

Exploring breast surgeons' reasons for women not undergoing immediate breast reconstruction

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ABSTRACT

Introduction: Factors influencing breast reconstruction rates in Canada are complex and multi-factorial, ranging from patient-related to systemic considerations. For plastic surgeons, rates of immediate breast reconstruction (IBR) hinge on referral patterns from general surgeons performing breast cancer surgery and informed discussions with patients about their goals and risk tolerance. We seek to understand the reasons Alberta patients are not receiving IBR as reported by general surgeons.

Methods: The Synoptec™ database is a synoptic operative report designed by Cancer Surgery Alberta™ and utilized by 95% of Alberta breast cancer surgeons. Within this report are mandatory questions regarding if a patient is receiving IBR and, if not, why. A retrospective review of this database was performed for all patients undergoing surgical treatment of breast cancer over two years. All statistical comparisons were made using chi-squared test for categorical variables with a *p*-value of 0.05 considered significant.

Results: Of 6253 patients undergoing breast cancer surgery, 2649 underwent mastectomy and 615 mastectomy patients received IBR. The most commonly reported reasons patients did not undergo IBR were patient preference (55%), high likelihood of postoperative radiation therapy (20%), and high risk due to patient co-morbidities (12%). Resource limitations (2%) and a lack of an IBR discussion (3%) was rarely cited as reasons for no IBR.

Conclusions: There are many reconstructive options following mastectomy in breast cancer survivors. This study provides a unique look into general surgeon reported reasons patients are not receiving IBR and demonstrates the need for further probing into the thought-process behind these reported reasons from both a surgeon and patient perspective.

1. Introduction

Despite numerous studies showing that immediate breast reconstruction (IBR) has psychosocial benefits and improves quality of life in patients undergoing mastectomy, IBR rates in Canada have been traditionally low [1–4]. IBR utilization in Ontario and Alberta in the mid-2000s was reported to be less than 10% [5,6] compared with nearly 40% in the United States during the same period [7]. More recent data shows improved uptake in Ontario, Alberta, and Quebec since 2014, but still remaining below 20% [5,6,8].

Factors influencing rates of reconstruction are complex and multi-factorial. Distance from a teaching hospital with two or more available plastic surgeons has been shown to be a barrier in access to IBR, as well as socioeconomic factors such as low income and immigrant status [9]. In its early years IBR utilization was limited as perceived risk factors

such as advanced age, obesity, and invasive carcinoma were considered absolute contraindications. There is emerging evidence, however, that IBR is safe in some of these patient populations with acceptable complication rates [10,11]. This change in perspective is reflected in the Breast Reconstruction Risk Assessment (BRA) Score (www.brascore.org), an online tool developed by reconstructive surgeons to assist in the decision-making process for breast reconstruction [12]. This tool individualizes co-morbidities and their subsequent risks by addressing bleeding risk, BMI, age, smoking status, cardiac risk factors, and the need for pre- and/or post-operative radiation therapy and determines a specific risk of complications based on National Surgical Quality Improvement Program (NSQIP) data [12].

Rates of reconstruction also hinge on referral patterns, with general breast surgeons acting as the main gatekeepers for referral for IBR. It is difficult to access the thought and decision-making processes of breast

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surgeons deciding whether or not to refer for reconstruction. A survey of general surgeons in Ontario found 22% reported a belief that IBR delays or interferes with recurrence detection and 35–61% reported a belief that IBR delays adjuvant therapy [13]. This is despite a lack of evidence for differences in survival, recurrence, or metastasis following IBR [14–17]. General surgeons have also reported lack of access to a plastic surgeon as a limiting factor for patient access to IBR [18].

We have a unique opportunity in Alberta to identify surgeon-reported barriers to patients receiving IBR. Ninety-five per cent of Alberta breast surgeons input all breast cancer procedures into a


standardized surgical synoptic template report, Synoptec™, that requires the reporting of patient demographics, disease details, and mastectomy operative details [19]. The template was enhanced in 2015 by adding mandatory questions as to whether the patient is receiving IBR and, if not, why. This might be our closest glimpse into the gatekeepers' reasoning and decision-making when it comes to IBR in their patients, and we present these data herein.

Immediate Reconstruction: Right Breast

*  Is the patient having immediate reconstruction done today? ?

Go to list 118

- Yes
 No

*  Specify reasons why the patient is not having immediate reconstruction

Go to list 72


- Reconstruction was not discussed
 Patient did not want breast reconstruction
 Significant comorbidities
 High likelihood of radiotherapy
 Resource limitations
 Other

 Specify comorbidity/comorbidities

Go to list 60

- Current smoking
 Obesity
 Diabetes
 Other

Specify other comorbidity

 Specify resource limitations

Go to list 101

- Limited access to breast reconstructive plastic surgeons
 Plastic surgery involvement will delay cancer care significantly
 Limited access to OR time for combined procedures
 Other

Specify other resource limitations

Fig. 1. Examples of questions in the Synoptec™ template. Red asterisk indicates a mandatory response.

2. Methods

2.1. Data source and study cohort

The Synoptec™ database, developed by Cancer Surgery Alberta™ surgeons, is unique to Alberta [19]. This operative report format is used to systematically record operative details in oncologic procedures in lieu of traditional dictated operative reports, providing consistent details of each procedure. Some questions, such as “breast surgery performed” or “is the patient having immediate reconstruction done today?”, require a mandatory response, while others (e.g. “Specify comorbidity/comorbidities” preventing IBR) do not (Fig. 1).

A retrospective review of the Synoptec™ database over a two-year period was performed for all patients undergoing surgical treatment for breast cancer. Tumour characteristics, procedures performed, and general surgeon-reported reasons that patients did not undergo IBR were gathered. Male patients were excluded from the analysis.

2.2. Outcome

The primary outcome of this project sought the reasons breast surgeons reported their patients not undergoing IBR. The Synoptec™ template has been designed to require an answer to the question: “is the patient having immediate breast reconstruction today?”. If the surgeon answers in the affirmative, no follow-up questions are prompted. If the surgeon answers “no”, they are then obligated to answer a follow-up mandatory question with the following options: “reconstruction was not discussed”; “patient did not want breast reconstruction”; “significant comorbidities”; “high likelihood of radiotherapy”; “resource limitations”; or “other”. Additional non-mandatory selectable responses regarding specific comorbidities (current smoking, obesity, diabetes) or resource limitations (limited access to breast reconstructive plastic surgeons, plastic surgery involvement will delay cancer care significantly, limited access to OR time for combined procedures) are made available in addition to a free text box to further elaborate (Fig. 1). Multiple responses may be selected from all lists.

Secondary outcomes reviewed rates of IBR in various groups of patients: 1) therapeutic mastectomy as a primary procedure (with or without a contralateral prophylactic mastectomy (CPM)); 2) a completion mastectomy after positive lumpectomy margins (with or without a CPM); and 3) bilateral or unilateral prophylactic mastectomy.

2.3. Statistical analysis

All statistical comparisons were made using chi-squared test for categorical variables and two-tailed t-test for continuous variables using software available on www.scostatistics.com. A p-value of ≤ 0.05 was considered statistically significant.

3. Results

Patient information was collected on 6253 patients undergoing surgical treatment of breast cancer in Alberta from March 2016 to June 2018. Forty-nine patients were excluded for being male. Of the remaining 6204 patients, 3555 underwent breast conserving surgery (BCS) and 2649 underwent mastectomy; the latter comprised our study population as they were potential candidates for IBR. The majority of mastectomies performed were for primary treatment of breast cancer (76%). Prophylactic (13%) and completion (11%) mastectomies accounted for the remainder of cases (Fig. 2). Six hundred fifteen patients (23%) underwent IBR (Table 1). Women undergoing bilateral mastectomies were more likely to receive IBR than women having a unilateral mastectomy (50% vs 15%, $p < 0.001$) (Fig. 3).

3.1. Prophylactic mastectomy and IBR

Patients who chose mastectomy for prophylaxis were more likely to receive IBR than patients undergoing therapeutic mastectomy for either completion or primary treatment (64% prophylactic, 27% completion, 16% primary, $p < 0.001$) (Fig. 4). Surgeon-reported reasons that patients did not receive IBR differed between treatment groups. “Patient did not want reconstruction” was a more frequently reported reason for not

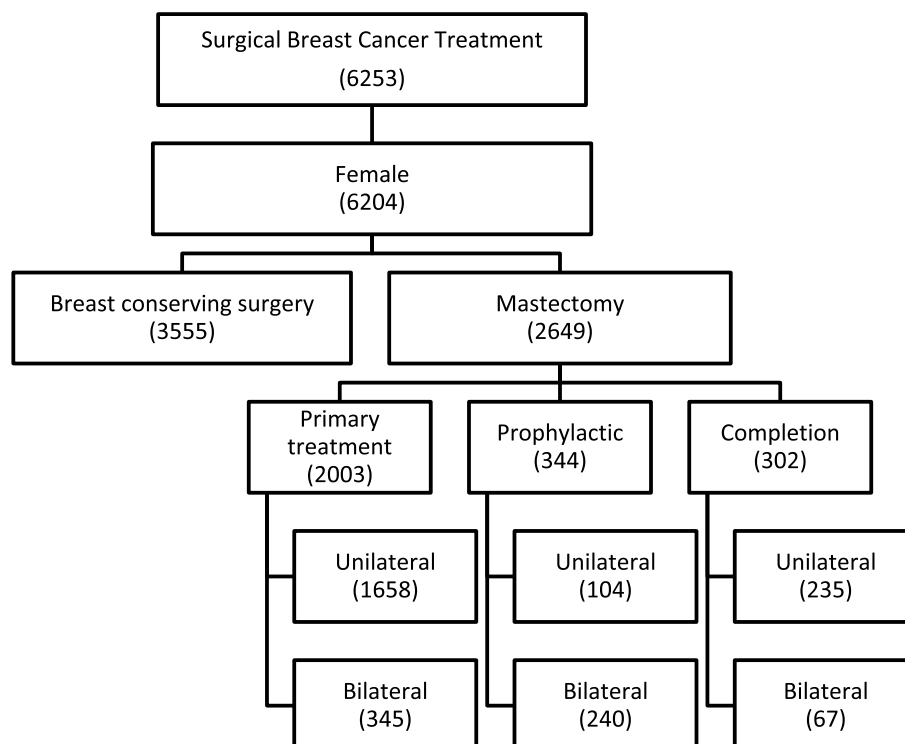


Fig. 2. Patient inclusion based on surgery and indication.

Table 1

Distribution of mastectomy patients receiving IBR based on indication for and laterality of mastectomy. Of the 2649 mastectomy patients included, 615 received IBR and 2034 did not.

Mastectomy Indication	IBR		No IBR	
Primary Treatment	312		1691	
	Bilateral	127	Bilateral	218
Prophylactic	220		124	
	Unilateral	185	Unilateral	1473
Completion	83		219	
	Bilateral	162	Bilateral	78
TOTAL	615		2034	
	Unilateral	58	Unilateral	46
	312		1691	
	Bilateral	36	Bilateral	31
	615		2034	
	Unilateral	47	Unilateral	188
	325		327	
	Bilateral	290	Bilateral	1707

receiving IBR in patients undergoing prophylactic mastectomy than therapeutic or completion mastectomy (87% prophylactic, 59% completion, 58% primary, $p < 0.001$).

3.2. Tumour characteristics and adjuvant therapies

Tumour characteristics and adjuvant therapies were also found to influence IBR rates. Of the 1073 patients for whom this data was provided, fewer patients received IBR if they were diagnosed with an invasive carcinoma versus isolated ductal carcinoma in situ (DCIS) or other rarer diagnoses (including Paget’s disease, pleomorphic lobular carcinoma in situ, phyllodes tumour, and angiosarcoma) (23% invasive carcinoma, 62% DCIS, 48% other, $p < 0.001$). Patients who had a palpable mass were less likely than those with no palpable mass to receive IBR (22% vs 41%, $p < 0.001$). Similarly, patients who underwent pre-operative treatment, such as chemotherapy or radiation therapy, were less likely than those with no pre-operative treatment to receive

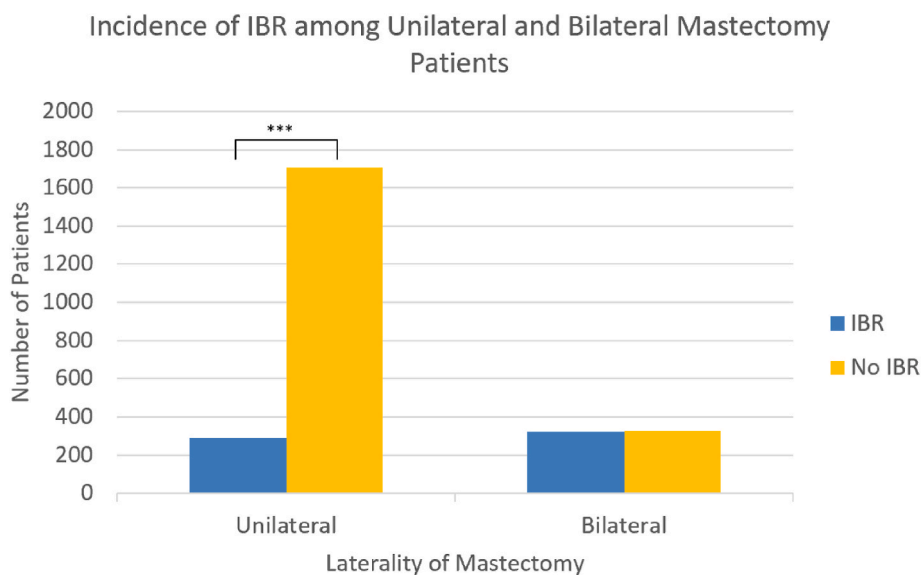


Fig. 3. Patients undergoing bilateral mastectomy for any reason were more likely than those undergoing unilateral mastectomy to receive IBR.

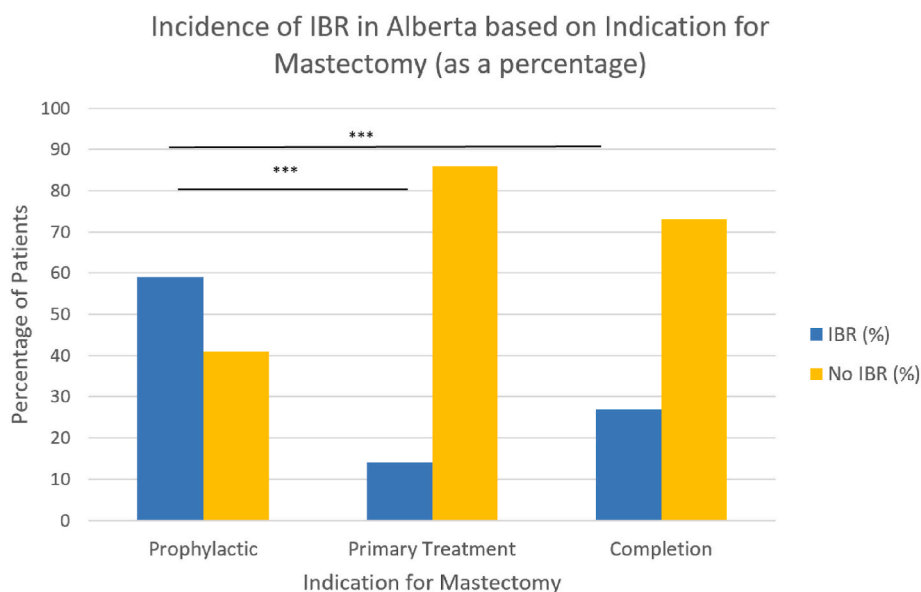


Fig. 4. Patients who chose bilateral or unilateral mastectomy for prophylaxis were more likely than patients undergoing bilateral or unilateral therapeutic mastectomy for completion of treatment or primary treatment of cancer to receive IBR.

IBR (17% vs 31%, $p < 0.001$) (Table 2).

3.3. Reasons offered to clarify No reconstruction

The Synoptec™ template required at least one reason be entered for each patient who did not receive IBR (Fig. 1, Table 3). From a total of 2309 reasons provided, it was rarely reported that a reconstruction discussion did not occur – in only 72 responses (3%) did the surgeon indicate that “reconstruction was not discussed”. “Resource limitations” preventing a patient from receiving IBR were equally rare, accounting for just 56 responses (2%).

The most commonly selected reason that no reconstruction was done was “patient did not want reconstruction” ($N = 1268$, 55%). “High likelihood of radiotherapy” accounted for an additional 452 reasons (20%), followed by 276 responses indicating the patient was too high risk due to “significant comorbidities” (12%). “Other” reasons accounted for 185 responses (8%), including large tumour, advanced patient age, possible post-op delay in chemotherapy, and recurrent cancer (Fig. 5).

3.4. Resource limitations and IBR

Contrary to our initial hypothesis, resource limitations only accounted for 56 reasons provided for no IBR, just 3% of all patients not receiving IBR. Resource limitations in this study exclusively address systemic limitations, including the perception that plastic surgery involvement would delay cancer treatment ($N = 27$, 39%), limited access to a breast reconstruction surgeon ($N = 25$, 36%), and limited access to operating room time for a combined procedure ($N = 17$, 25%) (Fig. 6). There were no questions to address patient-related resource limitations, such as ability to take time off work or resources for travelling.

3.5. Comorbidities and IBR

Obesity was the most commonly reported “significant comorbidities” for IBR not being performed ($N = 117$, 36%). Diabetes and current smoking accounted for 61 (19%) and 50 (15%) patients in this category, respectively. Other high-risk comorbidities input manually by the surgeon accounted for the remaining 97 patients (30%) in this category not receiving IBR (Fig. 7). These included cardiovascular disease, respiratory illness, advanced age and/or dementia, peripheral vascular disease, renal/liver failure, and use of therapeutic anticoagulation.

4. Discussion

It is difficult to know what the conversations are between patients and referring surgeons around mastectomy and reconstruction. By retrospectively reviewing data reported at the time of operation, this study allows us a glimpse into this conversation in real time, without relying on surgeon or patient memory. The decision to pursue IBR is complex and involves more than just the surgeon-reported resource limitations, co-morbidities, and adjuvant treatments addressed in the Synoptec™ questions. We are observing increasing rates of mastectomy

Table 2

Patient factors and incidence of IBR utilization in patients undergoing mastectomy for primary treatment of breast cancer.

	IBR	No IBR	p-value
Palpable Mass	141	495	<0.001
No Palpable Mass	173	253	
Pre-operative Treatment	21	104	<0.001
No Pre-operative Treatment	291	639	
Invasive Carcinoma	195	669	<0.001
Isolated DCIS	117	71	
Other	10	11	

in North America, with a growing trend of patients choosing mastectomy over BCS, which may be at least partially attributable to increased access to IBR [20–22]. Despite rising mastectomy rates, IBR rates remain low in Canada [5,6,8]. While it is difficult to determine exactly what factors are driving the rates of reconstruction in Alberta, this particular form of synoptic operative reporting has allowed us to begin to answer that question.

4.1. Resource limitations

Zhong et al. (2014) recently demonstrated that a major barrier to IBR in the Canadian universal health care system stems from a lack of access to a breast reconstructive surgeon or related resources [9]. Women living in wealthier neighbourhoods and those with easy access to a teaching hospital or a hospital with two or more plastic surgeons are more likely than other women to receive IBR. The Synoptec™ database is utilized by most breast surgeons across Alberta, providing data on patients from a variety of geographic areas presenting to both academic and community hospitals that may or may not have easy access to a plastic surgeon. With this diverse catchment, we were surprised to find only 3% of women who did not receive IBR had “resource limitations” listed as a reason. Perhaps this can be explained by the fact that, in the Synoptec™ template, “resource limitations” refers to healthcare institutional resources such as access to breast reconstructive plastic surgeons and combined operating room times. It does not offer an option to report potential patient-perceived resource limitations (e.g. access to time off work, transportation limitations, etc.). Such patient-borne resource limitations may contribute to a patient’s decision to pursue reconstruction or not. Further insight into the reasons patients decide not to pursue IBR could help us elucidate if patients are experiencing resource limitations barring access to IBR that are not being captured by the Synoptec™ reports.

4.2. Co-morbidities and pre-operative diagnosis

High-risk co-morbidities including obesity, smoking, diabetes, advanced age, and respiratory or cardiac disease were listed as reasons for 14% of women not receiving IBR. Similarly, those with invasive carcinoma, a palpable mass, or undergoing neoadjuvant therapy were also less likely than their counterparts to receive IBR. Co-morbidities are an important risk factor in determining patient appropriateness for IBR, however there is emerging evidence that IBR may be safe in some patients with individualized risk factors [10–12]. Patient preference and risk tolerance must also be taken into consideration and these patients should not be denied the opportunity for IBR without an informed conversation with a reconstructive surgeon [23].

4.3. Adjuvant therapy

The largest perceived barrier to undergoing IBR reported in this project was the possible need for adjuvant radiation therapy (22% of those not receiving IBR). While it has been demonstrated that post-mastectomy radiation therapy (PMRT) is associated with a higher risk of implant-based reconstruction failure and capsular contracture [24], there is not consensus in the global reconstruction guidelines regarding timing of breast reconstruction in the setting of PMRT [25]. Most guidelines, including Canada’s Alberta Health Services (AHS) breast reconstruction guidelines and the Cancer Care Ontario (CCO) guidelines, recommend deferring reconstruction until after radiation therapy, however the more recently updated National Comprehensive Cancer Network (NCCN) does not explicitly advise against IBR in the setting of PMRT and provides guidance on reconstruction for these patients [25–28]. Additionally, the AHS guidelines recommend a multidisciplinary meeting prior to mastectomy with a breast cancer surgeon, breast reconstructive surgeon, and radiation oncologist to determine the precise likelihood of requiring PMRT as IBR should be considered as a

Table 3
Reported reasons patients did not receive IBR. Some patients had more than one provided reason.

	Primary Treatment	Prophylactic	Completion	N	% of reasons provided (N = 2309)	% of patients not receiving IBR (N = 2034)
Patient Preference	988	157	123	1268	55%	62%
High likelihood RT	373	25	54	452	20%	22%
High risk comorbidity	248	7	21	276	12%	14%
Resource Limitations	50	2	4	56	2%	3%
Not discussed	66	0	6	72	3%	4%
Other	150	12	23	185	8%	9%

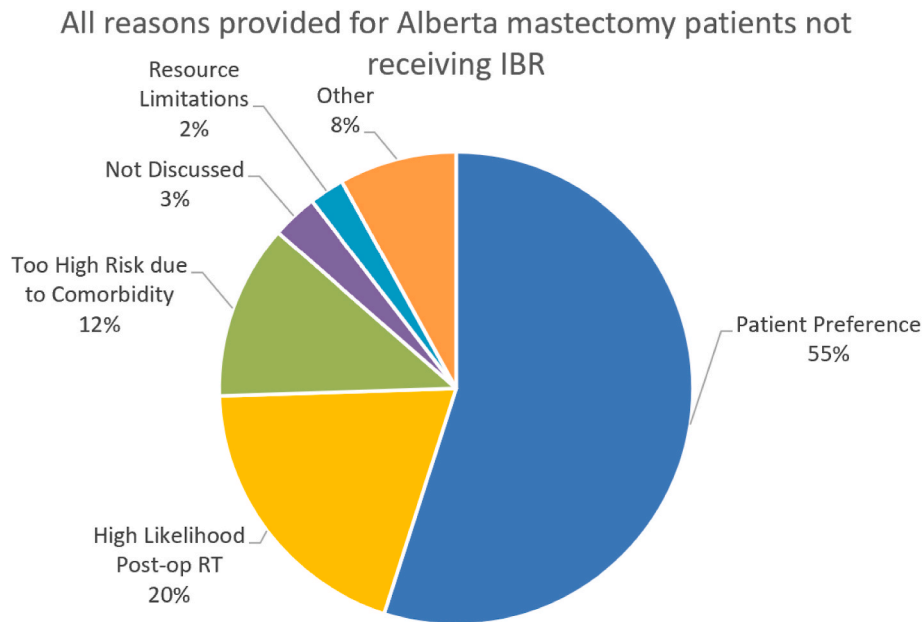


Fig. 5. All reasons provided for Alberta mastectomy patients (N = 2034) not receiving IBR. More than one answer was permitted per patient, for a total of 2309 reasons provided.

reconstructive option in those who do not require PMRT [26]. A recent survey of breast surgeons in the UK revealed that there are wide variances in practice in this particular setting, with the majority of surgeons who delay reconstruction citing a negative impact of RT on IBR cosmesis [29].

It is important to use a personalized and cooperative approach to consult with women regarding the impact on body image, for some women, of a post-mastectomy flat chest, compared with a radiated IBR outcome which may be more aligned with a woman’s body image, even if not as successful a reconstruction as a non-radiated one [30,31]. Incorporating patient opinion is essential in this cohort, despite the risks of post-operative RT, as patient satisfaction levels remain high in those who have chosen to undergo IBR and subsequently received RT [2,32]. Our data does not allow us to conclude whether the decision to forgo IBR in those with the possibility of requiring PMRT was made by the surgeon or patient. Based on the diversity of practice reported in the literature, we do recommend a frank discussion with the patient regarding the frequency and type of possible complications that IBR followed by PMRT may entail. Furthermore, a discussion should be undertaken of the pros and cons of the physical and psychological considerations related to choosing a post-operative period of flatness prior to making a collaborative decision with the patient as to whether to pursue IBR.

4.4. Patient and surgeon education

Patients rely primarily on their breast surgeon to provide them with information regarding mastectomy and breast reconstruction [33–35]. Communication-related barriers preventing patients from being able to make fully informed decisions on their health and treatment plan

following a diagnosis of breast cancer are evident within the literature, with many patients reporting difficulty accessing information on prophylactic mastectomy and subsequent IBR [36,37]. This highlights the need for ongoing surgeon and patient education in concert with a commitment to open and direct communication and collaboration between breast surgeons and reconstructive surgeons to ensure patients are provided with all treatment options.

One step toward addressing ongoing patient education and awareness is through the development of large-scale educational events such as Breast Reconstruction Awareness (BRA) Day. BRA Day is a collaborative effort between the Canadian Society of Plastic Surgeons (CSPS), the American Society of Plastic Surgery (ASPS), the Canadian Breast Cancer Foundation, and other breast cancer organizations globally that organize local events to educate communities, increase awareness of breast reconstruction options, and provide individuals with access to resources about breast reconstruction. BRA Day has been successful in raising awareness, as more communities continue to participate each year as more resources continue to be made available [38–40].

Perhaps more importantly, however, are the individualized conversations that happen between surgeons and their patients. While every patient may not be aware of breast reconstructive options prior to their diagnosis, all patients can be educated when discussing their treatment options with a breast surgeon who routinely integrate breast reconstruction options in the surgical decision-making process. The large number of patients who choose not to undergo any breast reconstruction may reflect a deficit in breast and reconstructive surgeons’ expertise in communicating all options routinely and clearly to their patients in a shared decision-making model. It could also represent a shortfall in consistent referral to a breast reconstruction surgeon for consultation.

Resource Limitations Preventing Alberta Patients from Receiving IBR

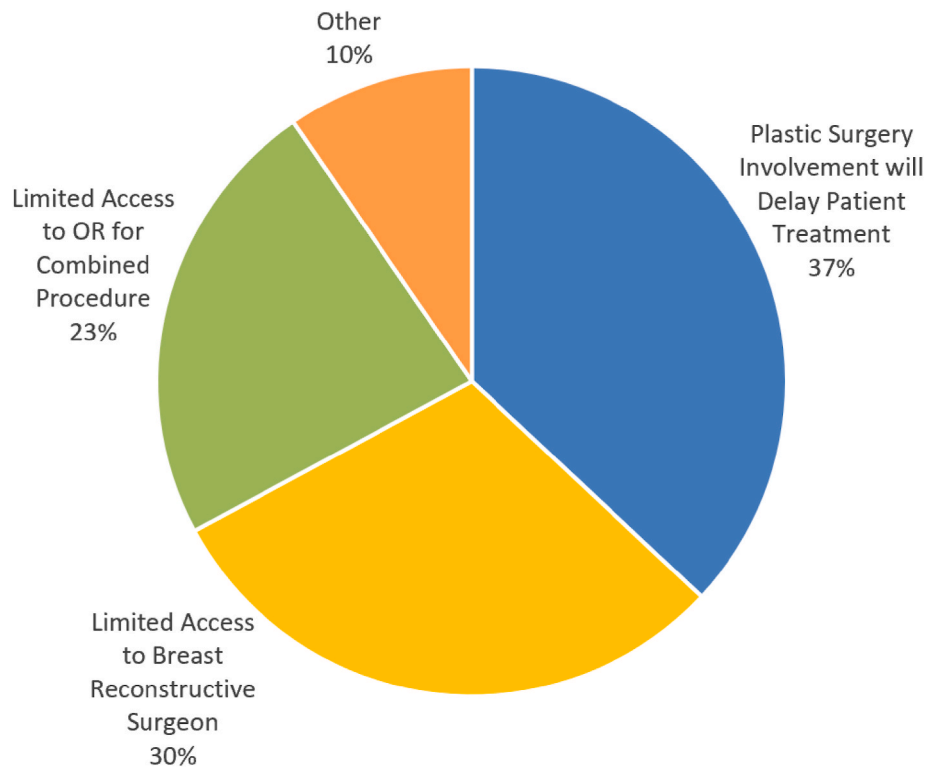


Fig. 6. Resource limitations preventing Alberta patients from receiving IBR. A total of 56 patients in our study (2% of all reasons cited that IBR was not utilized) were denied IBR based on resource limitations. Values are presented as a percentage of all resource limitations preventing IBR.

Co-morbidities Preventing Alberta Patients from Receiving IBR

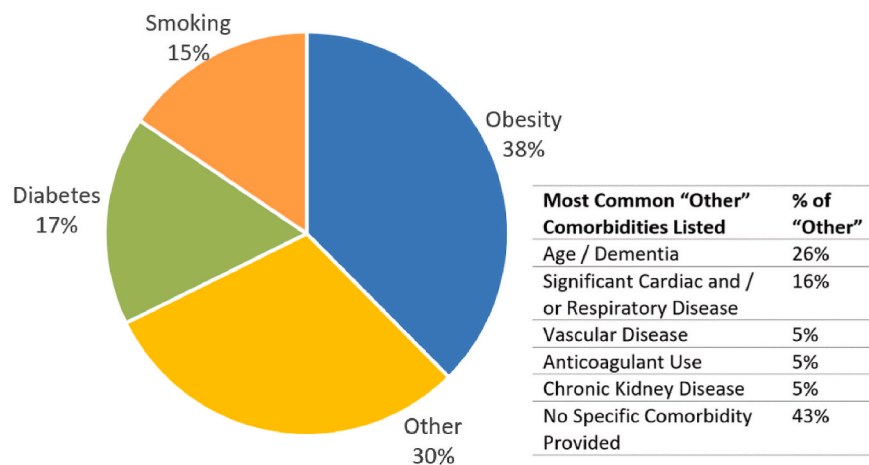


Fig. 7. Comorbidities preventing Alberta patients from receiving IBR. A total of 276 patients in our study (12% of all reasons cited that IBR was not utilized) were determined to be too high risk for IBR due to comorbidities. Values are presented as a percentage of all comorbidities preventing IBR.

This may highlight the need for more standardized reconstruction discussions between patients and surgeons or perhaps educational workshops for surgeons to hone their communication skills in this topic.

5. Conclusion

There are many reconstructive options following mastectomy in breast cancer survivors. Questions in Alberta’s synoptic operative reports addressing why patients are not receiving IBR have provided

insight into breast surgeon-reported reasons for no reconstruction. We have found that the top three reasons breast cancer surgeons report for why their patients do not receive IBR include patient preference, high likelihood of requiring PMRT, and high risk due to comorbidities. There are few reported incidences of no discussion of IBR nor resource limitations playing a role.

5.1. Limitations and future directions

Our study is primarily limited by the nature of the Synoptec™ database question set which is surgeon-reported data. We are not able to assess if patients who are not receiving IBR were referred to a reconstructive surgeon or not. It is equally plausible that patients were determined to be poor candidates by their breast surgeon and not referred to a reconstruction surgeon at all or that they were determined to be poor candidates by their reconstructive surgeon. Similarly, we are unable to determine the knowledge and resources patients have access to prior to choosing whether to pursue IBR. For example, the Synoptec™ questionnaire addresses system-based resource limitations (access to surgeons and operating rooms), while patient-based resource limitations (e.g. need to travel or take time off of work) are not addressed and could be contributing to patients' reconstructive decisions. Further probing of both patients and their referring breast surgeons alike indicating the reasoning behind their reconstruction choices in the future could provide insight into these currently unexplored barriers to the utilization of IBR.

5.2. Ethics

Our project proposal was analyzed via the Alberta Innovates A Project Ethics Community Consensus Initiative (ARECCI) online screening tool. The Ethics Guidelines for Quality Improvement and Evaluation Projects ethics screening score determined the project to be minimal risk and thus did not require further institutional ethical review.

Declaration of competing interest

None.

References

- Hatcher MB, Fallowfield LJ. A qualitative study looking at the psychosocial implications of bilateral prophylactic mastectomy. *Breast* 2003;12(1):1–9. [https://doi.org/10.1016/S0960-9776\(02\)00135-2](https://doi.org/10.1016/S0960-9776(02)00135-2).
- Altinok AY, Bese N, Kara H, Yazar S, Unal C. The satisfaction of patients with breast cancer undergone immediate reconstruction with implant and the effect of radiotherapy. *Współczesna Onkol* 2018;22(1):27–30. <https://doi.org/10.5114/wo.2018.74390>.
- Berbers J, van Baardwijk A, Houben B, et al. "Reconstruction: before or after postmastectomy radiotherapy?" A systematic review of the literature. *Eur J Cancer* 2014;50(16):2752–62. <https://doi.org/10.1016/j.ejca.2014.07.023>.
- Platt J, Zhong T, Moineddin R, et al. Geographic variation immediate and delayed breast reconstruction utilization in Ontario, Canada and plastic surgeon availability: a population-based observational study. *World J Surg* 2015;39(8):1909–21.
- Doherty C, Pearce S, Baxter N, et al. Trends in immediate breast reconstruction and radiation after mastectomy: a population study. *Breast J* 2020;26(3):446–53. <https://doi.org/10.1111/tbj.13500>.
- Stone JP, Sarmiento S, Bu J, Bhat D, Temple-Oberle C. Immediate breast reconstruction in Alberta: a Canadian perspective. *Plastic Reconstruct Surg Glob Open* 2018;9(9S). 73-undefined. <http://journals.lww.com/prsgo>.
- Albornoz CR, Bach PB, Mehrara BJ, et al. A paradigm shift in U.S. Breast reconstruction: increasing implant rates. *Plast Reconstr Surg* 2013;131(1):15–23. <https://doi.org/10.1097/PRS.0b013e3182729cde>.
- Karunanayake M, Bortoluzzi P, Chollet A, Lin JC. Factors influencing the rate of post-mastectomy breast reconstruction in a Canadian Teaching Hospital. *Plastic Surgery* 2017;25(4):242–8. <https://doi.org/10.1177/2292550317728034>.
- Zhong T, Fernandes KA, Saskin R, et al. Barriers to immediate breast reconstruction in the Canadian universal health care system. *J Clin Oncol* 2014;32(20):2133–41. <https://doi.org/10.1200/JCO.2013.53.0774>.
- Veronesi P, de Lorenzi F, Ballardini B, et al. Immediate breast reconstruction after mastectomy. *Vol vol.* 20.; 2011.
- Albornoz CR, Cordeiro PG, Farias-Eisner G, et al. Diminishing relative contraindications for immediate breast reconstruction. *Plast Reconstr Surg* 2014;134(3). <https://doi.org/10.1097/PRS.0000000000000478>.
- Kim JYS, Mlodinow AS, Khavanin N, et al. Individualized risk of surgical complications: an application of the breast reconstruction risk assessment score. *Plastic Reconstruct Surg Glob Open* 2015;3(5). <https://doi.org/10.1097/GOX.0000000000000351>.
- Coroneos CJ, Roth-Albin K, Rai AS, et al. Barriers, beliefs and practice patterns for breast cancer reconstruction: a provincial survey. *Breast* 2017;32:60–5. <https://doi.org/10.1016/j.breast.2016.12.012>.
- Petit JY, Gentilini O, Rotmensz N, et al. Oncological results of immediate breast reconstruction: long term follow-up of a large series at a single institution. *Breast Cancer Res Treat* 2008;112(3):545–9. <https://doi.org/10.1007/s10549-008-9891-x>.
- Gieni M, Avram R, Dickson L, et al. Local breast cancer recurrence after mastectomy and immediate breast reconstruction for invasive cancer: a meta-analysis. *Breast* 2012;21(3):230–6. <https://doi.org/10.1016/j.breast.2011.12.013>.
- Bezuhly M, Temple C, Sigurdson LJ, Davis RB, Flowerdew G, Cook EF. Immediate postmastectomy reconstruction is associated with improved breast cancer-specific survival: evidence and new challenges from the surveillance, epidemiology, and end results database. *Cancer* 2009;115(20):4648–54. <https://doi.org/10.1002/cncr.24511>.
- Reddy S, Colakoglu S, Curtis M, et al. Breast cancer recurrence following postmastectomy reconstruction compared to mastectomy with no reconstruction. *Ann Plastic Surg* 2011;66(5):466–71.
- Peiris L, Olson D, Dabbs K. Oncoplastic and reconstructive breast surgery in Canada: breaking new ground in general surgical training. *Can J Surg* 2018;61(5):294–9. <https://doi.org/10.1503/cjs.016717>.
- Temple WJ, Francis WP, Tamano E, Dabbs K, Mack LA, Fields A. Synoptic surgical reporting for breast cancer surgery: an innovation in knowledge translation. *Am J Surg* 2010;199(6):770–5. <https://doi.org/10.1016/j.amjsurg.2009.07.037>.
- Yu TJ, Liu YY, Hu X, Di GH. No survival improvement of contralateral prophylactic mastectomy among women with invasive lobular carcinoma. *J Surg Oncol* 2018;118(6):928–35. <https://doi.org/10.1002/jso.25221>.
- Sando IC, Billig JI, Ambani SW, et al. An evaluation of the choice for contralateral prophylactic mastectomy and patient concerns about recurrence in a reconstructed cohort. *Ann Plast Surg* 2018;80(4):333–8. <https://doi.org/10.1097/SAP.0000000000001258>.
- Benson JR, Winters ZE. Contralateral prophylactic mastectomy. *Br J Surg* 2016;103(10):1249–50. <https://doi.org/10.1002/bjs.10223>.
- Temple-Oberle C, Ayeni O, Webb C, Bettger-Hahn M, Ayeni O, Mychailyshyn N. Shared decision-making: applying a person-centered approach to tailored breast reconstruction information provides high satisfaction across a variety of breast reconstruction options. *J Surg Oncol* 2014;110(7):796–800.
- Ricci JA, Epstein S, Momoh AO, Lin SJ, Singhal D, Lee BT. A meta-analysis of implant-based breast reconstruction and timing of adjuvant radiation therapy. *J Surg Res* 2017;218:108–16. <https://doi.org/10.1016/j.jss.2017.05.072>.
- Popowich B, Kostaras X, Temple-Oberle C. Breast reconstruction after therapeutic or prophylactic mastectomy for breast cancer: a comparison of guideline recommendations. *Eur J Surg Oncol* 2020;46(6):1046–51. <https://doi.org/10.1016/j.ejso.2020.01.024>.
- Alberta Health Services. Breast reconstruction following prophylactic or therapeutic mastectomy for breast cancer. <https://www.albertahealthservices.ca/breastreconstruction>.
- Cancer Care Ontario. Breast cancer reconstruction surgery (immediate and delayed) across Ontario: patient indications and appropriate surgical questions. <https://www.cancercareontario.ca/breastreconstruction>.
- National Comprehensive Cancer Network. NCCN clinical practice guidelines in oncology. Breast cancer. Version 2. <https://www.nccn.org/breastcancer>.
- Duxbury PJ, Gandhi A, Kirwan CC, Jain Y, Harvey JR. Current attitudes to breast reconstruction surgery for women at risk of post-mastectomy radiotherapy: a survey of UK breast surgeons. *Breast* 2015;24(4):502–12. <https://doi.org/10.1016/j.breast.2015.05.002>.
- Tsoi B, Ziolkowski NI, Thoma A, Campbell K, O'Reilly D, Goeree R. Systematic review on the patient-reported outcomes of tissue-expander/implant vs autologous abdominal tissue breast reconstruction in postmastectomy breast cancer patients. *J Am Coll Surg* 2014;218(5):1038–48. <https://doi.org/10.1016/j.jamcollsurg.2014.02.011>.
- Thiboutot E, Craighead P, Webb C, Temple-Oberle C. Patient-reported satisfaction following radiation of implant-based breast reconstruction. *Plastic Surgery* 2019;27(2):147–55. <https://doi.org/10.1177/2292550319826090>.
- Brennan ME, Flitcroft K, Warrier S, Snook K, Spillane AJ. Immediate expander/implant breast reconstruction followed by post-mastectomy radiotherapy for breast cancer: aesthetic, surgical, satisfaction and quality of life outcomes in women with high-risk breast cancer. *Breast* 2016;30:59–65. <https://doi.org/10.1016/j.breast.2016.08.008>.
- Wysocki WM, Komorowski AL, Mitus J. Analysis of sources of treatment-related knowledge in women undergoing mastectomy for breast cancer and review of literature. *Przegl Lek* 2011;68(7):362–6.
- Saha S, Davila AA, Halen JP, et al. Post-mastectomy reconstruction: a risk-stratified comparative analysis of outcomes. *Breast* 2013;22(6):1072–80. <https://doi.org/10.1016/j.breast.2013.09.010>.
- Carr TL, Groot G, Cochran D, Holtslander L. Patient information needs and breast reconstruction after mastectomy: a qualitative meta-synthesis. *Cancer Nurs* 2019;42(3):229–41. <https://doi.org/10.1097/NCC.0000000000000599>.

- [36] Hoskins LM, Werner-Lin A, Greene MH. In Their own words: treating very young BRCA1/2 mutation-positive women with care and caution. *PLoS One* 2014;9(2). <https://doi.org/10.1371/journal.pone.0087696>.
- [37] Glassey R, O'Connor M, Ives A, et al. Patients' perspectives and experiences concerning barriers to accessing information about bilateral prophylactic mastectomy. *Breast* 2018;40:116–22. <https://doi.org/10.1016/j.breast.2018.05.003>.
- [38] Lamp S. BRA day and the plastic surgery nurse specialist. *Plast Surg Nurs* 2012;32(3):125–6. <https://doi.org/10.1097/PSN.0b013e318269ceb9>.
- [39] Turner AE, Abu-Ghname A, Davis MJ, Chu CK, Reece EM, Winocour S. The evolving role of the plastic surgeon in breast reconstruction education. *Plast Reconstr Surg* 2020;145(5):1012e–3e. <https://doi.org/10.1097/PRS.0000000000006759>.
- [40] Temple-Oberle C, Harrop R, Mehling B, Temple-Oberle J, Webb C, Rollheiser L. Maximizing success of BRA day events. *Plastic Surgery* 2014;22(2):143–undefined.