than 40% of the respondents who had lymph nodes removed, post-operative complications, or pre-existing musculoskeletal issues received any form of physical rehabilitation education or treatment as part of their standard care (Table 5).

Table 4

Percentage of respondents (N = 632) who reported to have received their physical rehabilitation education/treatment as part of their standard care or sought it independently for each of the physical side-effects.

Physical side effect	Education/ treatment provided as standard care (%)	I sought additional education/ treatment on my own (%)
Scar issues[1]	29.1	23.6
Shoulder issues[1]	29.9	36.7
Torso issues[1]	16.5	28.0
Lymphedema	35.8	34.2
Breast support issues	23.9	44.3
Sleep discomfort	13.8	21.5
Donor site pain[2]	23.8	33.7

[1] Scar, shoulder and torso issues include pain, decreased range of motion or muscle strength.

[2] Donor site pain was only completed by the breast reconstruction surgery group for autologous reconstructions (N = 95).

Table 5
Percentage of respondents (N = 632) who reported to have had lymph nodes removed, post-operative complications, or pre-existing physical problems and

Characteristic	Standard Care N (%)	Sourced treatment independently N (%)	No treatment received N (%)	Not applicable N (%)
Lymph nodes removed				
YES (N = 497)	183 (36.8)	190 (38.2)	69 (13.9)	55 (11.1)
Pre-existing musculoskeletal issues				
Shoulder/Torso (n = 70)	27 (38.6)	27 (38.6)	14 (20.0)	2 (2.9)
Post-operative complications*				
YES (N = 272)	85 (31.3)	115 (42.3)	68 (25.0)	4 (1.5)

received any form of physical rehabilitation education/treatment as part of standard care, sourced independently, or who received no education/treatment.

Content of physical rehabilitation

Considerable variation was found in the percentage of the entire cohort who received any form of physical rehabilitation according to each physical side-effect. More than 70% of respondents received physical rehabilitation for shoulder issues but less than 50% received anything for scar and torso issues or physical discomfort disturbing sleep (Table 2).

Discussion

Access to physical rehabilitation education and treatment for women following breast cancer surgery was found to be similar irrespective of the type of breast cancer surgery, except for lymphedema and breast support issues. Substantial variation was found in the access to physical rehabilitation depending on each specific physical side-effect. Because most respondents did not receive any form of physical rehabilitation education or treatment as part of their standard care, we deem that physical rehabilitation is a gap in care following all types of breast cancer surgery. The implications of this are discussed below.

Consistent with previous research, physical rehabilitation was found to be underutilized by women after breast cancer surgery [17, 28, 42]. The percentage of respondents who received any form of physical rehabilitation education or treatment for shoulder issues was similar to previous research [17]. No previous research, however, had measured access to any form of physical rehabilitation for the other physical side-effects.

The significantly lower percentage of the BRS group (25%) who received any form of physical rehabilitation for lymphedema compared to the MAST (86%) and BCS (85%) groups was attributed to previous research that reported the risk of lymphedema to be lower after breast reconstructive surgery [43, 44] compared to mastectomy and breast conserving surgery. Decreased risk, however, does not mean that women cannot develop lymphedema after breast reconstructive surgery. It is therefore concerning that only 17% of the BRS group who had an immediate breast reconstruction (n = 58) received any education or treatment for lymphedema (Table 3), even though 67.2% of these women also had lymph nodes removed. Only a third of the entire cohort who had lymph nodes removed (n = 497) received *any* information about lymphedema as part of their standard care (Table 5), yet the need for lymphedema education/treatment by these women is evident by the equivalent percentage who sourced their own lymphedema education/treatment (Table 4). Lymphedema has high economic cost to both the health system and individuals and negatively impacts long-term health and quality of life [24, 46–49]. Considering early intervention is vital to effectively manage lymphedema [17, 19, 24, 45] and providing education to allow for early intervention has a relatively low cost, the gap in care for lymphedema must urgently be filled, particularly given the increasing number of women who are electing to have an immediate breast reconstruction surgery [50, 51].

Contrary to our hypothesis, the only other significant difference in the access to physical rehabilitation for women following different types of breast cancer surgery was for breast support issues (Table 2). The significantly lower percentage of the BCS group (~ 50%) who received any form of education/treatment for breast support issues compared to the MAST (~ 85%) and BRS group (~ 66%) and the significantly lower percentage of the BRS group who had an immediate breast reconstruction (~ 50%) compared to those who had a delayed breast reconstruction (~ 75%) does not align with need for education/treatment for breast support issues. Approximately 60% of women experience breast support issues of a moderate-to-very high incidence and severity 12-months after all types of breast cancer surgery [14, 18, 52]. Importantly, breast support issues are perceived to be the third highest barrier to physical activity after breast cancer surgery [53–55] (Table 3). The need for education/treatment for breast support issues is supported by the nearly two-fold number of respondents who sourced their own education/treatment for breast support issues compared to that provided by standard care. It is also concerning for the BCS group because 97% also had radiation treatment, which is assocated with scarring and breast edema, which are known to exacerbate breast support issues [20, 49, 56–59]. Although the underlying mechanisms of breast support issues experienced by women varies according to the different types of breast cancer surgery [14, 52], the need for education and guidance on how to find a comfortable, supportive, correctly fitted bra (and prosthesis) is an essential component of any physical rehabilitation program following all types of breast cancer surgery.

Women who have a higher risk of developing more severe and frequent physical side-effects following breast cancer surgery are especially in need of physical rehabilitation education and treatment [15–19]. Pain, mobility, and strength issues associated with scars and the shoulder are likely sequelae of seromas and delayed healing of surgical scars secondary to infection or tissue necrosis. Yet, less than a third of the respondents who had post-operative complications (n = 272) received any form of physical

rehabilitation as part of their standard care for their shoulder or scar issues to help them to prepare for or manage these side-effects (Table 4). The same scenario occurred for respondents who had pre-existing physical problems in their shoulder or torso region, with less than 40% receiving any physical rehabilitation for their shoulder as part of their standard care. The equivalent percentage (~ 40%) who sourced their own treatment for these issues is evidence of the *need* these women have for physical rehabilitation to manage these side-effects. Pre-operative questioning for any pre-existing physical problems and greater follow-up of women who experience post-operative complications is required to ensure that the women who are at greater risk of developing more frequent and severe physical side-effects have access to physical rehabilitation as part of their standard post-operative care. This could limit the duration, progression, and impact of these physical side effects on physical activity, sport, and daily tasks.

Consistent with our second hypothesis, the content of the physical rehabilitation provided to women following *all types* of breast cancer surgery varied according to each side-effect and was less for scar, torso and breast support issues, and physical discomfort disturbing sleep compared to shoulder issues and lymphedema. Of concern, less than 50% of respondents received any form of physical rehabilitation education/treatment for scar or torso issues and only 25% received any guidance on how to get into a safe and comfortable position to enable good sleep after their surgery (Table 2). Again, the need for physical rehabilitation for these issues was evident by high percentage of women who independently sourced relevant information about physical rehabilitation education/treatment for scar, torso, and sleep issues compared to the percentage who received it standard care (Table 5). Scar issues that have an moderate to very high incidence and severity affect over 30% of women 6 months following all types of breast cancer surgery and can limit shoulder and torso range of motion and cause bra discomfort on underlying scars [14, 52]. Over 40% of women report difficulty finding a sleeping position in order to get a good night's sleep at 6 months post-surgery [14]. Guidance on how to get physically comfortable to enable good sleep is vital to promote tissue healing, and mental and physical health. Good sleep also limits fatigue, which is a known barrier to physical activity [53]. It is therefore vital that physical rehabilitation education and treatment programs for women following breast cancer surgery include all of the commonly reported physical side-effects, particularly because women report a lack of awareness and knowledge of how to manage these side-effects makes them more distressing and debilitating [60–62].

The content of physical rehabilitation education and treatment following autologous breast reconstructions was also lacking in relation to donor site issues because only one in two respondents received any physical rehabilitation for their donor site. Yet pain and decreased mobility and muscle strength in the region of the donor site of a moderate to very high incidence and severity has been reported by 20% of women 6-months after autologous breast reconstruction surgery [18]. Strategies to maximize the physical recovery of the donor site should also be fundamental content included in the physical rehabilitation education and treatment provided to women following autologous breast reconstructions.

Study Limitations

A limitation of the study is that no time limit was placed on the time since surgery (mean 6.7 ± 6.0 years (range: 0–46 years). It is therefore possible that the physical rehabilitation following surgery over this period may have changed, just as surgical techniques have changed. Although this study provides insight into the access to physical rehabilitation following different types of breast cancer surgery and which physical side-effects are commonly included, it does not provide any detail on the quality or patient perceptions of this education and treatment. The quality and patient perceptions of education and treatment delivered in the form of a pamphlet are likely to differ compared to follow-up sessions with a health professional, where exercises are demonstrated, checked, and progressed. Further research is therefore recommended to investigate the content of physical rehabilitation education and treatment both quantitatively and qualitatively, received by women following all types of breast cancer surgery.

Conclusion

Access to physical rehabilitation is poor following all types of breast cancer surgery, even for women who have a higher risk of developing more frequent and severe side-effects. Gaps exist in the physical rehabilitation provided for specific physical side-effects, especially scar and torso issues and physical discomfort disturbing sleep. There is an urgent need to improve the physical rehabilitation of women after all types of breast cancer surgery to enable women to maximize their physical recovery and live well with breast cancer

Declarations

The authors have nothing to declare.

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Conflicts of interest/Competing interests (include appropriate disclosures)

The authors have no conflicts of interest or competing interests.

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