

Exploring reasons for overuse of contralateral prophylactic mastectomy in Canada

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ABSTRACT

Background Contralateral prophylactic mastectomy (CPM) in women with known unilateral breast cancer (bca) has been increasing despite the lack of supportive evidence. The purpose of the present study was to identify the determinants of CPM in women with unilateral bca.

Methods This qualitative descriptive study used semi-structured interviews informed by the Theoretical Domains Framework. We interviewed 74 key informants (surgical oncologists, plastic surgeons, medical oncologists, radiation oncologists, nurses, women with bca) across Canada. Interviews were analyzed using thematic analysis and an analysis for shared and discipline-specific beliefs.

Results In total, 58 factors influencing the use of CPM were identified: 26 factors shared by various health care professional groups, 15 discipline-specific factors (identified by a single health care professional group), and 17 factors shared by women with unilateral bca. Health care professionals identified more factors discouraging the use of CPM ($n = 26$) than encouraging its use ($n = 15$); women with bca identified more factors encouraging use of CPM ($n = 12$) than discouraging its use ($n = 5$). The factor most commonly identified by health care professionals that encouraged CPM was lack of awareness of existing evidence or guidelines for the appropriate use of CPM ($n = 44$, 75%). For women with bca, the factor most likely influencing their decision for CPM was wanting a better esthetic outcome ($n = 14$, 93%).

Conclusions Multiple factors discouraging and encouraging the use of CPM in unilateral bca were identified. Those factors identify potential individual, team, organization, and system targets for behaviour change interventions to reduce CPM.

Key Words Contralateral prophylactic mastectomy, breast cancer, behaviour change, implementation, knowledge translation

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BACKGROUND

Contralateral prophylactic mastectomy (CPM)—removal of the noncancerous breast in a woman with known unilateral breast cancer (bca)—is a growing challenge in North America. Outside of women who are at high risk for bilateral bca (for example, carriers of gene mutations), who constitute a minority of patients with bca (5%–10%)^{1–4}, the risk of contralateral bca in women with known unilateral disease is low (4%–8% in the woman's entire lifetime)^{5,6}. Given that risk level, CPM in most women with unilateral

bca does not prolong survival⁴. Furthermore, complications after CPM occur in 15%–20% of cases⁷. They can include medical complications (wound, infectious, cardiorespiratory, neurologic, and thromboembolic complications)^{8,9} and psychological harms (poor cosmetic outcomes¹⁰, lessened feelings of sexuality¹⁰, depression¹¹). As a result, evidence-based guidelines “strongly discourage” the routine use of CPM in most women with unilateral bca¹². Position statements from the Society of Surgical Oncology¹³, the U.S. Preventive Services Task Force¹⁴, and a Canadian national expert panel¹⁵ provide similar

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guidance. Despite the recommendations, rates of CPM continue to rise internationally^{7,16–20}.

There is little understanding of why CPM rates are increasing, especially within the Canadian and American contexts. Covelli and colleagues^{21,22} conducted interviews with surgeons and patients. In those studies, 45 surgeons from across Ontario and the United States identified access to breast magnetic resonance imaging, breast reconstruction, surgeon preference, and patient choice as the main contributing factors. The 29 women with bca who were interviewed identified fear of bca recurrence as their main contributing factor^{21,22}. Although those studies shed some light on the reasons for increased rates of CPM, they are limited by the type and number of factors identified and the minimal groups and regions sampled. To develop sustainable efforts to reduce inappropriate use of CPM, it is important to establish the determinants of CPM from the perspectives of multiple stakeholders in different regions. The purpose of the present study was therefore to use state-of-the-art approaches in implementation science to identify the determinants of CPM in women with early-stage unilateral bca.

METHODS

Study Design

This qualitative descriptive study, approved by the Ottawa Health Science Network Research Ethics Board, was conducted using semi-structured interviews with physician specialities (general surgery, plastic surgery, medical and radiation oncology), nurses, and women with early-stage bca. The Theoretical Domains Framework (TDF) informed the development of the semi-structured interview guides and the subsequent analysis. The TDF is a behaviour change framework comprising 14 theoretical domains derived from 33 health and social psychology theories that explain health-related behavior^{23,24}.

Participants

Lists of eligible participants within each physician speciality were compiled by the multidisciplinary research team. Registered nurses were recruited from bca centres across Canada. A purposive and stratified [by 5 health care professional (HCP) groups and 4 regions] sampling strategy, augmented with snowball sampling, was used to recruit HCPs. Interviews within the 5 HCP groups were conducted until data saturation was achieved. Across all regions in Canada, women (patients) who were within 1 year of their surgical treatment for unilateral bca were also eligible to participate. Purposive sampling was used to recruit women who had and had not undergone CPM. Women were recruited using multifaceted social media approaches, postings through cancer support groups, and snowball sampling.

Data Collection and Analysis

Table I presents an example interview question for each of the 14 TDF domains. Interviews (conducted by telephone between July 2015 and July 2016) were digitally recorded, transcribed verbatim, and anonymized. Data were managed in the NVivo software application (version 10: QSR International, Melbourne, Australia). Data were first

analyzed separately for each key informant group and then synthesized across groups. The data were analyzed using thematic content analysis²⁵, which was conducted in 6 systematic steps. First, two team members independently coded the transcripts into the 14 TDF domains. Second, specific beliefs were generated for each utterance (coded interview quote) in each TDF domain. “Specific belief” refers to a collection of participant responses with a similar premise that suggests a problem or influence on behaviour (or both)^{26,27}, in this case about recommending or undergoing CPM or discouraging its use. After generation of the specific-belief statements, similar statements were merged. Third, themes were generated from the merged belief statements, allowing for recognition of similarities and differences between the key informant groups. Fourth, the themes were grouped deductively into 1 of 4 broad categories of determinants:

- Individual determinant—an individual’s knowledge, comfort level, intentions, and routine practices
- Influences from others determinant—HCP and patient and family influences
- Organizational determinant—organizational structure and resource forces
- System determinant—broader health care system structures and processes

Fifth, each theme was classified as a factor discouraging CPM use (reducing CPM in unilateral bca) or encouraging its use (contributing to the practice of CPM in unilateral bca). Sixth, themes were examined in relation to whether they were shared across key informant groups (shared beliefs) or within a key informant group (discipline-specific beliefs).

RESULTS

Participant Characteristics

The 74 participants interviewed included 59 HCPs (16 surgical oncologists, 15 plastic surgeons, 11 medical oncologists, 11 radiation oncologists, 6 nurses) and 15 women with bca. Table II summarizes the characteristics of the participants. Data saturation (defined as no new themes emerging in the last 3 interviews within each group) was achieved within each HCP group and within the patient group.

Relevant Theoretical Domains

All 14 TDF domains were relevant to the practice of CPM. In total, 58 themes reflecting determinants of CPM were identified: 26 being shared across the HCPs, 15 being discipline-specific, and 17 being expressed by women with bca. Health care professionals identified more discouraging ($n = 26$) than encouraging factors ($n = 15$); women with bca identified more encouraging ($n = 12$) than discouraging factors ($n = 5$).

HCP Interviews

Shared Themes

Table III summarizes the 26 determinants (16 discouraging and 10 encouraging factors) that were shared across HCP groups, with illustrative quotes. Most factors reflected

TABLE I Sample interview questions using the Theoretical Domains Framework

Theoretical domain	Definition	Sample interview question
Knowledge	An awareness of the existence of something	■ Are you aware of the existence of any guidelines about the use of CPM in patients with early-stage unilateral breast cancer?
Skills	An ability or proficiency acquired through practice	■ What skills have you acquired to aid in your decision to use CPM or not?
Social or professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting	■ Do you think it is your responsibility to promote or discourage the use of CPM?
Beliefs about capabilities	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use	■ How confident are you in your abilities to discourage or promote CPM? What makes it easy or what makes it difficult?
Optimism	The confidence that things will happen for the best or that desired goals will be attained	■ What do you think will happen if you recommended CPM to all your patients with unilateral breast cancer?
Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation	■ What are the benefits or negative aspects of CPM?
Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus	■ What negative or positive experiences influence your practice with CPM?
Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way	■ Do you intend to recommend CPM for patients with unilateral breast cancer?
Goals	Mental representations of outcomes or end states that an individual wants to achieve	■ Considering your other priorities, on a scale of 1 to 10, with 10 being very important, how important is recommending or discouraging CPM for patients with unilateral breast cancer?
Memory, attention, and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	■ How do you make decisions about the recommendation or discouragement of CPM? Talk me through your thought process.
Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour	■ What aspects of your work environment influence whether you recommend or discourage CPM?
Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours	■ Do other team members influence your decision to practice CPM?
Emotion	A complex reaction pattern, involving experiential, behavioural, and physiologic elements, by which the individual attempts to deal with a personally significant matter or event	■ Do your emotions or mood ever influence whether you recommend or discourage CPM?
Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions	■ What can be done to improve practice with CPM?

CPM = contralateral prophylactic mastectomy.

TABLE II Participant characteristics

Variable	Value [n (%)]
<i>Health care professionals</i>	59
Role	
Surgical oncologist	16 (27)
Plastic surgeon	15 (25)
Medical oncologist	11 (19)
Radiation oncologist	11 (19)
Nurse	6 (10)
Region	
Western Canada	18 (31)
Ontario	22 (37)
Quebec	9 (15)
Eastern Canada	10 (17)
Age	
<30 Years	1 (2)
30–39 Years	9 (15)
40–49 Years	20 (34)
50–59 Years	17 (29)
>60 Years	9 (15)
Missing	3 (5)
Sex	
Men	28 (47)
Women	31 (53)
Years of practice	
<10	16 (27)
11–15	10 (17)
16–20	14 (24)
21–30	10 (17)
>30	8 (14)
Missing	1 (2)
Years of breast practice	
<10	19 (32)
11–15	13 (22)
16–20	12 (20)
21–30	12 (20)
>30	2 (3)
Missing	1 (2)
Patients with BCa treated monthly (average)	
<10	22 (37)
10–20	20 (34)
21–30	4 (7)

Variable	Value [n (%)]
Patients with BCa treated monthly (average) continued	
>30	6 (10)
Missing	6 (10)
<i>Women with unilateral BCa</i>	15
Employment status	
Full time	6 (40)
Part time	2 (13)
Retired	2 (13)
Unemployed	3 (20)
Missing	2 (13)
Region	
Western Canada	6 (40)
Ontario	7 (47)
Quebec	0 (0)
Eastern Canada	1 (7)
Missing	1 (7)
Age	
<30 Years	1 (7)
31–40 Years	5 (33)
41–50 Years	3 (20)
51–60 Years	1 (7)
>60 Years	3 (20)
Underwent CPM	
Yes	12 (80)
No	2 (13)
Missing	1 (7)
Education	
PhD	1 (7)
Masters	2 (13)
Undergraduate	7 (47)
College	3 (20)
Missing	2 (13)
Marital status	
Married	9 (60)
Single	1 (7)
Divorced	2 (13)
Living with partner	2 (13)
Missing	1 (7)

BCa = breast cancer; CPM = contralateral prophylactic mastectomy.

TABLE III Shared beliefs of health care professionals (HCPs) with respect to contralateral prophylactic mastectomy (CPM) by determinant level (26 determinants, 59 participants)

Determinant class and theme	Participants [n (%)]	HCP group
Individual determinants (n = 19)		
Discouraging factors (n = 13)		
1) It is the responsibility of HCPs to counsel against CPM if it is not medically appropriate for the patient.	59 (100)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i> I think it's my responsibility to actually discourage the use of CPM in patients who don't have—who aren't, like, mutation carriers—or have had previous chest wall radiation or something, who are high risk. Bbecause I think it's not necessary surgery. — Surgical oncologist, West-4		
<i>Theoretical Domains Framework domain</i> Social or professional role and identity		
2) Patients may experience psychological adverse effects associated with CPM.	51 (86)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i> I think that a lot of patients suffer emotional or psychological disability from having bilateral mastectomies.... I think also that there's a lot of patients who don't like just the physical disability of it, of the scar tissue, the phantom pains, the nerve pains, the sometimes the swelling of the seromas results, and kind of they're kind of waking at night with a lot of discomfort and swelling. So I think there's a lot of stuff there that's like that. — Surgical oncologist, Ontario-3		
<i>Theoretical Domains Framework domain</i> Beliefs about consequences		
3) Aware of evidence or guidelines pertaining to the use of CPM.	40 (68)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i> There is a study from in the [Journal of the National Cancer Institute] that looked at this issue last year. And they that study really showed there was very little benefit in doing the procedure, and you know, it might make the surgeons think twice about taking someone to the operating room if they're getting such a small benefit. — Medical oncologist, Ontario-4		
<i>Theoretical Domains Framework domain</i> Knowledge		
4) Providing patients with information and educating resources on CPM, could help reduce the number of un-indicated CPM requests by patients	39 (66)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i> It would be nice to have, like, a pamphlet or something that the patients could go home with or like a real patient-focused document that could help them with their decision-making. — Surgical oncologist, West-2		
<i>Theoretical Domains Framework domain</i> Behavioural regulation		

TABLE III Continued

Determinant class and theme	Participants [n (%)]	HCP group
Individual determinants (n = 19) continued		
Discouraging factors (n = 13) continued		
5) CPM does not improve oncologic outcomes.	34 (58)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
So that, you know, we're getting down to numbers that, you know, are under 10%, 5%. So people, you know, and then you know say to them and if you did get a breast cancer, like, more than 80% of those would be cured. So you know you're talking about 1%–2% survival benefit from having that surgery, and these are all the potential consequences. — Surgical oncologist, West-4		
<i>Theoretical Domains Framework domain</i>		
Beliefs about consequences		
6) Lack of intention to recommend CPM in low-risk patients with unilateral breast cancer.	32 (54)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i>		
If someone is having a mastectomy or requiring a mastectomy, I always bring it up to make sure that the majority of those patients know it's not something they need to do. — Surgical oncologist, West-1		
<i>Theoretical Domains Framework domain</i>		
Intentions		
7) Not a priority to discuss CPM unless the patient brings it up.	29 (49)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
I don't bring it up unless they bring it up. — Surgical oncologist, Ontario-3		
<i>Theoretical Domains Framework domain</i>		
Goals		
8) Important to ensure patients are well informed about risks and benefits of CPM.	29 (49)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
I think we really need, you know, to educate the patients. They want to know, and they answer questions. So I think we need to educate also the patients about their disease, the evolution of the disease and the implication also of another surgery on the contralateral breast. — Radiation oncologist, Quebec-2		
<i>Theoretical Domains Framework domain</i>		
Goals		
9) Consideration of clinical factors (for example, risk factors) when making a decision on recommending CPM may reduce inappropriate use.	28 (47)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
Q: In what times or situations would you recommend?		
A: Generally if there's a strong family history. The patient's gone through genetic testing, but the genetic testing's negative, but there still remains a strong family history—like, multiple people in the family with a history of breast cancer generally under the age of 50—and I think we're just missing a mutation. — Surgical oncologist, Ontario-4		
<i>Theoretical Domains Framework domain</i>		
Memory, attention, and decision processes		

TABLE III Continued

Determinant class and theme	Participants [n (%)]	HCP group
Individual determinants (n = 19) continued		
Discouraging factors (n = 13) continued		
10) There's a lack of updated guidelines for guiding the use of CPM.	25 (42)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
Having position statements and guidelines that sort of articulate the pros and cons and provide general recommendations like using words like "discourage" or "not recommended." I think that would probably help standardize our message. — Surgical oncologist, Quebec-2		
<i>Theoretical Domains Framework domain</i>		
Behavioural regulation		
11) Confidence in discussing CPM with patients.	24 (41)	Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i>		
Q: If a patient brings up CPM to you, how confident are you in your ability to have that discussion with them and why?		
A: Very confident. We've seen it and understand why it's done, and you know what the results are, what the complications can be.... So you know we're pretty confident discussing that with them. — Radiation oncologist, West-3		
<i>Theoretical Domains Framework domain</i>		
Beliefs about capabilities		
12) Health care professional education, training and experience helps them to make recommendations or have conversations with patients about CPM.	16 (27)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i>		
I think we've had, I, at least speaking personally, have had to sort of become comfortable having that introductory, you know, conversation with a patient that, maybe in years ago, very rarely came up and ... but now, you know, patients are asking. I feel patients are asking way more about it, so it's something I've had to sort of, you know, learn more about and get comfortable talking, you know, about it. — Registered nurse, Ontario-1		
<i>Theoretical Domains Framework domain</i>		
Skills		
13) Decision process around CPM is straightforward.	9 (15)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
Q: Is this thought process straightforward for you or do you really have to think about it quite a lot?		
A: Like, yeah, the majority of people, no, I don't think I have to think about it a lot. — Surgical oncologist, West-2		
<i>Theoretical Domains Framework domain</i>		
Memory, attention, and decision processes		

TABLE III Continued

Determinant class and theme	Participants [n (%)]	HCP group
Individual determinants (n = 19) continued		
Encouraging factors (n = 6)		
1) Lack of awareness of existing evidence or guidelines for the use of CPM in early-stage breast cancer.	44 (75)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i> Q: Are you aware of the existence of any guidelines regarding the use of contralateral prophylactic mastectomy in early-stage unilateral breast cancer patients? A: Not specifically, no. — Plastic surgeon, Ontario-3 <i>Theoretical Domains Framework domain</i> Knowledge		
2) Lack of confidence in discouraging CPM when not indicated.	14 (24)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i> I can counsel the patient and give my opinion, but you know, if they're determined to have prophylactic surgery, and they can find someone who's gonna do it, then it's gonna happen, right? — Medical oncologist, East-2 <i>Theoretical Domains Framework domain</i> Beliefs about capabilities		
3) CPM improves oncologic outcomes.	13 (22)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i> Well, the benefits are that obviously it significantly reduces your risk of getting a contralateral breast cancer. — Radiation oncologist, West-3 <i>Theoretical Domains Framework domain</i> Beliefs about consequences		
4) There can be negative consequences to HCPs if they do not recommend CPM to their patients.	12 (20)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i> The one thing that could be negative is if you refused it. Then that could really, when the patient really wants it, that could really damage the doctor-patient relationship, I think. So I've never refused it. — Surgical oncologist, West-2 <i>Theoretical Domains Framework domain</i> Beliefs about consequences		
5) Intentions to recommend CPM.	6 (10)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i> If possible, I would do CPM on every patient due to better results from reconstruction on both sides. — Plastic surgeon, Ontario-2 <i>Theoretical Domains Framework domain</i> Intentions		

TABLE III Continued

Determinant class and theme	Participants [n (%)]	HCP group
Individual determinants (n = 19) continued		
Encouraging factors (n = 6) continued		
6) Personal beliefs of HCPs on CPM can influence a patient's decision to have CPM.	6 (10)	Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
I absolutely know what I would do, but it may not be what be what the patient would do. — Plastic surgeon, Ontario-4		
<i>Theoretical Domains Framework domain</i>		
Goals		
Influences from others determinants (n = 5)		
Discouraging factors (n = 1)		
1) It is a shared responsibility among the team to have a discussion on CPM.	31 (52)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
Q: Is it your responsibility to have this discussion on CPM?		
A: I think it's everybody's responsibility. I don't think it's one person's responsibility because I think part of the patients are seeking information, and they want a consistency with the story. — Plastic surgeon, Ontario-4		
<i>Theoretical Domains Framework domain</i>		
Social or professional role and identity		
Encouraging factors (n = 4)		
1) Women request CPM based on anxiety and fear of recurrence.	31 (52)	Surgical oncology Plastic surgery Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i>		
I think taking the patient's concerns and fears into account is really very important because we may say, in trying to discourage them, "You don't need it, you know. We will catch something in time. You're gonna be followed very closely. We're gonna be doing mammograms every year." But if that patient leaves the office or the hospital and is in a state of anxiety and not able to live their lives because of that, then what good are we doing? — Registered nurse, Ontario-4		
<i>Theoretical Domains Framework domain</i>		
Goals		
Memory, attention, and decision processes		
Environmental context and resources		
2) Public influences (for example, social media, print media, patients) increase requests for CPM.	26 (44)	Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i>		
Yes the—with Angelina Jolie undergoing this and social media talking about this—I think that was—there was, I would say—a rather increasing discussion. — Medical oncologist, West-1		
<i>Theoretical Domains Framework domain</i>		
Environmental context and resources		

TABLE III Continued

Determinant class and theme	Participants [n (%)]	HCP group
Individual determinants (n = 19) continued		
Encouraging factors (n = 4) continued		
3) CPM is the patient's decision to make.	15 (25)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i> Ultimately it's a woman's—to me it's a woman's choice—as to whether she wants to go through with another surgery or not. — Medical oncologist, West-4 <i>Theoretical Domains Framework domain</i> Social or professional role and identity		
4) Women's decisions to have CPM are based on misconceptions related to benefits and risks of CPM.	7 (12)	Medical oncology Radiation oncology Nurses
<i>Illustrative quote</i> There's lots of misinformation on the Internet and blogs, and all this other kind of stuff, and more and more young women are opting for mastectomy, and more and more young women are opting for CPM as well. — Medical oncologist, West-4 <i>Theoretical Domains Framework domain</i> Environmental context and resources		
Organizational determinants (n = 1)		
Discouraging factors (n = 1)		
1) Access to plastic surgery affects patient and physician decisions on CPM.	44 (75)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i> So if you tell a patient that you're not gonna be able to see a plastic surgeon, you know, if you're in a remote area, they may not want to have a mastectomy because they'll be without a breast for a while, right? — Registered nurse, Ontario-3 <i>Theoretical Domains Framework domain</i> Environmental context and resources		
System determinants (n = 1)		
Discouraging factors (n = 1)		
1) CPM increases health care costs.	34 (58)	Surgical oncology Plastic surgery Medical oncology Radiation oncology
<i>Illustrative quote</i> it's resource intensive to do bilateral mastectomies at our centre. Bilateral mastectomies in a large group of women is with immediate reconstruction, which is a huge amount of resources as well. And so just alone, bilateral mastectomies without reconstruction is a lot more time, and with reconstruction, it's an extraordinary amount of resources. — Surgical oncologist, West-2 <i>Theoretical Domains Framework domain</i> Beliefs about consequences		

individual-level determinants ($n = 19$, 73%), followed by influences from others determinants ($n = 5$, 19%), organizational determinants ($n = 1$, 4%), and system determinants ($n = 1$, 4%). As mentioned by HCP groups (with a frequency of greater than 70%), these 3 factors most frequently discouraged use of CPM:

- It is the HCP's responsibility to counsel against CPM if it is not medically appropriate for the patient ($n = 59$, 100%).
- Patients might experience psychological adverse effects associated with CPM ($n = 51$, 86%).
- Access to plastic surgery affects patient and physician decisions about CPM ($n = 44$, 75%).

Most factors believed to encourage CPM use (7 of 10, 70%) were categorized at the individual-level. As mentioned by HCPs, these factors most frequently encouraged use of CPM:

- There is a lack of awareness of existing evidence or guidelines recommending against the use of CPM in early-stage BCa ($n = 44$, 75%).
- Women request CPM based on anxiety and fear of recurrence ($n = 31$, 52%).
- Public influences affect the decision (for example, social media, print media, patients; $n = 26$, 44%).

Discipline-Specific Themes

Of the 15 discipline-specific factors identified (10 discouraging and 5 encouraging CPM), only 5 (3 discouraging and 2 encouraging factors) were mentioned by at least 50% of the corresponding discipline's respondents (Table IV). These were the 3 discouraging factors:

- It is a priority to discourage CPM, especially in low-risk patients (surgical oncology, $n = 13$, 81%).
- I am confident when not to recommend CPM (surgical oncology, $n = 13$, 81%).
- Readily available information on CPM is scarce (nurses, $n = 3$, 50%).

These were the 2 encouraging factors:

- CPM is discussed for reconstructive purposes (plastic surgeons, $n = 9$, 60%).
- Nurses inform oncologists of patients who are interested in CPM (nurses, $n = 3$, 50%).

Interviews of Women with BCa

The factors identified from the interviews with women (5 discouraging and 12 encouraging use of CPM) centred mostly on their decision to undergo CPM or not (Table V). The factors reflected mostly individual-level determinants ($n = 13$, 76%). More than 50% of women identified 1 discouraging and 4 encouraging influences. These were the 3 highest-frequency factors mentioned by women as discouraging CPM use:

- Information about CPM from the health care team was lacking ($n = 8$, 53%).

- I have low awareness of the pros and cons of CPM ($n = 6$, 40%).
- The decision about CPM was not influenced by media ($n = 6$, 40%).

These were the 3 highest-frequency enablers:

- My choice of CPM was based on better esthetic outcomes ($n = 14$, 93%).
- I thought CPM was my decision to make ($n = 10$, 67%).
- Information about reasons not to do CPM was provided by the health care team ($n = 10$, 67%).

Comparing Themes from HCPs and Women with BCa

With a few exceptions, HCPs and women with BCa largely identified different factors influencing use of CPM. A perception of less-positive oncologic outcomes associated with CPM (such as reduced contralateral BCa) was identified as discouraging CPM use by 34 HCPs (58%) and 4 women (27%). When women had high anxiety and fear of cancer recurrence, they were more likely to ask for CPM [encouraging factor identified by 31 HCPs (52%) and 6 women (40%)]. When women wanted CPM, they were more likely to receive it [encouraging factor identified by 15 HCPs (25%) and 10 women (67%)]. Limited access to genetic testing was identified by 2 nurses (33%) and 3 women (20%) as encouraging CPM.

DISCUSSION

In the present study, we simultaneously explored the determinants of the choice to undergo (women) or to recommend or provide (HCPs) CPM in a publicly funded health care system. The study is novel in that it evaluates the determinants of CPM from a behaviour change theory perspective, providing both diverse and comprehensive data about the experiences of women and various HCP groups involved in the CPM decision process. Determinants of CPM were multiple and were grouped as barriers or enablers within 4 main categories: individual, influences from others, organizational, and system. In the subsections that follow, we discuss 4 core findings from our study that can be considered when planning to reduce inappropriate use of CPM.

Views of Plastic Surgeons

Our study is the first to explore the views of plastic surgeons about CPM. Interestingly, a factor frequently believed by plastic surgeons to encourage CPM—expressed by more than half our plastic surgeon participants (8 of 15, 53%)—was not having access to CPM guidelines. Although multiple guidelines from the U.S. National Comprehensive Cancer Network¹², the Society of Surgical Oncology¹³, and the U.S. Preventive Services Task Force¹⁴—plus a consensus statement from the American Society of Breast Surgeons²⁸—are available, those guidelines are largely directed to breast surgeons. In addition, the American Society of Breast Surgeons consensus statement has been criticized for not including other relevant stakeholders such as the American Society of Plastic Surgeons²⁹.

Because plastic surgeons are frequently part of a patient's decision-making process with respect to CPM, the

TABLE IV Discipline-specific beliefs of health care professionals (HCPs) with respect to contralateral prophylactic mastectomy (CPM) by determinant level (15 determinants)

Determinant class and theme	HCP group (N)	Participants [n (%)]
Individual determinants		
Discouraging factors (n = 7)		
1) It is a priority to discourage CPM, especially in low-risk patients.	Surgical oncology (16)	13 (81)
<i>Illustrative quote</i>		
Q: And is it standard practice for you to either recommend or discourage CPM? Is it something that recurrently comes up?		
A: I always bring it up to make sure that the majority of those patients know it's not something they need to do. — Surgical oncologist, West-1		
<i>Theoretical Domains Framework domain</i>		
Goals		
2) Confident when not to recommend CPM.	Surgical oncology (16)	13 (81)
<i>Illustrative quote</i>		
Q: How easy or difficult is it for you personally to come to the decision to recommend or not recommend CPM for your patients?		
A: It's pretty easy in the circumstances where you know where it kind of fits some recognized guidelines. So I think it's easy to recommend in those appropriate circumstances. — Surgical oncologist, West-1		
<i>Theoretical Domains Framework domain</i>		
Beliefs about capabilities		
3) Consulting colleagues so that recommendations to not recommend or to do CPM can be validated and reinforced.	Surgical oncology (16)	5 (31)
<i>Illustrative quote</i>		
For patients who I think are just cancer-phobic and so they're making the decision and for all the wrong reasons ... sometimes I'll send them to a colleague to be told by them that they don't need a breast off too. — Surgical oncologist, West-3		
<i>Theoretical Domains Framework domain</i>		
Behavioural regulation		
4) Women should have pay for CPM if not medically indicated.	Surgical oncology (16)	4 (25)
<i>Illustrative quote</i>		
I think, you know, maybe one of the ways to discourage this is to say, "If you want your other side done, and there's not a medical indication for it, like, you don't have more than a, you know, 40% risk of breast cancer on that side," or something like, that maybe you should have to pay for that. — Surgical oncologist, West-4		
<i>Theoretical Domains Framework domain</i>		
Goals		
5) CPM complicates reconstruction.	Plastic surgery (15)	7 (47)
<i>Illustrative quote</i>		
You're adding more recovery time, and you're adding more revisions because now you're sort of going and you're working on two different things because they're not the same to start with the bilateral mastectomies. And they won't be the same to finish. Whereas if someone has a unilateral mastectomy, a unilateral reconstruction, you're really kind of just revising one breast or the other to match, and that's a lot easier. — Plastic surgeon, Ontario-4		
<i>Theoretical Domains Framework domain</i>		
Beliefs about consequences		
6) There needs to be an oncologic indication to do CPM.	Plastic surgery (15)	4 (27)
<i>Illustrative quote</i>		
If it's not necessary cancer wise ... I won't find any argument to do the contralateral mastectomy. — Plastic surgeon, Quebec-3		
<i>Theoretical Domains Framework domain</i>		
Goals		
7) Readily available information on CPM is scarce.	Nurses (6)	3 (50)
<i>Illustrative quote</i>		
Because that information doesn't seem to be out there for them, or they're not sure where to access that. I don't even know what I'd say about accessing that, what site, where I would tell them to go if they wanted more information about that. — Registered nurse, Ontario-2		
<i>Theoretical Domains Framework domain</i>		
Environmental context and resources		

TABLE IV Continued

Determinant class and theme	HCP group (N)	Participants [n (%)]
Individual determinants		
Encouraging factors (n = 3)		
1) Discuss CPM for reconstructive purposes.	Plastic surgery (15)	9 (60)
<i>Illustrative quote</i>		
I think the benefit is that it's easier to achieve symmetry for a bilateral reconstruction, so I always like to do the same thing to both sides. You can get a better, more symmetrical result. I think from an anxiety perspective, patients who you know even if their cancer is small and if they're an anxious personality who's always gonna be worried about having cancer on the other side, then they get the benefit of not having to worry about that. — Plastic surgeon, Quebec-3		
<i>Theoretical Domains Framework domain</i>		
Social or professional role and identity		
Goals		
Beliefs about consequences		
2) Nurses' role to keep oncologists informed of patients who are interested in having CPM.	Nurses (6)	3 (50)
<i>Illustrative quote</i>		
I think you know we're patient advocates, and you know we would let their doctor know about their worries, their concerns, their questions in helping to facilitate that, you know, communication and information sharing. — Registered nurse, Ontario-1		
<i>Theoretical Domains Framework domain</i>		
Social or professional role and identity		
3) Would not discourage CPM based on personal experience with it.	Nurses (6)	2 (33)
<i>Illustrative quote</i>		
Well I don't know if it needs to be discouraged... I think the medical community does work really hard at discouraging it, maybe too much. Having been there myself, I can say that it was the best thing possible for me. — Registered nurse, Ontario-4		
<i>Theoretical Domains Framework domain</i>		
Reinforcement		
Influences from others determinant		
Discouraging factors (n = 1)		
1) There are harms (for example, surgical complications and emotional distress) associated with having CPM.	Medical and radiation oncology (22)	7 (32)
<i>Illustrative quote</i>		
It would be inappropriate, in my opinion, and the consequences would be that a whole bunch of people undergo potentially morbid procedures with a fair number of complications unnecessarily. — Radiation oncologist, West-3		
<i>Theoretical Domains Framework domain</i>		
Optimism		
Encouraging factors (n = 1)		
1) Plastic surgeons influence my CPM practice.	Surgical oncology (16)	3 (19)
<i>Illustrative quote</i>		
I do have a plastic surgeon who does a lot of delayed reconstruction, and I will come over and do a contralateral prophylactic mastectomy in the delayed setting with him. I do find in that setting I feel a little bit more pressured to offer the patient that if they've already made some decisions around what they're gonna do for the reconstruction. So I'm kind of a little bit hampered by that. In that one setting, that's the one time where I feel a little bit kind of pushed. — Surgical oncologist, West-2		
<i>Theoretical Domains Framework domain</i>		
Social influences		

TABLE IV Continued

Determinant class and theme	HCP group (N)	Participants [n (%)]
Organizational determinants		
Discouraging factors (n = 2)		
1) Limited operating room time and hospital budget influences the amount of CPMs that can be done.	Plastic surgery (15)	3 (20)
<i>Illustrative quote</i>		
We are limited by access to resources, and those resources could either be surgeon resources, operating room time, hospital budget (because hospital budget is associated with how much time you have in the operating room), as well as the implements and the products that are being used. — Plastic surgeon, West-3		
<i>Theoretical Domains Framework domain</i>		
Environmental context and resources		
2) CPM takes away resources for necessary surgeries.	Plastic surgery (15)	3 (20)
<i>Illustrative quote</i>		
I have this huge wait list of people who need breast reconstruction because they have breast cancer or who want breast reconstruction because they had mastectomy in the past, and that's already insurmountable. If you are doing even more mastectomies where it's not even necessary, that's going to be very bad for everybody who actually needs one. — Plastic surgeon, Ontario-1		
<i>Theoretical Domains Framework domain</i>		
Environmental context and resources		
System determinants		
Encouraging factors (n = 1)		
1) Limited access to genetic testing influences CPM decisions by patients.	Nurses (6)	2 (33)
<i>Illustrative quote</i>		
I think genetics is one biggie, eh? Even expedited testing for genetics can take up to a couple of months, and you can imagine I don't think a lot of patients would want to wait a couple of months to have surgery. — Registered nurse, Ontario-1		
<i>Theoretical Domains Framework domain</i>		
Environmental context and resources		

creation of a guideline tailored to include plastic surgeons that emphasizes not only the evidence against routine CPM in the non-high-risk patient, but also the esthetic considerations in this population could be useful given that 40% of the plastic surgeons interviewed mentioned that they often “discuss CPM for reconstruction purposes.” Since the completion of our study, a Canadian consensus statement on CPM has been published¹⁵. That consensus statement, which was developed using a national Delphi process, included representation from plastic surgeons (2 of 26 panel members).

Patient Fear and Anxiety, Esthetic Concerns

Consistent with prior studies involving women with bca and HCPs alike, our study revealed that women's fear and anxiety about cancer recurrence influences the decision to undergo CPM^{21,22}. Although some studies have shown that quality of life and other measures of psychological well-being are not different between women who undergo CPM and those who do not^{30,31}, most studies demonstrate that women are satisfied with their decision to undergo CPM, and if asked, indicate that they would undergo the procedure again^{32,33}. In addition, we showed that the esthetic concerns of women are a driver of CPM.

Women in our study, whether they underwent CPM or not, believed that bilateral mastectomy would improve reconstruction outcomes³⁴.

One way to address fear, anxiety, and esthetic concerns on the part of patients is to develop educational materials such as patient decision aids that accurately inform patients about the risks of contralateral bca and of future recurrence, the lack of a survival benefit for CPM, the psychosocial ramifications of CPM, and the outcomes of reconstruction, including its risks and benefits³⁵. Other strategies to address the core theme of fear and anxiety among women with bca, which centres on cancer recurrence in the contralateral breast, could involve the use of social and other media to educate the public about the actual risks and options.

CPM Discussions Are a Shared Responsibility

Physician—and especially surgeon—recommendations have repeatedly been demonstrated to have a significant effect on a patient's decision to undergo CPM. In one study, the individual attending surgeon accounted for a large proportion (20%) of the overall variation in CPM use in patients in the Surveillance, Epidemiology, and End Results program registries of the U.S. state of Georgia and of Los

TABLE V Beliefs of women with unilateral breast cancer with respect to contralateral prophylactic mastectomy (CPM) by determinant level (17 determinants, 15 participants)

Determinant class and theme	Participants [n (%)]
Individual determinants (n = 13)	
Discouraging factors (n = 4)	
1) Aware of the pros and cons to CPM.	6 (40)
<i>Illustrative quote</i>	
I'm gonna increase probability of infection, and what I read was, with a single, it's 2% and, with a double, it's 4% chance of infection. So I figured I can handle that. It's not too much. I'm a pretty clean person. — Patient, West-4	
<i>Theoretical Domains Framework domain</i>	
Beliefs about capabilities	
Memory, attention, and decision processes	
2) Decision on CPM was not influenced by media.	6 (40)
<i>Illustrative quote</i>	
I didn't research very much on the Internet because my surgeon had given me what I call the breast cancer bible. — Patient, East-1	
<i>Theoretical Domains Framework domain</i>	
Environmental context and resources	
3) Lack of positive oncologic outcomes associated with CPM.	4 (27)
<i>Illustrative quote</i>	
I also I know that it's statistically it might not be likely that I get breast cancer on the second side. — Patient, West-2	
<i>Theoretical Domains Framework domain</i>	
Beliefs about consequences	
4) The decision to undergo or not CPM is difficult.	4 (27)
<i>Illustrative quote</i>	
No woman makes the decision to lose both of her breasts lightly. I don't doubt that there is a huge amount of thoughts and fretting and staying up at night for every woman making this decision. — Patient, West-2	
<i>Theoretical Domains Framework domain</i>	
Memory, attention, and decision processes	
Encouraging factors (n = 9)	
1) Decision to have CPM is based on better esthetic outcomes.	14 (93)
<i>Illustrative quote</i>	
Basically from an esthetic perspective. I was not going to, I was not going to be getting reconstruction, and I'm not interested in wearing falsies or anything like that. So I, I, I didn't want one boob, basically. And I thought it would look much better and more even to have none rather than one. — Patient, Ontario-2	
<i>Theoretical Domains Framework domain</i>	
Knowledge	
Beliefs about consequences	
Goals	
2) CPM is the woman's decision to make.	10 (67)
<i>Illustrative quote</i>	
I was pretty confident in what I wanted and again she, she wasn't going to stand in my way if that's what we wanted, if that's what I had decided and that's what I wanted to do. — Patient, Ontario-6	
<i>Theoretical Domains Framework domain</i>	
Goals	
Social influences	
3) Predetermined intent for CPM.	7 (47)
<i>Illustrative quote</i>	
I knew if I was ever diagnosed with breast cancer I would definitely have a bilateral mastectomy. — Patient, Ontario-1	
<i>Theoretical Domains Framework domain</i>	
Social or professional role and identity	

TABLE V Continued

Determinant class and theme	Participants [n (%)]
Individual determinants (n = 13) continued	
Encouraging factors (n = 9) continued	
4) Public information (for example, Internet and social media) influences the decision for CPM.	7 (47)
<i>Illustrative quote</i>	
I really didn't have any detailed consultation about the options with the medical staff.... At the first opportunity I had to discuss it with somebody, I was basically turned away and told not to worry about these things so much. — Patient, West-3	
<i>Theoretical Domains Framework domain</i>	
Intentions	
5) Anxiety and fear leads women to want CPM.	6 (40)
<i>Illustrative quote</i>	
I would say a lot of worry like I, sorry—[emotional]—since I've been diagnosed, I've worried a lot about if or when it will come back. So I guess that was a big, a big thing for me—like fear of, of recurrence. — Patient, Ontario-8	
<i>Theoretical Domains Framework domain</i>	
Knowledge	
Environmental context and resources	
6) Previous experience with cancer predicts whether or not a women will request CPM.	6 (40)
<i>Illustrative quote</i>	
I'm, well, I grew up with a mum who had one breast until I was 10, and then no breasts after that. And I knew what that was like, and I knew how that looked like on her body, and that she had to wear, well, she didn't have to, but she chose to wear prosthetics when she went out. And, you know, although I probably would have gone for reconstructive surgery, but so I mean, I had a picture of what it looked like when you don't have any breasts on your body. And I liked mine. I liked the way my body looks already, so I was, I didn't really want that. — Patient, West-1	
<i>Theoretical Domains Framework domain</i>	
Emotion	
7) The decision to have CPM is difficult.	5 (33)
<i>Illustrative quote</i>	
Well, that's what I said. It's going to be a short interview because there's it was, you know, everything was, everything was so straightforward. There was no question that such a thing could, could even be on the table. — Patient, Ontario-3	
<i>Theoretical Domains Framework domain</i>	
Reinforcement	
8) Fear of cancer recurrence leads to request for CPM.	5 (33)
<i>Illustrative quote</i>	
To me it seems like "Okay, you've got breast cancer. Get rid of all that tissue there to prevent it coming back." It's, be as aggressive as you can at the beginning to avoid any of it possibly ever coming back. I don't know. I wish I could like articulate how strong, because I feel strongly about it. I feel strongly like "Okay, fine. You've got breast cancer. Let's get rid of both your breasts." It's just the best and the most aggressive. You want to be aggress—yeah—aggressive I guess. — Patient, Ontario-2	
<i>Theoretical Domains Framework domain</i>	
Memory, attention, and decision processes	
9) Lack of understanding of the pros and cons of CPM.	2 (13)
<i>Illustrative quote</i>	
There we didn't really. We did talk about the pros and cons of having the mastectomy, but not so much the CPM. — Patient, Ontario-1	
<i>Theoretical Domains Framework domain</i>	
Knowledge	
Goals	

TABLE V Continued

Determinant class and theme	Participants [n (%)]
Influences from others determinants (n = 3)	
Discouraging factors (n = 1)	
1) Lack of information on CPM provided by the health care team.	8 (53)
<i>Illustrative quote</i>	
I really didn't have any detailed consultation about the options with the medical staff.... At the first opportunity I had to discuss it with somebody, I was basically turned away and told not to worry about these things so much. — Patient, West-3	
<i>Theoretical Domains Framework domain</i>	
Environmental context and resources	
Encouraging factors (n = 2)	
1) Information on reasons not to do CPM provided by the health care team.	10 (67)
<i>Illustrative quote</i>	
The surgeon basically, you know, explained what the surgery would look like in terms of how things would look from an esthetic perspective after—what the actual, you know, what the surgery she would be doing would be. And we talked around, you know, what would happen if we did a lumpectomy, and some of the risks around that, and you know, decided that wasn't the way to go in terms of my sort of peace of mind. — Patient, Ontario-1	
<i>Theoretical Domains Framework domain</i>	
Environmental context and resources	
2) Decision to have CPM is influenced by members of my health care team.	9 (60)
<i>Illustrative quote</i>	
The surgeon that actually removed my cancerous tumour, he was just super supportive. And, really, most of the time when you ask a doctor what they would do they don't, they don't want to tell you an answer. They don't want to push you towards one decision or another, but that's really what I was looking for.... He said if you were my wife or if I was a woman that's 100% what I would do. — Patient, West-5	
<i>Theoretical Domains Framework domain</i>	
Social influences	
System determinants (n = 1)	
Encouraging factors (n = 1)	
1) Limited access to genetic testing contributes to women requesting CPM.	3 (20)
<i>Illustrative quote</i>	
They've been completely inundated with people needing to do genetic tests, wanting to do genetic tests.... To get the appointment takes well over 12 months, they said.... It's totally unhelpful to you if you're trying to make surgical decisions.... I think that probably plays a big part in why a lot of young women might do what I did.... You're having to make all these decisions sort of blind. — Patient, West-2	
<i>Theoretical Domains Framework domain</i>	
Environmental context and resources	

Angeles County³⁶. Interestingly, more than half the HCPS in our study (52%, including surgeons) seemed to emphasize that the discussion about CPM was a collective and shared responsibility for the members of the entire health care team and not just the surgeons. Often, HCPS face the difficult situation of providing ever-increasing amounts of information to patients with bca³⁷; we therefore emphasize the importance of consistent communication between HCPS in their messaging about recommendations for or against CPM for each individual patient.

Genetic Testing for BCa

On a system level, limited access to expedited BRCA genetic testing was cited by nurses and women with bca

as a key factor encouraging CPM. Currently, such genetic testing is offered only to, and covered only for, people who meet eligibility criteria based on several factors, such as a strong family history of cancer. Obtaining test results can take several weeks to many months in certain jurisdictions. Our findings shows that the lack of clarity about future risk of bca for an already anxious woman might influence the decision to undergo CPM. Interestingly, though, that observation contradicts an American study of changing surgical trends in young patients from the U.S. National Cancer Database, which demonstrated that the increased availability of genetic testing was associated with increased use of CPM from 2003 to 2010³⁸.

Strengths and Limitations

Our study has some notable strengths. It is the first national evaluation of the determinants of CPM in women with unilateral breast cancer that has obtained a multi-stakeholder sample of participants from various centres across Canada. Second, the qualitative behavioural approach used for the study allowed for a detailed identification of determinants, which is necessary to inform the design of strategies to reduce CPM. Third, the HCP sample had good representation with respect to sex, age, and years in practice. The main limitation of the study was the opt-in sampling strategy, which might have led to missed feedback from individuals who were more impartial with respect to the topic. Second, more factors encouraging rather than discouraging CPM were identified in the patient sample. That finding might be attributable to the fact that most of our patient sample had undergone CPM. Incorporating the views of more women who have elected not to undergo CPM might have revealed additional factors discouraging CPM use.

CONCLUSIONS

This national study identified several determinants of CPM use in patients with unilateral breast cancer at the individual, influences from others, organization, and system levels. Most of the determinants were shared by all stakeholder groups, but some were unique to HCP specialities or to patients. The findings of this study can be used to inform future knowledge translation interventions to reduce the evidence-to-practice gap where CPM is inappropriately used in practice.

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CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

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