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The Impact of the COVID-19 Pandemic on Breast Reconstruction: A Canadian Perspective

Les conséquences de la pandémie de COVID-19 sur la reconstruction mammaire : un point de vue canadien

Caroline F. Illmann, MSc[1], Christopher Doherty, MD, MPH, FRCSC[1], Margaret Wheelock, MD, FRCSC[2], Joshua Vorstenbosch, MD, PhD, FRCSC[3], Joan E. Lipa, MD, MSc, FRCSC, FACS[4], Toni Zhong, MD, MHS, FRCSC[5], and Kathryn V. Isaac, MD, MPH, FRCSC[1]

Abstract

Background: The COVID-19 pandemic has led to unprecedented challenges and restrictions in surgical access across Canada, including for breast reconstructive services which are an integral component of comprehensive breast cancer care. We sought to determine how breast reconstructive services are being restricted, and what strategies may be employed to optimize the provision of breast reconstruction through a pan-Canadian evaluation from the providers' perspective. **Methods:** This was a cross-sectional survey of Canadian plastic and reconstructive surgeons who perform breast reconstruction. The 33-item web-based questionnaire was developed by a pan-Canadian working group of breast reconstruction experts and disseminated via email to members of the Canadian Society of Plastic Surgery. The questionnaire queried respondents on the impact of the COVID-19 pandemic and associated restrictions on surgeons' breast reconstruction practice patterns and opinions on strategies for resource utilization. **Results:** Responses were received from 49 surgeons, who reported practicing in 8 of 10 Canadian provinces. Restrictions on the provision of breast reconstructive procedures were most limited during the First Wave of the COVID-19 pandemic, where all respondents reported at least some reduction in capacity and more than a quarter reporting complete cessation. Average reported reduction in capacity ranged from 31% to 78% across all 3 waves. Autologous, delayed, and prophylactic reconstructions were most commonly restricted. **Conclusion:** This study provides a pan-Canadian impact assessment on breast reconstructive services during the COVID-19 pandemic from the providers' perspective. To uphold the standards of patient-centred care, a unified approach to strategically reorganize health care delivery now and in the future is needed.

Résumé

Historique : La pandémie de COVID-19 a donné lieu à des défis et des restrictions sans précédent en matière d'accès aux interventions chirurgicales au Canada, y compris les services de reconstruction mammaire qui font partie intégrante des soins complets du cancer du sein. Les chercheurs ont voulu déterminer le mode de restriction des services de reconstruction mammaire et les stratégies possibles pour en optimiser la prestation grâce à une évaluation pancanadienne du point de vue des chirurgiens. **Méthodologie :** La présente étude transversale a été effectuée auprès de chirurgiens plasticiens et reconstructeurs canadiens qui font de la reconstruction mammaire. Un groupe de travail pancanadien d'experts de la reconstruction mammaire a

[1] Division of Plastic Surgery, University of British Columbia, Vancouver, Canada
[2] Division of Plastic Surgery, Dalhousie University, Halifax, Nova Scotia, Canada
[3] Division of Plastic and Reconstructive Surgery, McGill University, Montreal, Quebec, Canada
[4] Division of Plastic, Reconstructive and Aesthetic Surgery, Sunnybrook Health Sciences Centre, Toronto, Canada
[5] Division of Plastic and Reconstructive Surgery, University Health Network, Toronto, Ontario, Canada

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Corresponding Author:
Kathryn V. Isaac, 2211 Wesbrook Mall, Room M41, Vancouver, British Columbia, Canada V6T 1Z7.
Email: kathryn.isaac@ubc.ca

préparé le questionnaire en ligne en 33 points, lequel a été transmis par courriel aux membres de la Société canadienne de chirurgiens-plasticiens. Le questionnaire portait sur les répercussions de la pandémie de COVID-19 et les restrictions connexes sur les modes de pratique de reconstruction mammaire des chirurgiens, de même que sur leurs avis et stratégies à l'égard de l'utilisation des ressources. **Résultats :** Un total de 49 chirurgiens, qui ont déclaré exercer dans huit des dix provinces canadiennes, ont répondu au sondage. Les restrictions imposées aux interventions de reconstruction mammaire ont été plus limitées pendant la première vague de la pandémie COVID-19, puisque tous les répondants ont rendu compte d'au moins une certaine restriction de la capacité et que plus du quart ont fait état de leur arrêt complet. La diminution moyenne de la capacité a varié de 31 % à 78 % dans l'ensemble des trois vagues. Ce sont les reconstructions autologues, tardives et prophylactiques qui ont surtout été touchées. **Conclusion :** La présente étude fournit une évaluation pancanadienne des incidences de la pandémie de COVID-19 sur les services de reconstruction mammaire du point de vue des chirurgiens. Pour maintenir les normes des soins axés sur les patients, il faudra procéder à une réorganisation stratégique unifiée de la prestation des soins, tant maintenant qu'à l'avenir.

Keywords
breast reconstruction, breast cancer, COVID-19, pandemic response, reconstruction mammaire cancer du sein COVID-19 réponse à la pandémie

Introduction

The COVID-19 global pandemic has led to unprecedented challenges in health care delivery, threatening access to surgical and medical services across all sectors. For over 25,000 women diagnosed with breast cancer annually, the impact of the pandemic on our Canadian health care system has resulted in significant changes from the standard of care delivery.[1] Comprehensive breast cancer care requires timely multidisciplinary assessment, evaluation, and consideration for multiple treatments including ablative surgery, systemic therapy, and radiation therapy. Breast reconstruction is an integral component of cancer care, recognized as an important option for women undergoing total or partial mastectomy.[2] However, this is considered an elective component of breast cancer care, and thus may be delayed in situations of limited capacity.[3-6] Limited access to breast reconstruction in Canada precedes the COVID-19 pandemic.[7] With the advent of recent health care restraints on surgical services and inpatient care, breast reconstruction resources will be further restricted.

Breast cancer survivors directly derive great health benefits from immediate breast reconstruction (IBR) post mastectomy, with substantial improvements in their quality of life.[8-10] Immediate breast reconstruction is performed at the same time as the ablative surgery, allowing for a decreased number of surgeries and improved aesthetic outcomes when compared with delayed breast reconstruction (DBR).[11] From a patient's perspective, IBR decreases psychosocial distress experienced following mastectomy, decreases body stigma, and improves social and emotional well-being.[12-15] Respecting the patient's autonomy and optimizing the outcome of the reconstruction is an important component of the associated improvement in their quality of life. From a societal perspective, the individual benefits of decreased surgery and improved social functioning portends a faster return to pre-cancer function. In a single-payer system, decreased Operating Room(OR) utilization allows those resources to be used for another individual, allowing greater access to surgical care. Health economic research on IBR supports this, with IBR shown to be cheaper and more cost-effective than DBR.[16-19]

There have been severe and fluctuating restrictions in surgical access across Canada during the COVID-19 pandemic. As an integral component of breast cancer care, we sought to determine whether and how breast reconstructive services are being restricted with a pan-Canadian evaluation of surgical access from the providers' perspective. Furthermore, we sought to determine what strategies are being, or may be, employed to optimize the provision of breast reconstruction during the pandemic.

Methods

Study Design and Population

This was a cross-sectional survey of Canadian plastic and reconstructive surgeons who perform breast reconstruction for patients with breast cancer. A voluntary response sampling methodology was used. Members of the Canadian Society of Plastic Surgery (CSPS) were invited to participate via email invitation distributed to the CSPS email list-serv. Surgeons were contacted and invited to participate twice, 10 days apart. Questionnaires were disseminated and responses collected in May 2021 using Qualtrics, a web-based survey platform. Responses were received anonymously.

Questionnaire

The survey questionnaire contained 33 items that enquired about the impact of COVID-19 pandemic and associated restrictions on surgeons' breast reconstruction practice patterns. Our questionnaire also queried surgeons on their opinions regarding the best strategies for resource utilization during a global pandemic or periods of limited resources. Questions included numeric, multiple-choice, and free-text responses. The questionnaire was developed in consultation

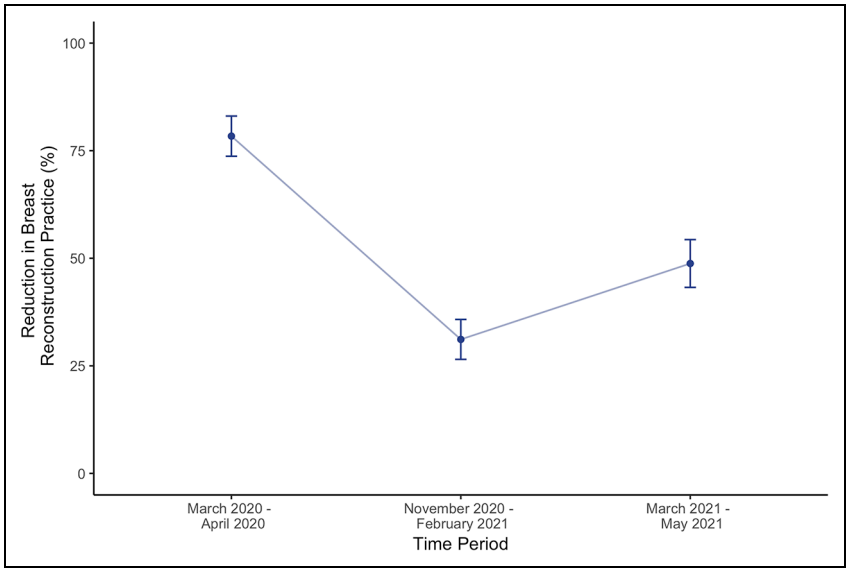

Figure 1. Capacity reduction in breast reconstruction practices across Canada during COVID-19 pandemic. Error bars represent standard error.

with a pan-Canadian working group of breast reconstruction experts and tested for content and branching logic prior to dissemination. Results were analyzed using descriptive statistics.

Results

Demographics

A total of 49 plastic and reconstructive surgeons completed the questionnaire. Ten surgeons responded and indicated that breast reconstruction is not part of their clinical practice. This represents a response rate of 20.8%. Survey respondents had surgical practices located in 8 of 10 Canadian provinces; Nova Scotia, Newfoundland, and Labrador were not represented. The largest proportion of responses was from surgeons who practiced in British Columbia (28.6%) and Ontario (38.8%). A quarter (24.5%) of respondents' report practicing solely in the community, 38.8% practice solely in an academic setting, and 30.6% practice in both community and academic settings. The reported proportion of respondents' practices dedicated to breast reconstruction ranged from 5% to 97%, with an average of approximately half (46%) dedicated to breast reconstruction. Respondents reported performing an annual average of 41 IBR cases (range 0-300 cases/year) and 20 DBR cases (range 0-100 case/year) prior to the COVID-19 pandemic.

Practice Changes and Restrictions Over the Course of COVID-19 Pandemic

During the first wave of the COVID-19 pandemic in Canada, defined as the time period between March and April 2020, respondents reported an average reduction of 78% in the volume of breast reconstructive cases in their practice (Figure 1). To note, during this time period, more than a quarter (27.4%) of respondents reported a complete cessation of breast reconstruction cases in their practice, and all respondents reported at least some reduction in capacity of their breast reconstruction practice (minimum 5%). During the second wave, defined as Autumn of 2020 and Winter of 2021 (November 2020-February 2021) respondents reported an average of 31% reduction in breast reconstruction cases. No respondents reported a complete cessation of breast reconstruction cases during this wave and 8% of respondents report operating at full capacity. Surgeons saw an average reduction of about half (49%) of their breast reconstruction practice during the third wave of the COVID-19 pandemic, defined as Spring 2021. Reported restrictions due to COVID-19 pandemic response were heterogeneous, ranging from 0% to 100% reduction in capacity across all 3 waves.

Current State of Breast Reconstruction Provision in Canada

Currently, a majority of respondents (70.6%) report restrictions, in some capacity, on the provision of elective surgery at their site of primary practice, and 60.8% of respondents report that these restrictions include the provision of breast reconstruction, as compared to standard care. In a free-text response box, common reported themes included restrictions on the delivery of free flaps (eg, deep inferior epigastric perforator flaps) and/or procedures that require hospital admission, postponement of DBR, and restrictions on prophylactic mastectomies with IBR. One surgeon described,

> Currently [we are] only allowed to offer [breast reconstruction to] healthy patients with outpatient procedures. No complex reconstructions. All [a]utologous reconstruction has been put on hold since March 2020 (eg, no flaps [because] they require admission).

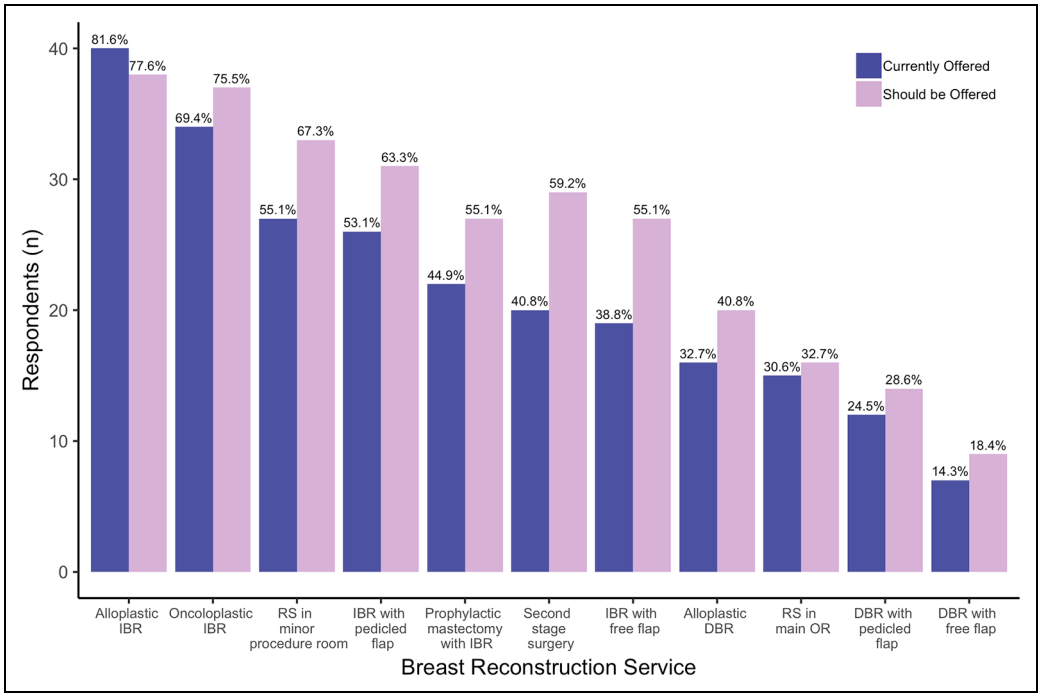

Figure 2. Breast reconstruction services. Dark bars indicate procedure that respondents are currently able to offer. Light bars indicate services that respondents believe should be offered to patients; revision surgery is defined as nipple reconstruction or revision surgery including fat grafting, dog ear excision; alloplastic BR is defined as BR with a tissue expander or implant; second-stage surgery is defined as tissue expander exchange to permanent implant. DBR indicates delayed breast reconstruction; IBR, immediate breast reconstruction; RS, revision surgery.

> Patients with immediate [breast] reconstruction who are not an ASA 1 or chose flap surgery are now all delayed reconstruction.

Most respondents report that they are currently able to offer immediate oncoplastic (69.4%) or alloplastic (81.6%) breast reconstruction, defined as insertion of a tissue expander or implant at time of mastectomy (Figure 2). Only half of respondents (53.1%) are able to offer autologous breast reconstruction with a pedicled flap and less than half (38.8%) are able to offer reconstruction with a free flap in the immediate setting, whereas a majority (63.3% and 55.1%, respectively) of respondents believe that these procedures should be offered at this time. Less than a third of respondents are able to offer DBR with alloplastic techniques (32.7%) and less than a quarter with autologous techniques (24.5% with a pedicled flap, 14.3% with a free flap). Access to second-stage surgery, defined as the exchange of a tissue expander to a permanent implant, is limited where 40.8% of respondents report the ability to offer these procedures despite a majority (59.2%) of respondents believing it should be offered.

Strategies to Optimize Resource Utilization

Respondents were asked to highlight strategies they have implemented or believe would be possible to implement to reduce the burden of resources required for providing oncologic breast reconstruction. Strategies were grouped into 4 themes: (1) strategies for triage and patient selection; (2) strategies for shifting or consolidation of clinic and operating room resources; (3) peri-operative management strategies; and (4) surgical management strategies. Respondents could select multiple strategies for each theme. Results are reported in Table 1. For patient selection, strategies most commonly reported were the use of preoperative COVID-19 testing for all surgical patients (49.0%) and the use of neoadjuvant chemotherapy or endocrine therapy (40.8%) to facilitate conversion from mastectomy to partial mastectomy or to delay surgical resection. Half (49.0%) of respondents favoured a shift in the allocation of operating room time between plastic surgeons and surgical oncologists for IBR cases. Shifting of reconstructive services to outpatient facilities was favoured or applied by 30.6% of surgeons, while sharing of patients and operative resources among plastic surgeons was endorsed by 26.5%. The most favoured peri-operative and surgical management strategies were to institute enhanced recovery after surgery protocols (49.0%) and to restrict types of procedures offered (42.9%), specifically limiting the use of autologous breast reconstruction. Other supported surgical strategies included the promotion of oncoplastic reconstruction (40.8%) and planned staging of the reconstruction with insertion of a temporary prosthesis (38.8%).

Discussion

This survey-based study provides a pan-Canadian description of restrictions on breast reconstructive services during the COVID-19 pandemic, inclusive of providers with a dedicated breast reconstructive practice and those with a lower volume of

Table 1. Strategies to Optimize Resource Utilization.[a]

Strategy	n (%)
Triage and patient selection	
COVID-19 testing of all surgical patients	24 (49.0)
Neoadjuvant therapy (and endocrine therapy) to (1) delay surgical resection or (2) convert mastectomy to possible partial mastectomy	20 (40.8)
Centralized triage of referrals	15 (30.6)
MDT discussion	12 (24.5)
Increased restrictions of IBR referral for prophylactic mastectomy	11 (22.4)
Increased restrictions of IBR referral for therapeutic total mastectomy	7 (14.3)
Increased restrictions of IBR referral for therapeutic partial mastectomy	5 (10.2)
Sharing, shifting, consolidating OR/clinic resources	
Changing designated OR time used for IBR cases	24 (49.0)
Sharing patients among surgeons to consolidate IBR cases according to OR day	15 (30.6)
Shifting BR services to sites with no or few COVID inpatients/demands for COVID care	13 (26.5)
Peri-operative management	
Instituted ERAS protocols to reduce inpatient stay	24 (49.0)
Instituted regional anesthesia to reduce inpatient stay	15 (30.6)
Use of virtual clinics	15 (30.6)
Use of combined MD clinics	8 (16.3)
Surgical management	
Restricting type of reconstruction offered (eg, no autologous reconstruction)	21 (42.9)
Oncoplastic reconstruction	20 (40.8)
Staging reconstruction with temporary insertion of prosthesis	19 (38.8)
Double staffing of IBR cases	14 (28.6)
Prepectoral reconstruction with ex vivo preparation of prosthesis and mesh	8 (16.3)

Abbreviations: ERAS, enhanced recovery after surgery; IBR, immediate breast reconstruction.
[a]Count represents number of respondents who have implemented each strategy or believe possible to implement. Percentage is calculated from total number of respondents (n = 49).

cases practicing across community and academic settings. This study supports that, throughout the pandemic, breast reconstructive services have been significantly restricted across Canada, with fluctuating yet persistent limited delivery of care. Over the last 18 months, complete restoration of breast reconstructive services was briefly available for fewer than 10% of providers across Canada. During the most recent contraction of resources, in Spring 2021, the provision of breast reconstruction is reduced to approximately half of full capacity. Microvascular reconstruction, delayed and prophylactic reconstructions of any type, and other procedures necessitating inpatient care continue to be the most commonly restricted. Strategies endorsed for the safe delivery of reconstructive services aim to reduce the risk of viral transmission, maximize utilization of operative time, and optimize the efficiency of peri-operative care.

During this third wave of the pandemic, immediate alloplastic breast reconstruction with tissue expanders or implants were the most commonly reported type of breast reconstructive services available by Canadian plastic surgeons, with most restrictions placed on autologous breast reconstruction. These findings echo reports from a survey study of the American Society of Plastic Surgeons where half of respondents reported complete restriction on autologous breast reconstruction in their institution of practice.[20] These findings align with the recommendation by 42.9% of our respondents to restrict the types of breast reconstructive services offered to patients as a strategy to optimize resource utilization. However, these recommendations contrast consensus opinions from Imperial College/Northwest-London Oncoplastic Breast multidisciplinary unit in the United Kingdom that support immediate autologous breast reconstruction to be safe and feasible during a pandemic.[21] This discordance among Canadian providers between reconstructive services that are currently available and those that should be available is likely reflective of variations in hospital capacity across provinces. Restoration of the complete spectrum of breast reconstructive services may be achieved in a safe, equitable, and timely manner with the strategic application of best practice standards according to local institutional capacity. Strategies outlined in this study, supported by other international groups,[20,22] provide a roadmap for collaborative discussion between providers and hospital administrators to reduce the burden of resources required for microvascular reconstruction.

In addition to restrictions on autologous breast reconstruction, our Canadian respondents report substantial restrictions on the provision of DBR, where less than one-third are able to offer DBR of any type (alloplastic or autologous). This is in contrast to our American counterparts, where less than 5% of plastic surgeons report restrictions on delayed procedures.[20] Notably, as a result of the Canadian response, this cohort of patients awaiting delayed reconstruction will suffer unacceptably long wait times given their limited access to reconstruction preceding the COVID-19 pandemic.[3] This rising unmet

demand is unfavourable from both an individual and societal perspective, contributing to the psychosocial hardships of breast cancer survivors[11-14] and leading directly to increased health care costs for Canadians.[15-18] With over a decade of multi-year wait times, this cohort of patients with breast cancer merit recognition of their suffering with resources justified to meet their reconstructive needs as hospitals' restore health care services post-pandemic.

Over the course of the pandemic, providers across Canada have adapted their reconstructive practices to optimize the use of existing resources. Strategies to delay the need for surgical access with adjuvant therapy were commonly employed, reflecting the importance of coordination with the multidisciplinary team and administrators allocating resources. This delay of demand for surgical care provides flexibility and facilitates the organized allocation of resources based on predicted needs. However, with uncertainty in the duration and severity of restrictions, this strategy only provides short-term relief with an inevitable surge in demand. Another important strategy utilized is the planned staging of reconstruction, further contributing to delayed exponential growth in the demand for resources to complete the second phase of the reconstruction. These anticipated resource demands compound those of delayed reconstruction patients previously outlined and those of patients awaiting second-stage surgery, both with unfavourable long-term consequences for our patients.[14,23] This study provides evidence foreshadowing the impending backlog of demand for reconstructive services in Canada. Despite demonstrated efforts to employ strategies within the context of institutional restrictions, providers will require tremendous support from administrators and policymakers to restore the standard of care in breast reconstruction.

Limitations

These data must be interpreted in the context of the survey study design. This cross-sectional assessment of restrictions in breast reconstructive services is limited to a single period of time within the context of fluctuating hospital capacity across Canada, with an inherent risk of recall bias. Diversity in practice location, type, and volume of breast reconstruction among the survey respondents supports this study as representative of a pan-Canadian perspective. However, due to the anonymity of responses, a non-responder analysis was incomplete. Institutional-level data on service provision and restriction would further supplement the evidence provided on delivery of care. Evaluation of these structural and process measures, in concert with patient-reported outcomes, is the subject of a future study on reconstructive outcomes during the pandemic.

Conclusion

This study provides a pan-Canadian impact assessment on breast reconstructive services during the COVID-19 pandemic from the providers' perspective. Despite fluctuations in hospital restrictions, breast reconstruction has been persistently limited across Canada since the onset of the pandemic in March 2020. To uphold the standards of patient-centred care, a unified approach to strategically reorganize health care delivery now and in the future is required given this current environment of fluctuating and prolonged strains on the health care system.

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ORCID iDs

Caroline F. Illmann https://orcid.org/0000-0002-0635-717X
Kathryn V. Isaac https://orcid.org/0000-0002-9374-031X

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