# SCREENING AND PREVENTION FOR INHERITED CANCER: EXPLORING THE EXPERIENCES OF BRCA MUTATION CARRIERS IN NEWFOUNDLAND LABRADOR

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## Abstract

**Background** Females with *BRCA 1*/2 gene mutations have increased lifetime risk of breast and ovarian cancers. BRCA mutation carriers in NL are not engaging in cancer prevention and screening behaviors according to recommended guidelines.

**Methods** Qualitative interviews were combined with a provincial survey to conduct a comprehensive assessment of BRCA mutation carriers' opinions towards risk management services.

**Results** Female BRCA mutation carriers' risk management is influenced by numerous and varied factors including clinical and social influences, family and personal history of cancer, life stage, health system access, and family physicians' BRCA knowledge and expertise. Individuals were overwhelmingly in support of a centralized and coordinated inherited cancer program.

**Conclusion** The current system of patient self-navigation and reliance on family doctors to coordinate screening and prevention services results in some patients struggling to access the ongoing management they require. An inherited cancer risk service must recognize the complexities that influences individuals' behaviors towards risk reducing services.

## General Summary

This multi-method study was part of a more extensive program of research with BRCA mutation carriers in NL. This portion of the program explored the problem of inadequate cancer prevention and screening in individuals known to carry a *BRCA1* or *BRCA2* mutation. Perceptions of cancer prevention and screening in known female BRCA mutation carriers in NL was explored using qualitative interviews and supplemented with data from a descriptive postal survey. The focus was on patients' experience with access to care and personal management of their risk and reported patient–identified barriers to optimal care. Key aims of this study were to interview known carriers about their screening and prevention experience, to explore patient perspectives on reasons for the lack of compliance with national screening and prevention guidelines, and to explore whether BRCA mutation carriers see any value in an inherited cancer registry.

The results of this project have made it clear that the current model of high-risk care is not fully meeting the needs of these families, and that patients themselves are strongly supportive of coordinated care in a registry-based model. Participants reported that the level of care they receive is inconsistent which makes it challenging to properly adhering to screening guidelines. This included the challenges of access timely breast MRI screening. They reported that physicians' knowledge was varied and that they were receiving hard-to- understand, and sometimes contradictory information from their care providers. We strongly recommend the careful and purposeful funding of an inherited cancer clinical service for BRCA carriers in NL who would benefit from a comprehensive and centralized program to streamline their cancer risk management services.

## Co-Authorship Statement

I am the sole author of this thesis. Publications arising from this work will also include members of the supervisory committee, while I will remain the primary and corresponding author:

**Primary Investigator and author of thesis** – Jaclyn Hynes (JH), Memorial University of Newfoundland

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The broader program of work into which this thesis falls was conceived by HE and LD. The current study design, measures and methods were conceived by JH, in discussion and partnership with HE, LD, and patient partners. JH, as the primary investigator (PI), completed all data collection and analysis, including qualitative interviews and survey questionnaires. HE provided guidance and statistical expertise for data analysis.

HE and LD supervised this work and served as scientific advisors throughout. HE was the primary editor of this work, while LD and MW served as secondary editors. All authors contributed important intellectual content, and all read and approved the final thesis version.

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## List of Abbreviations

BMI: Body Mass Index

HBOC: Hereditary Breast and Ovarian Cancer

LY: Life Years

NCCN: National Comprehensive Cancer Network

NL: Newfoundland Labrador

BC: Breast Cancer

OC: Ovarian Cancer

PI: Primary Investigator

PMGP: Provincial Medical Genetics Program

QALY: Quality Adjusted Life Years

RRM: Risk Reducing Mastectomy

RRSO: Risk Reducing Salpingo-Oophorectomy

QoL: Quality of Life

# Chapter 1.0 Introduction

Since the identification of the *BRCA1* and *BRCA2* genetic mutations in the mid-1990s, much has been discovered regarding the risk management and outcomes of this inherited cancer syndrome (1). Inherited pathogenic variant or mutation in BRCA genes entered mainstream awareness when actress and activist Angelina Jolie publicly spoke about her BRCA mutation and encouraged women at risk to receive genetic testing and follow through with actionable risk-management, if they tested positive (2). Since then, the demand on genetic counselors has increased tremendously, and still continues to do so a decade later (3). Individuals who are BRCA mutation carriers are at increased risk for several cancers, primarily breast and ovarian, with modest increased risk of prostate, pancreatic, and melanoma (4–6). It is beneficial for BRCA mutation carriers to be identified early and to adhere to age and sex-specific risk management guidelines to limit their risk of associated cancers (7). There is clear evidence that women who access cancer screening and prevention according to recommendations (National Comprehensive Cancer Network, Society of Gynecological Oncology of Canada, Society of Obstetricians and Gynecologists of Canada) can significantly reduce their cancer risk and all-cause mortality by more than 70% (8–10).

It is recommended that individuals suspected to be at risk for carrying a BRCA mutation undergo genetic counselling and genetic testing (11). Upon the receipt of a positive genetic test result, the responsibility falls on the patient to inform other at-risk family members. BRCA mutation carriers are suggested to follow risk-management guidelines, which include surgical and screening prevention services (12). A BRCA mutation is life-changing for individuals and comes with significant burden to manage their cancer risk and risk reduction strategies (11).

This master's thesis explores the screening and prevention behaviours of female BRCA positive mutation carriers in Newfoundland and Labrador (NL).

**Background and Rationale**

*BRCA1* and *BRCA2* are tumour suppressor genes responsible for repair of DNA double strand breaks during cell division (13). When mutations occur in these genes, the result is a cancer predisposition syndrome that leads to a 50-70% lifetime risk of breast cancer (BC) and 20-40% lifetime risk of ovarian cancer (OC) (12,14,15). In 1994, when these genes were first identified in families with many cancers, very little was known about optimal cancer prevention (1). Since then, an enormous amount of research and progress has led to clear guidelines about optimal management of BRCA mutation carriers and solid evidence that cancer rates and all-cause mortality can be decreased through appropriate risk management (8); further, screening and prevention services are cost-effective (16,17).

Well-designed studies now demonstrate that breast screening MRI and mammogram in healthy female BRCA carriers have a sensitivity of 93% for the detection of earlier stage BC (18,19). If a woman chooses prophylactic mastectomy, she lowers her BC rate by >90% (20,21). The most valuable intervention for cancer prevention in BRCA mutation carrier women is risk-reducing salpingo-oophorectomy (RRSO) which virtually eliminates OC risk and reduces BC rates in pre-menopausal women by 50% (22–27). In fact, RRSO completed after childbearing (but before natural menopause) results in a 60% improvement in all-cause mortality for female BRCA mutation carriers (28–30). This surgery, however, is accompanied by immediate surgical

menopause with significant sequelae including acute menopausal symptoms, cognitive impacts, sexual effects, as well as risks of bone loss and cardiac disease (20,31).

## Clinical BRCA

In order to discuss *BRCA1* and *BRCA2* mutations at an in-depth level throughout this thesis, it is important to ensure that proper description of the clinical and genetic aspects of these mutations has been provided. The following sections describe hereditary breast and ovarian cancers (HBOC), specific genetic information about *BRCA1/2* mutations, as well as the prognosis and recommendations for individuals with *BRCA1/2* mutations.

### *1.1.1 Hereditary Breast and Ovarian Cancer*

The diagnosis of a cancer predisposition syndrome in a patient with cancer is considered when the following factors are observed: young age at onset, multiple family members with cancer diagnoses, multiple cancers in one individual or particular pathologic characteristics i.e. hormone receptor negative breast tumour. A syndrome is definitively diagnosed when a germline pathogenic variant in a known tumour suppressor gene (*BRCA1/2*) is identified on DNA sequencing. In the case of patients with a compelling family history and uninformative testing, a presumptive diagnosis of hereditary cancer syndrome may be made based on likely elevated empiric risk due to pedigree alone (32). Hereditary breast and ovarian cancers (HBOC) are responsible for approximately 5-10% of all breast cancers and nearly 18% of all ovarian cancers (32–34). *BRCA1/2* mutations are responsible for upwards of 80% of genetic breast cancers (12); however, mutations in other genes have been identified in recent years. For example, *PALB2*, *BARD1*, *CHEK2*, *CDH1*, and *PTEN* genes are known breast cancer susceptibility genes (35).

Additionally, *RAD51C, RAD51D*, and *BRIP1* mutations have been reported to lead to a lifetime risk of ovarian cancer of 10% in affected populations, although they have much weaker penetrance than BRCA gene mutations (32).

### *1.1.2 BRCA Genes*

BRCA genes follow an autosomal-dominant pattern of inheritance, meaning that affected individuals have a single copy of the dysfunctional gene paired with a normal gene (13,21). *BRCA1/2* mutation carriers inherit one mutant BRCA allele from one parent, and a wild-type allele from the other. For the cancer to develop, the normal wild-type allele will also have to be deleted or mutated in the presence of the inherited mutated gene in particular cells (e.g., in the breast) (15). Thus, the "second hit" germline mutation in these genes is highly penetrant, up to about 50- 80%. Penetrance refers to the lifetime risk of developing cancer and is often defined as the risk up to 70 years of age (1).

BRCA genes are responsible for managing double-strand breaks that occur during cell division, thus inhibiting tumorigenesis (32). These genes form a complex with the *RAD51* protein which plays a role in homologous recombination, the process of exchanging nucleotide sequences between two similar molecules of DNA (13,32). The goal of homologous recombination is to restore damaging breaks that occur on both strands of the DNA during the cell division phase and functions to maintain genomic integrity during cell division (13). Specifically, the *BRCA2* gene is associated with homologous recombination and DNA repair mechanisms, while the *BRCA1* gene has an impact on DNA repair, transcription regulation, and control of cell cycle checkpoints

(36,37). These regulatory roles of *BRCA1/2* genes are highly correlated with their tumor suppressor activities (37).

### *1.1.3 Prevention, Guidelines, and Implications*

The ability to detect cancers at an early stage makes a significant difference in survival rates. Stage 1 breast cancer has a survival rate of 90%, whereas individuals diagnosed at stage 4 face a survival rate of just 15% (38). Breast cancers diagnosed at screening have the best survival rates, while cancers detected within 12 months of a negative screen have similar survival rates to those diagnosed within 12-27 months of a negative screen; non-screen detected cancers have the poorest survival (39). Ovarian cancer, the most lethal gynecological cancer, has a five-year survival rate <30% (40). Most women are diagnosed at an advanced stage, as ovarian cancer is often asymptomatic during the early stage (40). Despite several large-scale trials of ultrasound and cancer antigen 125 (CA125) testing, no screening test has been proven effective in the detection of early stage ovarian cancer (41,42).

The National Comprehensive Cancer Network (NCCN) recommends specific breast and ovarian cancer screening and prevention guidelines for BRCA carriers (8). These guidelines are as follows: Breast cancer awareness and monthly exams should begin at the age of 18 and semi-annual clinical breast exams should start by age 25. Between ages 25-75, breast MRI should be conducted annually. Annual mammography should be carried out between 30-75yrs. Bilateral prophylactic mastectomy with or without reconstruction is an alternative to surveillance and is offered to and discussed with female BRCA mutation carriers.

Due to the absence of reliable screening methods for ovarian cancer, the recommendation for BRCA mutation carriers is removal of ovaries and fallopian tube after childbearing, called prophylactic risk-reducing salpingo-oophorectomy (RRSO) (8). RRSO is recommended between the ages of 35-40 for *BRCA1* carriers and 40-45 for *BRCA2* carriers. The difference in recommended age at surgery is based upon the observed ovarian cancer incidence in each mutation. After RRSO, there is an associated ovarian cancer risk reduction between 80-90% and a breast cancer risk reduction estimated at 50%, particularly in *BRCA2* carriers. These risk reduction percentages decrease closer to menopause (8). Highest rates of survival are reported to occur with RRSO at age 40 combined with risk reducing mastectomy (RRM) at age 25. This increases survival by 26% and 12% for *BRCA1* and *BRCA2* carriers, respectively (21).

**BRCA in Newfoundland & Labrador**

In NL, routine clinical BRCA gene testing became available in 2006 for cancer patients from families with multiple relatives having cancer at a young age. The costs of testing were high, and specimens analyzed elsewhere. In recent years, testing costs have decreased dramatically and future implementation of germline testing locally is being planned. If an individual is at risk for harbouring a BRCA mutation, they will undergo in-person genetic counselling prior to testing and, if positive, receive a summary of recommendations in the form of a letter. The patient is instructed to share the letter with their family physician and relatives. In this way, at-risk relatives can be referred to medical genetics and gynecologic oncology for assessment and counselling.

Currently, there is no ongoing process of support or follow up for these very high-risk individuals, nor are there systems in place to monitor whether individuals adhere to screening or

prevention interventions. There is no continuity of care providing cancer genetics expertise and no process to ensure that patients are referred to the appropriate specialist. The quality of care for these mutation-positive patients rests solely on the individuals themselves or their family physicians.

There are 276 confirmed *BRCA1/2* carriers in NL; 114 (41.3%) *BRCA1*, 163 (58.7%) *BRCA2*. There are 43 unique mutations, 20 of which are in *BRCA1* and 23 are in *BRCA2*. Of those, 210 (76.1%) are female; 41 are deceased and 13 are living out-of-province. Prior work from our team found that over 50% of women with BRCA mutations in NL were not receiving screening or prevention according to guidelines. However, a current comprehensive clinical review is in progress to more accurately understand the profile of BRCA mutation carriers in NL (manuscript in preparation). Preliminary results suggest the number of adherent patients has increased to nearly two thirds of the population. This is encouraging; however, this report has shown that nearly 20% of *BRCA1/2* patients are still not adherent to the recommended screening and prevention guidelines, and 14% are considered only somewhat adherent to these recommendations. Individuals with a *BRCA1* mutation were considered very adherent if they were aged 25 to 75 years and were both adherent to breast guidelines and had completed RRSO (if eligible). Individuals were considered moderately adherent when they had followed at least one guideline recommendation, but not all. A non-adherent label was given to women 25 to 75 years of age with no breast screening or preventative surgery (RRM) and no RRSO (if eligible).

Results from this most recent review suggests that of the 105 (67.3%) who were eligible for RRSO, 77 (73.3%) have completed an RRSO. Of the 136 (88.3%) of those deemed eligible for RRM, only 53 (39%) have undergone the procedure. Of those who had not undergone a

mastectomy, 77 (49.4%) were eligible for MRI, and 47 (61%) had been screened in the last 18-months. Similarly, 73 (46.8%) were eligible for mammogram; 45 (61.6%) had been screened during this time period. At the time of the current project's conception, only 48% of women over age 40 had had RRSO. Although the percentage of female BRCA mutation carriers adhering to recommendations have increased, these numbers are still lower than local care providers would prefer.

*Problem*

BRCA mutation carriers in NL are not receiving cancer prevention and screening services according to recommended guidelines. It is not known if the deficiencies in the current care model in NL are due to individual patient factors, limitations in health care access, wait times, lack of continuity in primary care, or some unknown factors.

**Overview of Thesis**

This multi-method study was part of a more extensive program of research with BRCA mutation carriers in NL. This portion of the program explored the problem of inadequate cancer prevention and screening in individuals known to carry a BRCA mutation. Perceptions of cancer prevention and screening in known female BRCA carriers in NL was explored using qualitative interviews, supplemented with data from a descriptive postal survey. The focus was on patients' experience with access to care and personal management of their risk and reported patient–identified barriers to optimal care. The research design was developed with patients from the outset and included them in the identification of solutions and recommendations.

By exploring barriers to optimal inherited cancer risk management, our team, including patients and researchers, hoped to identify areas where additional study, analysis, or investment is required to bring the BRCA carrier population in NL to screening and prevention participation rates on par with other jurisdictions.

### *Setting*

This study took place across the province of Newfoundland and Labrador (NL). Participants for qualitative interviews were identified by healthcare providers who care for the NL BRCA mutation carrier population, while the postal survey was sent to all known BRCA mutation carriers, regardless of place of residence in NL.

### *Team*

A multidisciplinary team was constructed to offer a range of knowledge and experience. The team was comprised of the Primary Investigator (JH), a gynecological oncologist (LD), and a health psychologist and Genetics, Ethical, Legal, Social issues (GELs) researcher (HE). Three patient partners were a key part of the team and shared their expertise and opinions about the structure, goals, and analysis of the study.

## Research Questions and Study Objectives

### *Research Question*

What are the reasons for the different uptake in preventative interventions between female BRCA carriers who adhere to screening and preventative recommendations and those who do not?

*Thesis Objectives*

1. To explore patient perspectives on reasons for the lack of compliance with national screening and prevention guidelines for BRCA carriers.
2. To interview BRCA mutation carriers about their screening and prevention experiences and needs.
3. To explore whether BRCA mutation carriers see any value in an inherited cancer registry and what their research and care priorities are.

# Chapter 2.0 Literature Review

The purpose of this literature review was to examine current evidence regarding factors that influence the uptake of preventative interventions by individuals with hereditary cancer mutations. This chapter assesses the literature surrounding adherence levels, access and uptake of genetic testing, as well as the psychological impact of inherited cancer mutations.

The first section investigates how individuals and families make decisions regarding genetic counselling and testing, risk management options, and prevention and screening services. This section also includes literature considering how individuals identify and cope with their perceived cancer risk, and the psychological distress that comes from living with a HBOC genetic mutation. The second section examines BRCA mutation carriers' needs and experiences when navigating the healthcare system with regards to their HBOC genetic predisposition, and highlights identified BRCA-specific barriers in the healthcare system. The third section assesses literature surrounding inherited cancer registries, the uptake of these registries when newly implemented, and patients' opinions on the benefit and value of a formal registry.

## 2.1 Genetic Counselling and Testing Behaviors in High Risk Individuals

Genetic counselling is the standard of care prior to HBOC syndrome-related genetic testing. Individuals are typically referred to a genetic counselor by their healthcare provider or family physician. During a genetic counselling session, a detailed family history is taken to create a patient's family pedigree (43). This provides the genetic counselor with information pertaining to the incidence of BRCA-related cancers in the family and determines whether an individual meets genetic testing criterion. Individual centres have

different testing criteria; NCCN Guidelines for testing criteria for high-penetrance breast and/or ovarian cancer susceptibility genes has been included in Appendix A (8)

It is useful to review the literature surrounding genetic counselling and testing behaviours in high-risk individuals as the genetic counselling experience will influence informed decision- making about cancer risk-management. Genetic counselling is the process of assisting individuals with understanding the impacts of genetic mutations, such as the medical, psychological and familial implications of a genetic testing result (44). Genetic counselling includes receiving education and support with concepts such as testing, management, and prevention. This opportunity provides potential carriers with counselling to discuss these concepts and to encourage informed choices that align with personal values when making decisions about genetic testing.

A 2017 study in the United States found that of women affected by breast cancer who met at least one eligibility criterion, only 15.3% received testing, while 7.2% of women who had breast cancer, but did not meet eligibility criteria, received testing (45). For women affected by ovarian cancer, 13.1% were advised to receive genetic testing with a total 10.5% who proceeded with testing. This study estimated that over 1 million women with a history of breast and/or ovarian cancer had not undergone genetic testing in the US. Despite the NCCN guidelines which recommend genetic testing for patients affected by breast or ovarian cancer, this study found that over 70% of eligible patients with breast cancer, and 80% of eligible patients with ovarian cancer had not discussed genetic testing with their care provider (45). The study hypothesized that the high percentage of untested eligible patients may be due to the focus on patients with new diagnoses, which neglects those with a past history of breast or ovarian cancer. Women with

diagnoses 5 or 10 years ago are less likely to undergo testing due to the lack of awareness of genetic testing, but who would likely still benefit from such testing (45). These low numbers highlight the continued lack of awareness by care providers that OC, in particular, is an indication for genetic testing (45). It is worth noting that the recommendation of routine testing for all cases of epithelial non-mucinous OC has only been since 2014 (8,46,47).

A study by Allen et al. (48) explored the predictors for genetic counselling. This study highlighted that less than half of patients with breast or ovarian cancer had received genetic counselling or testing, with even fewer having ever discussed genetic testing with their doctor. This 2015 study included 18 601 women (88% at low risk; 10.7% at medium risk; 1.7% at high risk) and found that less than 3% had ever had genetic counselling and less than 2% had genetic testing. Predictors of the likelihood to have genetic counselling included perceived cancer risk, personal history of cancer, and level of familial risk. Allen et al. found that 12% of participants would have been eligible for genetic counselling and testing, but only a small number were offered these services. Similarly, a 2016 study found that only 8% of high-risk women who completed a family history questionnaire had received a genetic counselling appointment within the year following receiving a genetic counselling recommendation letter (49).

A recent study by Swink et al. (50) reported 30% of patients at their institution who met genetic counselling criteria did not receive genetic counselling. Investigation showed that initial referral to genetic counselling by a treating oncologist was the largest barrier for at risk patients. This highlights the importance of timely referrals for individuals who meet testing criteria. The study

also found that younger women (<50 years of age) were more likely to have conversations with their physicians regarding the likelihood of a hereditary cancer mutation.

## 2.2 Psychological Distress and Quality of Life in BRCA Patients

Understanding the mental and emotional processes BRCA mutation carriers undergo when managing their increased risk of cancer is important when investigating screening adherence. Voorwinden et al. (51) investigated the prognostic factors for distress subsequent to genetic testing for hereditary cancer. This study noted that although many individuals' BRCA-related distress was reduced with preventative surgery and regular screening, some individuals experienced long term psychological problems as a result of their mutation status. Pre-existing psychological distress, cancer affected relatives, strong emotional illness and grief were significant predictors for psychological problems, with pre-existing psychological distress being the biggest prognostic factor for psychological problems after an unfavorable result (21). In addition, cancer-related worry after a positive test result was best predicted by being single, and levels of pre-existing cancer worry and cancer risk perception.

A 2016 systematic review (52) focused on anxiety, depression, and psychological distress in BRCA mutation carriers who had been affected by cancer. This review examined studies that investigated intermediate- and long-term psychological outcomes in cancer-affected BRCA mutation carriers. Ringwald et al. (52) found that cancer-affected BRCA mutation carriers experienced distress after receiving their positive test result. However, this distress was generally observed within the first 12 months but did not translate into intermediate or long-term depression or anxiety symptoms. Two studies included in the review did show considerable psychological

distress present after four and five years, and potentially clinically relevant depression and anxiety was found in two studies in the review. Ultimately, this study found contrary results regarding breast and/or ovarian cancer affected women and long-term distress, depression and anxiety. However, the majority of studies saw an increase in psychological symptoms at three and twelve months, with medium symptoms occurring at 17 months and up to an average of five years.

A 2015 literature review (53) examined the available literature on quality of life (QoL) in female BRCA mutation carriers. QoL levels were comparable between the general population and BRCA mutation carriers who had been unaffected by cancer. General mental health was comparable between carriers and non-carriers, with no statistically significant difference. No long-term effects on QoL were found after risk-reducing ovarian surgery, and general QoL appeared not to be affected in the long term by unaffected carriers' choices in breast and ovarian cancer risk management. BRCA carriers who had undergone RRM had comparable levels of QoL scores, or slightly above levels of age- matched women in the general population. Lower QoL was found in carriers whose mother had died compared to those whose mother was still living. Risk-reducing surgeries were shown to have negative effects on women in areas such as sexual functioning and body image. A slight decrease in sexual pleasure was observed in women after RRM and RRSO. Body image generally decreased after RRM. After RRSO, discomfort, vasomotor symptoms, and vaginal dryness were more common, especially in women who were younger at the time of surgery (53).

Harmsen et al. (53) brought awareness about the often-mixed results reported regarding cancer worry and distress scores in BRCA mutation carriers. Risk factors for higher levels of distress

were identified including risk overestimation, excessive breast self-examination, loss of first-degree relatives, and a passive coping strategy. Individuals who had a partner and presented with a coping style that included reassuring thoughts were more likely to have lower distress levels (53).

## 2.3 Screening Behaviors in BRCA Patients

Garcia et al. (54) reported that 74% of women who were seen in their clinic underwent RRSO, with a medium time of 6 months after they received their carrier status results. This study also noted that 17% of those who underwent an RRSO were under 40 years of age, with *BRCA1* mutation carriers being 2.19 times more likely to have an RRSO than *BRCA2* mutation carriers. Garcia et al. also reported that of the women seen in their clinic, women who had an RRM were 3.79 times more likely to have a RRSO than women who had not received an RRM. The study highlighted that history of cancer or BMI were not associated with RRSO. However, women with at least one breast cancer were 2.96 times more likely to have a bilateral mastectomy when compared to women without a history of BC in their study population. For RRM, the frequency of RRM was not different depending on *BRCA1* or *BRCA2* mutation status, and BMI, menopausal status, or ethnicity were not associated with RRM. Of the women in the cohort that had not received an RRM, their annual MRI adherence dropped from 35% to 3% within 5 years (54).

Haroun et al. (55) surveyed 434 women aged 25-65 with BRCA mutations who adhered to breast cancer screening recommendations and found that women with *BRCA1* mutations were 7% more likely to undergo RRM. Women with a mother or sister who had a prior BC diagnosis were more likely (21%) to have RRM than those without a first-degree relative affected with cancer. However,

neither of these differences was statistically significant. The women in this study who had undergone RRM listed fear of cancer as their most common reason for electing for the procedure (38%). Women also included fear of dying and leaving children behind (26%) and having seen a relative battle cancer (13%) as reasons for preventative surgery. Three percent of women chose RRM because of a previous false positive screening test. For women who did not undergo RRM, high confidence in screening was observed, and fear of surgery and concern over body image were common reasons for avoiding preventative breast cancer surgery. Moreover, 11% of women in this group stated that they believed having had the RRSO reduced their breast cancer risk to a level that was manageable. This study reported that 11% of women with RRSO had RRM, while 22% of women without the ovarian prevention surgery went ahead with RRM (55).

A medical record review of 110 women (56) found that 44% of women with BRCA mutations had an RRM. A study by Flippo-Morton et al. found similar responses to surgical adherence (57). A total of 54% of women in their cohort had undergone either RRM, RRSO, or both. This study reported time to surgery after BRCA diagnosis and found that women who elected for RRM (75%) did so within a medium time of 7.5 months, while women who chose RRSO (25%) did so at a medium time of 4.7 months. They reported no significant difference in age among patients who underwent either or both surgeries (57).

## 2.4 Cost Effectiveness of Risk Reducing Services

BRCA screening and prevention recommendations have been evaluated in terms of their cost savings and effectiveness. A systematic review by Petelin et al. (7) reported that RRSO and RRM resulted in the highest life expectancy, but not necessarily quality-adjusted life expectancy. This

review also noted that annual MRI combined with mammography was generally the most effective breast screening strategy reported. This review called for the need for conclusive longitudinal studies with mortality data to investigate BRCA mutation risk management strategies (7). A study by Yamauchi et al. (58) looked at the cost-effectiveness of surveillance and prevention strategies in Japan. This study reported that preventative surgeries were more cost-effective than surveillance. Yamauchi et al. reported that RRSO combined with RRM was the most cost- effective approach in *BRCA1* mutation carriers (58).

In a cost effectiveness study that examined BRCA mutation carriers with a history of ovarian cancer, RRM in the years after a diagnosis of OC was unlikely to be cost effective or have substantial survival gains (59). RRM was most cost-effective among *BRCA1* carriers from age 40-50 years old. Women who had OC at the age of 60 years or later, RRM was considered not cost-effective. The study assumed 82% of women undergoing RRM would opt for reconstruction, based on previously reported averages (59).

## 2.5 Inherited Cancer Registries

When addressing issues of screening and prevention adherence, it is important to examine systematic ways to address issues with low adherence. A valuable resource for improving clinical management for high risk individuals is through the implementation of a registry to collect information about these individuals, monitor their adherence, and provide a centralized point of data collection and storage.

A systematic review examining the impact of registries and colorectal cancer (60) reported a significant reduction of colorectal cancer (CRC) incidence and mortality with registration and screening for familial adenomatous polyposis (FAP), and a reduction of CRC incidence and mortality for individuals with Lynch Syndrome. This review noted that studies show that CRC incidence can be reduced by half and survival can be improved significantly when individuals were registered. In particular, a UK based study (61) looked at the outcomes from a CRC registry and saw that in the 22 years after creating the registry, the 10-year cumulative survival rate of their patients improved from 49 to 75% ($P<0.001$). This study also noted that the age of diagnosis of FAP decreased from 33 to 23 years; additionally, when examined by a different group, the same registry was seen to have demonstrated that the CRC incidence reduced by half and the rate of diagnosis of FAP had increased by double (62).

Several studies explored recruitment in inherited cancer registries and addressed issues about the types of individuals who are more likely to self-refer to register to these programs. A cross-sectional study by Henrikson et al. (63) reported that having a cancer diagnosis was the biggest predictor of whether an individual self-referred, and that they were more likely to have higher rates of cancer within their family. In addition, this study explored the differences between the groups who self-referred and those who did not. They found individuals who self-referred had statistically higher levels of anxiety, depression, education, and previous cancer diagnosis. Also, the self-referral group was more highly motivated towards cancer screening behaviors (63).

Additional studies about inherited cancer registries (64) noted the underrepresentation of ethnic minorities in registries and addressed the need for specific approaches to be used to increase the enrollment of these underrepresented groups and those groups who may be less likely to

participate (65). Knight et al. (66) found that men were less likely to participate in the Cooperative Family Registry for Breast Cancer Studies at their Ontario site. This study also found that age was a factor in the participation of women, and that ethnic origin other than white was associated with lower response rates. The Mid-Atlantic Cancer Genetic Network compared two methods of recruitment (passive vs. active) and concluded that allocating staff for recruitment of potential participants helps achieve increased enrollment. This study found that active recruitment increased contact with potential patients by 43% and increased enrollment by 51.8% when compared to passive recruitment (65).

In addition, registries increase the potential for future research studies. For example, the initiation of the Breast Cancer Family Registry, a multinational registry located in Canada, the United States, and Australia (67) has resulted in the launch of over 80 research projects. In addition, the Dutch Lynch Syndrome Registry (68) describes how the program has generated studies which helped design surveillance protocols, and the registry acknowledges that hereditary cancer registries play a central role in improving the clinical management of affected families.

The Dutch Lynch Syndrome registry demonstrates a successful registry framework. (68) The aims of the Dutch Lynch Syndrome registry include promoting the identification of families with hereditary cancer, encouraging high-risk individuals' participation in surveillance programs, ensuring continuity of lifelong surveillance examinations, and promoting research. The registry focuses on family follow-up, ensuring the quality of surveillance programs, and appropriate clinical management of individuals enrolled in the registry. (68) A similar registry design would be of great value for managing BRCA mutation carriers in NL.

## Discussion of Literature

The literature demonstrated variability in living with *BRCA1/2* mutations, adherence to screening and prevention strategies, levels of cancer worry, and patient perceptions of quality of life. This literature review was crucial to assist with the development of research questions pertaining to this population.

This literature review was aimed at giving a broad picture of the impact of genetic testing and BRCA genetic mutations on the individual, as well as the healthcare system. The literature demonstrated that coping with genetic testing, receiving a positive test result, and navigating decisions surrounding screening and prevention services is fluid and shifts over time, often dependent on the individual. Risk management in high risk individuals is dependent upon many factors, including socioeconomic situation, age, family planning, coping style, and family history. It is clear that BRCA mutation carriers who receive appropriate screening and prophylactic surgeries within recommended time frames to reduce their risk of BRCA-associated cancers have better mortality outcomes. Moreover, the healthcare system benefits from individuals adhering to the recommended guidelines and reducing their risk of receiving a cancer diagnosis. The information gathered during this literature review further reinforced the necessity of investigating reasons for lower than optimal risk management adherence in the Newfoundland and Labrador BRCA mutation carriers.

In order to ensure quality care is provided to the carriers in the province, it is crucial to investigate the patient identified barriers with the healthcare system and allow their stories to be heard. This descriptive study aimed to describe BRCA mutation carriers' lived experiences, including their

experience with inherited cancer, cancer risk, their perceptions of risk management and quality of life. This literature review did highlight the lack of patient-oriented research studies which help to make sure a study is rooted in patient preferences, concerns, and priorities. As a result, this study was guided by a patient-oriented approach with BRCA mutation carriers as members of the study team to help fill this gap in the literature.

# Chapter 3.0 Methodology

This multi-method study was part of an ongoing program of research with BRCA mutation carriers in NL. This portion of the program explores the problem of inadequate cancer prevention and screening in individuals known to carry a BRCA mutation. The current project focuses on the less-than-optimal adherence to cancer prevention and screening in known female BRCA mutation carriers in NL using qualitative interviews supplemented with a descriptive survey. The study is a patient-oriented research study, designed with, and informed by, patient partners. The research aims to explore patient perspectives on reasons for the lack of compliance with national screening and prevention guidelines; to interview known carriers about their screening and prevention experiences and needs; to explore whether BRCA mutation carriers see any value in an inherited cancer registry; and identify their research and care priorities. The study combines descriptive qualitative interviews with patient surveys to provide a comprehensive assessment of the views of BRCA positive individuals in NL. The study took place from September 2017-June 2019.

## Section I: Qualitative Interviews

### 3.1 Patient-Oriented Design and Interview Development

Patient engagement is increasingly recognized in research as meaningful, valid, and has the ability to enhance service delivery in health research (69–71). The study team recognized that BRCA mutation carriers are the experts on navigating the healthcare system, including screening and prevention services. The team believed the outcomes of the study would have higher levels of uptake if they aligned with patient priorities. The intention was to ensure all aspects of the study design and methods were executed in a manner that was respectful and considerate of the sensitive nature of navigating cancer worry and inherited cancer risk.

This multidisciplinary team included three patients (DC, AH, LW) who were involved in the study design from the inception of a research grant application that was ultimately funded. These women were recruited through the gynecological oncologist on the team, LD. These women were approached specifically because they cover a range of experiences with inherited breast cancer. Collectively, they represent the experience of an unaffected person in a multigenerational rural family, a young female carrier planning a family and a cancer survivor who initiated genetic workup and now guides her family members through the process. They are all dealing with decisions about preventative surgeries, ongoing access to screening, and family communication about inherited cancer risk.

Many of the decisions about the research plan, study goals and study measures were made in consultation with the patient experts. The patient partners began by outlining the areas of research of highest priority to them and what study designs could best address the research question(s). Initial discussion with patient partners clearly revealed their focus on inherited cancer risk management, including prevention and screening behaviours, and their desire to use a method that allowed us to 'talk to patients'. The full study team, including the patient partners, met after ethics approval and before the start of recruitment. At this meeting, the project plan was reviewed and included discussion regarding execution and evaluation of data collection.

The interview guide consisted of open-ended questions designed to elicit commentary on experiences with **cancer in the family** (first awareness of hereditary risk, perceived personal risk, screening motivation), **genetic testing** (decision-making, counselling experiences, reaction to status, understanding implications, impact on family), **healthcare needs** (barriers to accessing

necessary resources, difficultly accessing healthcare needs pertaining to the BRCA status, knowledge of health professionals about BRCA), as well as their opinions on a provincial **inherited cancer registry** (advantages, concerns, research needs and interests). Prompts were also developed to provide suggestions for the interviewer to direct the conversation for optimal levels of information extraction and clarification. The goal of the interview was to balance specific questions the team believed were important to have answered, with a conversational style that allowed for participants to share as much as they were comfortable. The aim of the interview questions was to gain a full picture of patients' experience as a BRCA carrier in NL. Additional questions included adjusting to carrier status, screening experiences, and health care service needs.

Following initial discussions with patient partners, a draft interview guide was created by members of the research team and returned to the three patient partners for review. The feedback from the patient partners was invaluable. Several questions were suggested to be worded differently. For example, the question below was highlighted and changed after discussion with patient partners.

| **Question:** | **Prompt:** |
|---|---|
| Did you feel you had enough information to make an informed decision about how you have decided to manage your cancer risk? | Have you ever regretted your decision? |

One of the patient partners suggested the prompt should be changed to "Is there anything you wish you would have done differently with regards to making decisions about cancer risk

management?" In her opinion, she would answer the two questions very differently. As she noted in an email response:

> "[T]he only thing I would possibly change is the wording of the question involving regret (#3 prompts). It's just a personal opinion but I regret nothing as every experience has brought me to where I am now . . . I don't find the question offensive or inappropriate in the context of the study, I just know for me personally if you asked, "Would you make a different decision with the information you have now?" rather than "Have you ever regretted your decision?", it would elicit a very different response."
>
> - Patient Partner May 2018

This example demonstrates how imperative it is to seek the advice and expertise of patients who are directly impacted by the subject being investigated. The suggested prompt was added to the interview guide, along with any other recommendations received from the patient partners. The full interview guide can be found in Appendix B.

## 3.2 Participants and Recruitment

Inclusion criteria for this study included females over the age of 25 with a *BRCA1* or *BRCA2* mutation confirmed through the Provincial Medical Genetics Program (PMGP). Carriers who had been previously diagnosed with cancer, who currently had a diagnosis of cancer, or who had never received a cancer diagnosis were able to participate in the study; having individuals with a range of cancer experience provided a rich dataset most generalizable to BRCA positive individuals in NL. The minimum age limit of 25 was set because guidelines recommend beginning risk reducing strategies at this time. Males were excluded from the study as the focus

was on breast and ovarian cancer prevention in female carriers. Participants were also excluded if they did not meet the minimum age criteria, if they did not have a confirmed mutation through the PMGP, or if they were unable to provide informed consent.

A total of 23 participants were recruited. Recruitment was conducted by two physicians, a gynecological oncologist (LD) and a medical oncologist, within patients' circle of care as directed by the local ethics board. Having worked with the families with BRCA mutations in the province for many years, the physicians purposively sampled the database to identify potential participants to be invited to the study. Purposeful sampling was used to ensure that there was variability within the participants. In all cases, participants were chosen to reflect a range of experience with inherited cancer, differing years since receiving carrier status, differing numbers of affected family members, varying ages, and residence in different areas of the island. The ultimate goal of purposeful sampling, as described by Sandelowski et al. (72,73) is "to obtain cases deemed information rich for the purpose of the study".

The physicians informed the potential participants about the study and provided them with a study information sheet (Appendix C). Once permission had been obtained for the PI to contact them, the PI made contact via telephone or email to explain the study further and ask if they were interested in participating. Three participants were unable to be reached at the time of PI follow up. This resulted in a total of 20 participants for the study. Saturation occurred after the 15th interview, and the study team thought it unnecessary to continue to interview patients as the interviews do have the potential to be distressing, and it was felt to be unethical to unnecessarily continue with the interviews given saturation had been reached.

Efforts were made to identify, and recruit women deemed non-compliant by the oncologists on the team; however, these individuals proved challenging to recruit for the study. Extended efforts were made to identify and contact these individuals by research team physicians. It was not the case that these individuals declined to participate explicitly; rather, they were difficult to reach. Five non-adherent individuals were contacted multiple times; despite best recruitment efforts, only three were recruited into the study.

Participants were invited to participate in either an individual interview or a focus group with other BRCA mutation carriers. For an individual interview they were given the option of taking part either in person, by telephone or via email. Providing participants with multiple options of study involvement allowed participants to take part in the way most comfortable and acceptable to them. In particular, discussing cancer history and risk can be distressing; individual interview options allowed a private discussion. All participants agreed to an individual interview; however, one participant brought her daughter, who was also a BRCA mutation carrier.

### 3.3 Study Procedure

Recruitment and data collection began following receipt of ethical approval from the Health Research Ethics Authority (approval included in Appendix D). Initial contact with potential study participants was made via telephone or in person by the gynecological oncologist or medical oncologist on the study team. Those who agreed received a follow up telephone call from the PI (JH). During this phone call, the PI provided additional information to the participant and answered all questions. If the participant was interested, the interview was scheduled. If the participant preferred an in-person interview, this was scheduled at a time and location that worked

best for the participant. If the participant was in a rural community some distance from the main study site, a telephone interview was scheduled.

Data collection occurred from March 2018 to February 2019. Interviews were held either in person at the Health Science Centre in St. John's NL, or over the phone. This decision was left to the participants and every effort was made to ensure participants were accommodated in their desired location for the interview. Prior to beginning the interview, the consent form was discussed with the participant (Appendix E). The participant was given time to read the consent form, ask any questions, and then date and sign the form. It was here that the interviewer discussed any issues with audio recording and transcribing the interview and described the protocols put in place to ensure their information was protected and only available to individuals within the study team. Participants were assured that their information would be kept confidential and that they would not be identified in the results of this study. The risks associated with the study were minimal. However, the interview had the possibility of bringing up topics that could be distressing for participants; therefore, a list of counselling services and resources was provided to all participants after the interview.

Interviews ranged from 32 minutes to 62 minutes and were about 45 minutes on average. Interviews were audio recorded and transcribed verbatim. The interview guide was used for all interviews to ensure similar content was encompassed across interviews. However, questions may not have been asked in exactly the same order in each interview and participants were encouraged to ask any questions or raise any other issues important to them. Thus, while conversations differed slightly during each interview, and the order of topics varied slightly, all scripted topics were covered in all interviews.

For interviews that were conducted over the phone, the interviewer was alert to pauses, sighs, or other sounds of potential distress, and patients were reminded that any questions which were difficult did not require an answer and they were welcome to skip over any questions that were potentially distressing. Interviews proceeded until no new ideas or themes developed; at that point, data saturation was deemed complete and no further interviews were conducted.

A semi-structured interview guide was used because it allowed for clarification and probing and flexibility in the order of questions. It also allowed patients to steer the conversation towards subject areas that came up during the interview. This is important because it allowed participants to tell their own stories in their own ways. The interviewer would ask open ended questions to the participants and let them dictate the direction of the conversation. Prompts were used when necessary to get the most accurate representation of their experience and ensure collection of data necessary to the current study questions; however, participants were encouraged to discuss aspects of their experience that they felt to be important.

### 3.4 Data Analysis

Qualitative description (72–74) was employed to summarize the data pertaining to accounts of ongoing management of inherited cancer risk. This is a form of naturalistic inquiry that makes no theoretical assumptions about the data. Rather, a key goal is to present the data in the language of participants, without aiming to interpret the data in more theoretical ways. The end result is a comprehensive summary of the event in question. Qualitative description was a logical choice for analyzing study data as a key goal is to provide a comprehensive account of the factors

influencing screening and prevention measures in individuals BRCA mutations, as well as to describe their healthcare needs and research priorities. NVivo 12 software was used for analysis. This software provides a system for managing and organizing qualitative data, including codes and themes that emerge during data analysis.

The researcher plays an active role in qualitative analysis in identifying appropriate themes that are relevant, accurate and complete. Often, methods of qualitative analysis are described too simply, stating that themes "emerged" from the dataset. Morse (75) criticizes this passive way of reporting qualitative data. The following is an in-depth explanation of how data from these interviews were analyzed to generate the themes presented in Chapter 4.

The process of analyzing the data began with familiarization of the transcripts. After the first three interviews were completely transcribed, transcripts were reviewed with the qualitative expert on the supervisory committee (HE). Transcriptions were read in detail, making note of initial ideas and codes. The remaining interviews were completed and transcribed, and the team met continuously to brainstorm, code and generate themes. After 15 interviews were completed, full review of the transcripts began. Interviews were all read independently by both members of the analytical team (HE and JH). Both members then met to read and discuss surface level ideas and begin suggesting potential themes and codes that became relevant throughout the familiarizing processes. The goal of these sessions was to ensure transcriptions were fully read and discussed, both members feeling as though it was crucial to have a deep understanding of the data before rigorous coding and the generation of themes began. However, throughout these meetings, a running list of potential codes and noteworthy themes was kept, aiding in generating the final coding map.

Once all interviews had been actively read and ideas initiated, generating the initial codes began. Coding data aims to produce pockets into which similar data can be grouped. At this initial stage, transcripts were again read in their entirety, this time with a more active goal of generating as many codes as possible. A full list of each potential code was kept, attempting to code for as many potential themes as possible.

After all transcriptions had been re-read and a full code list generated, several higher order themes became clear by noting which ideas fit under the same general label. For example, many individuals discussed the shock they felt when hearing their genetic test results, while other individuals spoke about the relief they felt after hearing their BRCA mutation carrier status was confirmed. Although these were different codes, they fit under the same theme of "feelings surrounding genetic testing result". It was at this stage that a more complete list of codes, with their hierarchical themes began to develop. It was important at this stage to not remove potential codes because they were not popular throughout many transcripts, as well as avoiding reducing codes down too much, as this can result in unspecific codes. After the full code and theme chart was generated, NVivo was used to code all interviews with the complete list of codes and themes. It was through this rigorous coding process that the most relevant themes became clear; codes were constantly compared throughout the entire process.

After all interviews had been re-coded in NVivo, codes were examined to see which ones could be removed entirely due to lack of relevance; which codes could be grouped together as they clearly described the same thing; and which codes fit together to form more general themes.

Once transcriptions had been rigorously coded this final time, data was reviewed, and codes were now examined independently. Namely, instead of taking an interview and sectioning the text into codes, individual codes were examined. All data pertaining to a particular code were examined to ensure it made sense to group text together and that it did indeed describe the code.

During this detailed coding process, a greater understanding of BRCA mutation carriers' experiences, the effect their genetic mutation has had on their emotional wellbeing, their perceptions of the healthcare system and the available supports for them as BRCA mutation carriers was developed.

### *3.4.1 Vigor and Validity in Qualitative Description*

Qualitative description was seen as a good fit for this project given the project's aim to describe BRCA carriers' experiences with risk-reducing surgeries and screening services. This study focused on understanding the experiences of BRCA mutation carriers in NL, including how individuals managed their cancer risk and accessed risk reducing surgeries and screenings.

The goal of using qualitative description is to capture the elements of an experience and describe individuals' perceptions (76,77). The end result is a description of the individuals' experiences in a language that is similar to their own words and voice (78). Qualitative description is rooted in the general principles of naturalistic inquiry, a commitment to studying something in a situation closest to its natural state.

To ensure the descriptive analysis of the qualitative data was analyzed with validity and vigor, the following tools were used: ensuring participants voices were heard and paying close attention to context, employing content analysis, member checking, and objectivity. These concepts are explained in greater detail in the following sections.

*Participants Voices Were Heard*

Qualitative description intends to fully describe an experience in the words of the individual experiencing it. In order to do this in a responsible way, it is necessary to probe for clarification and prompt with follow up questions when necessary. This requires careful attention to cues from participants. For example, noticing cues that suggest the participant might have more to tell and probing with additional questions, or re-wording the question, is necessary. These strategies are used to provide the opportunity for the individual to share their experience in a way that is true to them and to ensure their voice was heard. The interviewer must present as being impartial and neutral to the situation. As a result, participants understand they can share information in a confidential and neutral space. For example, in the context of the interview guide for this project, it was important to share with participants that the interviewer (JH) was not connected to a particular doctor. This often allowed them to open up and share their healthcare experiences candidly, without concern the interviewer was partial.

*Attention to Context*

Proper evaluation of qualitative data requires careful attention to context. Qualitative research is rich with detail from the participants through accounts of their experiences. This detail is used to give the reader a strong understanding of the experiences and themes established through data collection and analysis. It is crucial to pay close attention to context when generating codes and

themes. For example, if a participant disclosed that they did not know about their family's previous experience with cancer, it was important to think about the context in which this information was given. A participant may not know about their family's history of cancer because there is a low history of cancer in their family, or because the participant was not close with members of their family and did not have access to this information, or because they have never asked their family about this information. In certain contexts, not knowing about family history of cancer might be coded as 'lack of family cancer knowledge', whereas in other circumstances, this may be coded as 'unmotivated to learn about BRCA and cancer risk'.

*Member Checking*

Two members of the research team met regularly to guarantee thorough data collection and analysis. During these meetings, JH and HE would assess the findings to ensure the credibility and validity of the themes and codes generated. Themes were discussed with the committee to ensure that members agreed that the themes and codes developed logically from the transcripts, and to discuss alternative interpretations. The team understood that presenting findings with the use of descriptive, direct quotations would allow readers to judge the credibility and integrity of the themes. Full disclosure of findings was also a component of ensuring integrity of the presented themes.

Additionally, patient partners were presented with the themes and relevant data. After reviewing, patient partners were asked their opinions on whether the themes made sense in the lens of their experience.

*Objectivity*

The study's methods and procedures have been described in explicit detail in the effort to remain transparent and objective. Rigorous description has been provided with regards to data collection and analysis. To enhance credibility and integrity, we were careful to look for data that did not seem to fit emerging categories and themes.

*Content Analysis*

Data collection and analysis normally occur simultaneously throughout qualitative research. In order to ensure codes and categories continue to fit the data, critical appraisal of data was on-going throughout the project. Interpretation and reporting material can be vulnerable to bias; thus, it is important to be fully transparent in the process of content analysis and to provide readers with generous amounts of data from which codes and themes were generated.

## 3.5 Descriptive Profile of Interview Participants

The following table includes the demographic information for the 15 women interviewed as part of the qualitative section of the project. Relevant clinical information has also been included.

Table 1: Descriptive Profile of Interview Participants

| **Characteristic** | **n** |
|---|---|
| **Age** | |
| Under 40 | 8 |
| Over 40 | 7 |
| **Residence** | |
| Rural | 5 |
| Urban | 10 |
| **BRCA 1 vs. BRCA 2** | |
| BRCA1 | 10 |
| BRCA2 | 5 |
| **Risk Reducing Salpingo-Oophorectomy** | |
| Yes | 5 |
| No | 10 |
| **Risk Reducing Mastectomy** | |
| Yes | 1 |
| No | 14 |
| **Compliance Level** | |
| Low | 1 |
| Medium | 5 |
| High | 9 |
| **Breast Cancer** | |
| Yes | 4 |
| No | 11 |
| **Ovarian Cancer** | |
| Yes | 1 |
| **No** | 14 |

## Section II: Descriptive Survey

### 3.6 Survey Design

The descriptive survey was designed by the study team to capture BRCA mutation carriers' opinions and perceived self-knowledge about inherited risk management and care. It was informed by the literature on BRCA carriers, but also by clinical experience of the team and lived experience of patient partners. To supplement qualitative data, the survey (Appendix F) collected quantitative data pertaining to patient's perceived adherence to screening and prevention guidelines, as well as their satisfaction with health services. The survey was comprised of 39

items, all with a Likert response scale of strongly agree to strongly disagree. A Likert scale was chosen as it allows a comparison of mean responses, instead of a simple yes or no response, providing more variability in the responses and greater insight into respondents' experiences. The survey was approved by the Health Research Ethics Authority (HREA 14.054).

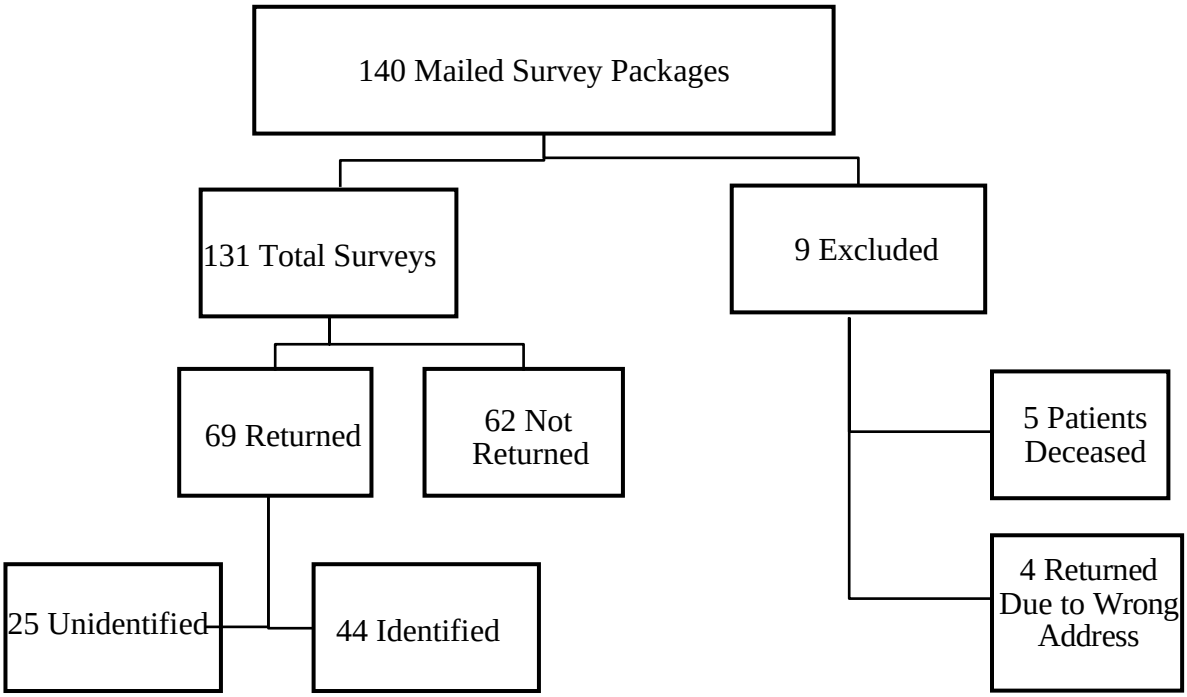
Items measured patients' understanding of BRCA mutations, cancer risks, and their perception of access to care and availability of medical advice. Additionally, the survey investigated BRCA mutation carriers' interest in an inherited cancer registry and their research priority areas. Patient partners were provided the survey and given ample time to review and suggest any edits or additional questions the research team had not considered. Partners agreed the survey was comprehensive and understandable and did not suggest additional items.

### 3.7 Survey Procedure

All known BRCA mutation carriers in the province were eligible to receive the postal survey. Records from the PMGP at the Eastern Health Authority St. John's, NL were queried by a research nurse to obtain a complete dataset of all patients with *BRCA1* and *BRCA2* pathogenic variants province wide. All patients who had received a BRCA mutation carrier status, reported through the program clinically (since 2006), and through research (1994-2006), were identified by clinicians on the study team. Records from the Inherited Cancer Prevention Clinic run by gynecology oncology at the Craig L Dobbin Genetics Research Centre, Memorial University were also reviewed, including for individuals who had obtained results through private or out-of-province testing. Inclusion criteria were limited to females over 18 years of age residing in NL.

The surveys were mailed to all identified, eligible female BRCA mutation carriers during the Fall of 2018. A total of 140 survey booklets were mailed. Follow up phone calls were completed by the research nurse in the inherited cancer clinic to ensure participants had received their survey, to answer any questions they had, and to follow-up on survey recipients who had not returned the survey. Figure 1 displays the flow chart of survey administration.

Figure 1: Survey Mail-Out Flow Chart




Unfortunately, an administrative error at the time of survey mail out meant that not all survey respondents could be linked with their clinical and demographic data (n=25). As a result, inferential statistics are limited to those respondents who could be properly identified and linked to their corresponding clinical data (n= 44). However, the population of BRCA mutation carriers in the province have never been involved in research exploring the experience of risk management and perceptions of barriers to care. Given the importance of this study for management of BRCA mutation carriers and cancer mortality reduction, the results still have

descriptive value and we report descriptive data from all respondents. The response rate for the survey was 52.7% (69/131).

## 3.8 Survey Data Analysis

Survey data was analyzed using SPSS Software 25.0. Descriptive statistics were calculated for demographic factors, cancer family history, cancer knowledge, and perceived cancer risk. Descriptive statistics were reported for all survey items. Independent t-tests were used to assess differences between respondents and non-respondents on continuous variables, while chi squared tests and Kruskal Wallis tests were used to assess differences on ordinal and nominal variables.

## 3.9 Descriptive Profile of Survey Participants

The survey measured only three self-reported demographic and clinical items: education, household income, and preventative ovarian surgery. Available information can be found in the following table. The descriptive profile of responders and non-responders has been assessed and is included in the results section.

| **Table 2: Self-Reported Survey Demographics (n=69)** | **Frequency (N)** | **Percentage (%)** |
|---|---|---|
| Highest Level of Education Completed | | |
| Less than High School | 9 | 13.0 |
| High School Graduate (Includes Equivalency) | 9 | 13.0 |
| Completed Post-Secondary Training | 28 | 40.6 |
| Completed University Degree | 9 | 13.0 |
| Masters or Professional Degree | 10 | 14.5 |
| Household Income | | |
| Low Income | 11 | 15.9 |
| Middle Income | 44 | 63.8 |
| High Income | 7 | 10.1 |
| Completed BRCA-Related Ovarian Surgery | | |
| Strongly Agree | 42 | 60.9 |
| Agree | 4 | 5.8 |
| Disagree | 2 | 2.9 |
| Strongly Disagree | 4 | 5.8 |
| Not Applicable | 15 | 21.7 |

# Chapter 4.0 Results

The purpose of this study was to explore the experiences and perceptions of female BRCA mutation carriers in the province of NL. The chapter is divided into two sections. The first section presents data from the qualitative interviews that were conducted with 15 women between February 2018 and February 2019. Participants were asked to share their personal and family history with BRCA and BRCA-related cancers, to discuss their genetic counselling and healthcare experiences, and to share any barriers they faced when trying to avail of recommended screening and prevention services. Patient partners were asked to review the themes following analysis. They agreed that themes and participant quotes were an accurate reflection of life with BRCA; no revisions were made following their review. The second section presents the descriptive results from a postal survey of BRCA carriers throughout the province. The descriptive survey measured self-reported adherence to screening and prevention services, perceived understanding and knowledge of BRCA and appropriate risk management behaviors, and carriers' opinions about the usefulness of an inherited cancer registry.

## Section I: Qualitative Interviews

Key themes that arose during data analysis included: family and personal history of cancer, genetic testing decision making, risk management decision making, quality of life, inherited cancer registries, and living with a BRCA mutation. Family and personal history of cancer reflects the impact of one's family history with cancer, whether strong or limited, or a personal diagnosis of cancer and how these experiences shape an individual's opinion on BRCA mutations and ultimately lead to discovering personal risk of harbouring a BRCA mutation. Genetic testing decision making is centered on drivers and deterrents of genetic testing, while also revealing

patients' feelings surrounding their own test results, but also concerns for untested family members. Risk management decision making reveals the factors that propel individuals to act on risk management recommendations, as well as factors that result in risk management avoidance.

This section also describes patient-identified barriers to screening and prevention guidelines, patients' experience within the healthcare system, and satisfaction with their risk management decisions. In the next section, patients discuss their opinions on an inherited cancer registry for the province and identify their key research priority areas. Finally, patients describe their quality of life post-BRCA diagnosis and discuss their feelings surrounding life with a BRCA mutation, providing an insightful look at how individuals adapt to adversity and come to terms with a health diagnosis.

Note that all patient names have been replaced with an interview number in the data that follows.

## 4.1 Family and Personal History of Cancer

Two key themes arose when exploring individuals' experience with cancer and how they discovered their personal risk of carrying a BRCA mutation: personal history with cancer and family history with cancer. Participants discussed how high incidence of cancer in their family led to a sense of knowing 'something' was present, how they grew up around individuals with BRCA mutations and cancer diagnosis, or how a limited family history of cancer led to their BRCA mutation carrier status coming as a shock. Participants also discussed their own cancer diagnosis, if applicable, and how that was related to them undergoing BRCA mutation testing. Participants also recalled how a cancer diagnosis in close female figures shaped their relationship with BRCA risk management. Three common subthemes developed: a strong family history leads to a sense

that ‘something’ is going on, a personal diagnosis aids with the identification of the BRCA mutation, and a diagnosis in a first-degree relative heightens BRCA mutation awareness.

### 4.1.1 Family History of Cancer

Many participants spoke about the prevalence of cancer in their family. It is common for BRCA mutation carrier families to have pedigrees with significant family history of cancer. Several of the patients shared similar stories. Patient 1 recalled:

> “My very first knowledge of it was my father’s sisters. He had four sisters die from cancer, over a period of time… My sister died when she was only 38 and within the two-year period there were four cousins in their 30’s that had died with cancer. I think three of them were ovarian and one with breast.” – Patient 1

Patient 4 also spoke about the numerous cancers within the females in her family:

> “My grandmother and my mother have both passed away with ovarian cancer. And my two aunts, my mom’s sisters, both passed away with breast cancer.” – Patient 4

Commonly, patients spoke about knowing ‘something’ was going on in their family. Patient 13 stated:

> “My aunt … had ovarian cancer and in questioning her, there was too many in the family that had it, too many cancers that didn’t add up that it was just a random thing”
>
> – Patient 13

It is also possible for patients to recall a low to moderate family history but discover a BRCA mutation later in their family pedigree. Unlike the previous patients who had cancer present throughout many generations, for some, cancer showed up further down their family line. Patient 5 explained:

> "She [mother] was diagnosed about, I'm going to say fourteen years ago with breast cancer. At that point, she really was the only person in her family who had ever had any type of cancer. It didn't really send off any red flags … her sister was a little older when she was diagnosed. And, again, just the second person in the family, too. Then we were kind of thinking, okay, something may be going on here. It never really went anywhere. Then a few years ago, my older sister had been diagnosed at 36. That's when we were like, yeah there's something going on here, for sure." – Patient 5

As this patient notes, when cancer is not prevalent in one's immediate family history, no 'red flags' are present to alert patients to the possibility of their own risk. For others, however, growing up with cancer in their immediate family raises personal cancer awareness at a very young age:

> "My mother, when I was really young, she had breast cancer. I didn't even know what cancer was then, I thought she had the flu or something in the hospital. I was about eight or nine; she had one of her breasts removed then. The second time I was a teen I guess, early teens and that's when she had the second breast removed … I started looking at cancer and cancer research at a very young age … My mom had it again then and I guess I was in my early 20's when she died. Then about seven years ago my oldest sister had breast cancer and it metastasized to the brain. She died within two years."

– Patient 2

### 4.1.2 Personal cancer diagnosis

For patients with a limited family history of cancer, it is possible their BRCA mutation diagnosis came as a result of a particular cancer diagnosis in either themselves, or a close family member. Five participants in this study had a previous cancer diagnosis, several of which discovered they were at risk for harbouring a BRCA mutation due to their cancer pathology. For example, patient 9 described, "I was 34 when I was diagnosed … with triple negative breast cancer." Patient 15 recalled how her ovarian cancer diagnosis came as a shock, "to be honest, when I was diagnosed with [ovarian] cancer, I was surprised because there's not really many of members of my family who have cancer."

For another patient, there was no family history of cancer to give an early indication of cancer risk. It is possible to see high incidence of cancer show up in younger generations, even when older generations had none. Patient 11 was the proband in her family, and explained her family's history of cancer:

> "I was the first one in my family to develop it when I was 35. I ended up with it again before I turned 38. Then a sister who is a year older than I am, she ended up getting it. I think she was 39 … then it was the two oldest sisters, they each ended up with it … Two of them ended up dying from cancer." – Patient 11

### 4.1.3 Diagnosis in a close female figure

Individuals may have also learned of their BRCA mutation risk because they grew up with family members who were confirmed carriers. These members were identified due to high family cancer

prevalence, but the individual's lived experience with cancer included prophylactic BRCA risk management treatment of relatives. When asked about her family history with cancer, patient 10 stated, "my mother went on to have the prophylactic surgery, she had the double mastectomy and the salpingo-oophorectomy."

Patient 6 knew since she was in high school that her family had an inherited increased risk of cancer and had watched her mother and aunt undergo preventative surgeries, "neither of them had cancer at any point but they both had prophylactic [surgeries] and they're both still living." These individuals knew from a young age that they were at risk and decided on their terms when they were ready to receive genetic counselling and testing. The next section discusses individuals' experience with genetic testing and decision making.

## 4.2 Genetic Testing and Decision Making

When attempting to illustrate a comprehensive picture of individuals' experience with BRCA mutations, patients recalled how they came to discover they were at risk through either personal or family history of cancer. Narratives then turned to describing their thinking regarding whether to receive testing for a BRCA mutation. Individuals discussed deterrents that prevented them from seeking testing, and eventually, the drivers that propelled them to receive genetic counselling and testing. Patients discussed their feelings surrounding their genetic testing result, which ranged from assuming they had a BRCA mutation before testing, to complete shock upon hearing test results. Patients also discussed their genetic counselling and testing experience. These descriptions gave valuable insight into how patients could be supported better through this

process. Additionally, patients discussed feelings and frustrations around untested family members.

### 4.2.1 Drivers for genetic testing

Analysis revealed many factors that encouraged people towards genetic testing. For some individuals, genetic testing came following a cancer diagnosis, leaving little contemplation about whether to be tested or not. For example, Patient 7 said, "I was tested after I had my first cancer; I discovered I had cancer in 2005. I knew at Christmas something was going on … first week of January testing confirmed."

Patient 15 shared a similar experience. She recalled, "the way I ended up knowing I had cancer, they wanted to see if I carried the gene. So, of course it was discussed, and I said yeah sure of course I'll go and get tested".

For others, a health scare prompted a visit to the genetics office. Patient 3 spoke about how she had delayed testing for years, but quickly reconsidered when she discovered a lump in her breast.

"I was around 29-30 and I found a lump and I was like, "oh my god, I'm not going to live forever". At the time mom suggested [genetic testing] again and at that point and I was like, "ok what is this?" – Patient 3

Several individuals discussed how their knowledge of risk management guidelines led them to pursue genetic testing. These individuals noted that their knowledge of guidelines was mostly based on age-related risk management recommendations. When asked what prompted her to seek

genetic testing after years of knowing she was at risk, Patient 3 simply stated, “the fact that my screening options without the testing were limited.”

Patient 10 described how these decisions are often multifaceted, including several factors such as knowledge of guidelines, family planning, and age:

> “I had two children and I thought it would be good to know because right now I am thirty-six, and I knew about the oophorectomy surgery they recommended to have it done by forty. I just thought it would be beneficial to know at this stage.”
>
> – Patient 10

A common reason for pursuing testing was one’s children. When asked what drove her to testing, Patient 9 said, “knowing at some point down the road my children will have to be tested. That was probably the biggest.” Patient 10 similarly shared, “After I had two kids, then I decided I would be tested.” Patient 2 discussed how deciding to get tested can take years, but ultimately, she wanted to know because of her daughter:

> “I didn’t get tested at first because I had to make sure I was in the right space. It took about two or three years and then I thought, sure I will get tested, because I have a daughter. She is twelve.” – Patient 2

Several patients discussed the impact their family and clinical support had on their decision making:

> “I had family who were knowledgeable, and my husband knew all about it and he kind of wanted me to get it done as well. I think for someone who has no knowledge or

experience on this or has a family who is very fearful and prone to stress over these type things, I think it would be a much harder to go forward with." – Patient 8

"[My sister] had breast cancer and it metastasized to the brain, she died within two years. Shortly after that I was tested." – Patient 2

"More so mom kind of pressing me. We share a family doctor and my family doctor is incredible, and really pushed [for testing]." – Patient 6

### 4.2.2 Deterrents for Genetic Testing

When discussing their genetic testing experience, individuals spoke about factors that delayed their testing. Often, these factors were similar to the drivers for genetic testing. For example, having children was often described as a reason to pursue testing, but for other individuals, they preferred to delay testing until childbearing was finished. Patient 10 discussed this:

"Really, I didn't want to get tested until I was finished having kids or have at least started that because I knew I wasn't going to go ahead with any surgery until that point … I knew it was one thing I would have to deal with, but at the time I didn't have a family yet, so there wasn't much that I could start to do." – Patient 10

Patient 4 also discussed waiting until she was finished having her children before she got tested:

"Have your children and once you're ready [get tested], because if it's a positive, it affects your life. I know everybody is not the same but … it will affect your life. So, if you're not

> ready … to have surgery or do anything about it, or you don't have your children or your family, I would wait until then." – Patient 4

For other individuals, their genetic testing was dependent on their engagement with their cancer risk during that time in their life. For several individuals, their personal health risk was outside their zone of relevance during the time due to other factors in their lives. Zone of relevance refers to situations or conditions in an individual's life under which risk is not prominent (79). Patient 5 spoke about how she came to find out her husband had cancer while planning for her genetic testing:

> "[Genetic testing] had been the plan, and then shortly after my husband was diagnosed with cancer, so that just put everything on hold. Everything kind of shifted to him, and just getting him through treatment … He did treatment right up until September and just before he was getting ready to go for the first steps for stem cell we sat down, and he said "we've put this off for long enough, you really do have to look into this testing."
>
> – Patient 5

Patient 8 discussed her delay for genetic testing because her mother was battling cancer during the time.

> "I was more concerned about what was going on with mom at the time. I guess I slowly learned more about it as mom was learning about it because I used to go to appointments with her a lot of times too. It was never a huge concern for me." – Patient 8

For others, it was a slow shift over time to genetic testing. Some individuals need time to process the reality of possibly finding out they had a BRCA mutation. Patient 14 described this process:

> "I didn't get tested right away, I waited for a few years. I wasn't quite ready to know that information. I knew what was going on and the chances and things like that, but it took me a while and now I said, you know it's probably best to know and to try to do whatever I could in a preventative way. … I guess mentally you just had to be in a place or okay to get tested and knowing that you're okay whatever the result was going to be."
>
> – Patient 14

### 4.2.3 Feelings Surrounding Genetic Test Results

Data analysis revealed three main sub-themes about how individuals' felt about their genetic testing results. Some individuals assumed they were a carrier before hearing their results, and therefore the genetic testing results felt more like a formality than hearing difficult news. For others, discovering their carrier status came as a complete shock and accepting their genetic testing results was a challenge. Additionally, a number of individuals described hearing their testing results as "a relief", providing them with a sense of being followed and monitored. These patients came to appreciate their mutation carrier status as a way to take charge of their own health.

*Some individuals assumed they had a BRCA mutation*

Individuals who assumed they had a BRCA mutation prior to genetic testing spoke about receiving their test results without much disbelief. When asked about how she felt regarding her genetic testing results, patient 8 described, "I expected it. If I went in and found out I didn't have

it, it would have been really awesome, I would have been happy. I had to be realistic." This was similar to patient 5, who recalled: "I wasn't overly upset because I was kind of prepared for, if that makes sense. It took so long to get to the point of actually being tested. I had lots of time to think about it."

Patient 7, who had already been diagnosed with cancer twice before her testing, stated,

> "I was called in by someone who had been working in genetics and just informed me that I did have the gene, which didn't surprise me of course, it wasn't a shocker … I had done a lot of reading on it and I kind-of went into it expecting more or less, mentally prepared to hear I had the gene. When she told me, I wasn't shocked at all." – Patient 7

Similarly, patient 10 echoed these feelings of 'assumed carrier status':

> "I wasn't too surprised because even other family members have it. So, I was kind of expecting it. I mean, yes it would be nice to not be carrying it but at the same time, I wasn't surprised … because it just seems like a pretty strong link in my family. Overall, it wasn't like I was overwhelmingly surprised by that." – Patient 10

*BRCA carrier status came as a shock*

For other individuals, hearing about their positive carrier status came as a shock. This disbelief was seen in individuals with and without a strong family history of BRCA-related cancer. For these individuals, accepting their genetic testing results was "overwhelming", as explained by patient 12. She noted:

> "Oh, I felt it was overwhelming … We went in and we sat down with the genetic counsellor and she told me I was BRCA [mutation] positive and I cried, and I don't remember exactly what she said to be honest with you because it was too much information coming at me … I just felt horrible and I remember it was something that was on my mind almost 24/7 right to the point that it was overwhelming." – Patient 12

Another patient spoke about feeling confident she would not receive a positive test result, and the emotional stress that came with hearing she was indeed a BRCA mutation carrier:

> "The 50-50 thing really had my hopes up I was like, "man this is great". And then when they called me with the positive results, I lost it. I didn't see it coming and I was so upset. I was devastated; it's funny, because I was so certain up to that point. I can't even explain." – Patient 3

Patient 11 discussed how difficult it was to find out her cancer had a genetic cause, thereby knowing it could have potentially been passed on to her child and grandchildren. She reflected on knowing her BRCA mutation carrier status with reluctance:

> "That [genetic testing results] was harder for me than finding out I had breast cancer because there was that possibility that I could pass that down through my son or my grandchildren. That part struck me hard … now I know that I wish I didn't know because then I wouldn't be so upset about it. I guess either way it's better that I do know because now if something goes wrong with them, we can have them tested for the gene. One minute I'm glad I had it and the next minute I'm sad I had it." – Patient 11

*Carrier status provides a sense of relief*

Several patients described the relief they felt after hearing their test results, as this gave them access to screening and prevention services, as well as a sense of being "in the system". To quote patient 8, "I'm just happy to know now that I have it and I'm very glad to be in the system being followed."

> "I feel like now that I'm in the system, it's a relief, and I know that I am going to get somewhere with this. Being proactive, being your own advocate is huge. Cause, otherwise, you get lost, and nobody's going to come looking for you." – Patient 5

Patient 2 described, "I was really thankful and appreciative that from that moment on I was treated as a cancer patient. I'm seen three or four times a year, I get things in the mail, it was great."

### 4.2.4 Feelings Surrounding Untested Family Members

The lived experience of inherited risk includes not just the individual's personal risk, but also that of relatives. Several participants discussed their feelings surrounding untested family members. This topic was not a question on the interview guide but came up organically as patients discussed their BRCA mutation experience. The following quotes are from patients who discussed the complex issues genetic testing can create within a family and on sheds light the tensions created in families as a result.

> "I find it mind boggling that [my cousin] is doing nothing. I just find that I wouldn't be able to sleep at night if I didn't get tested." – Patient 12

> "It actually affected family relationships because I'm very bitter against my aunts that wouldn't get tested for their daughters … you are going to end up with something that could be preventable, so it made a lot of hard feelings with family because brothers and sisters did not get tested … one cousin actually got sick and then you get one in the family saying, "well that's her own fault", and then you get someone else saying, "oh poor thing". It just affected family because people did not make educated decisions … that's the problem and then people are blaming." – Patient 13

> "I don't know why [my son] refuses to get tested. I don't know if he is afraid that it would show up that he has it too or whatnot." – Patient 11

Patient 3 said it simply when she stated, "I really wish my brother would get tested."

## 4.3 Risk Management Behaviours

A key goal of this study was to explore individuals' risk management behaviours. This included adherence to breast MRI and mammogram guidelines, and engagement with prophylactic mastectomy and salpingo-oophorectomy. However, it is important to note that interviews included women at a variety of ages and family histories, and therefore, with a variety of risk-reducing recommendations. As well, several women interviewed had a previous cancer diagnosis, and had undergone surgeries which were not prophylactic in nature. It is important to recognize

that risk management behaviours and recommendations can be slightly different for patients; the goal of this analysis was to identify what drives and deters women from engaging with the recommendations they were given.

In this section, patient-identified motivators for risk management behaviours, including age of affected family members, impact of clinical and personal supports, cancer worry, and family planning are presented. Next, barriers to engaging in the recommended risk reducing strategies are discussed. These include concerns about surgical side effects, lack of support system, family planning, and logistical challenges to utilizing screening services.

### 4.3.1 Drivers and Supports for Risk-Management Behaviours

Several patients discussed how previously affected family members impacted their engagement with risk management services. For some, the death of a close loved one resulted in an aggressive risk management style. This is revealed in a quote from patient 3:

> "The lack of testing for ovarian cancer, I was not ok with it. I mean my aunt was in her early 30's and I was like, "Why won't anyone take these? I don't want them, I don't need them, they don't work, take them." – Patient 3

When asked about her preventative oophorectomy, patient 13 simply stated, "My decision was based on my aunt who died with ovarian cancer."

Patient 11 felt similarly after caring for her sister who lost her battle with ovarian cancer.

> "Three years ago, my sister died of ovarian cancer. After she died, she was the one I was closest to, it's kind of scared me more after she died knowing that there is a possibility that I could go the same way. This is why I wanted to get it done as fast as possible."
>
> – Patient 11

When asked about what lead her to pursuing a RRSO, patient 4 discussed the loss of her mother at a young age and the impact that had on her decision making.

> "[My physician] told me that I do have time but it's completely up to me as to what I wanted to do … she knew that I was really scared and worried, and, I guess because I've been through this before with my mom, she referred me to a doctor out this way … maybe it's because I've been through it with my mom … or just in my mind, knowing that I have two kids and knowing that if I did develop ovarian cancer it would be too late before they found it and I wouldn't be able to be here with them. My mom passed away when I was nineteen and I don't want that for my kids." – Patient 4

Risk reducing surgeries, which involve the complete removal of the ovaries and/or fallopian tubes, impact a woman's ability to bear children. Due to this, some patients delayed ovarian cancer surgical prevention until childbearing was complete.

> "I just knew that now I'm definitely not having any more children, and putting that into perspective, and I am getting closer to the age of forty, I thought this was probably a good time to do it … it definitely wasn't the easiest but I felt it was easier now at this point in my life than deciding that if I was younger, or getting to this point if I wanted to still have children it would be harder." – Patient 10

> "Having children at home, wanting the future best for them, I just thought it was a no brainer. I didn't have any kind of hesitation and there was no part of me that was like, "I don't want to know". It was, "I want to know so I can get this done." … I have 3 children. I certainly don't need the parts." – Patient 9

Similarly, participants also discussed feeling drawn to surgical prevention because of their children and grandchildren, and their willingness to do whatever necessary to ensure they would be around to watch them grow up.

> "That's why I decided to get my surgery done, earlier than it comes to waiting time because, I know they say between 35 and 40, but I was just too worried with two small kids. It's scary." – Patient 4

> "Yeah, I don't want to, but I have to. My sole responsibility is for my daughter. Her dad died years ago. There's nobody else." – Patient 2

> "I have two grandchildren growing up and I want to see them grow up." – Patient 11

Individuals spoke about their high levels of cancer worry and how they could not cope with living with such a significant risk of cancer, which led them to prophylactic surgery. Patient 5 discussed her fear of cancer, "I'm waiting to find it. I'm waiting to find that lump. I'm waiting to be the next person. I don't want to wait anymore."

Patient 4 echoed the impact of living with high cancer worry and how this plays a direct role in decisions regarding prophylactic risk reduction.

> "If that came back positive, I knew I was eventually going to have it done … But once I found out that I did have it, I got [RRSO] done a lot sooner than I expected because it affected me more than I thought it would." – Patient 4

Participants recognized there are currently no effective screening options for ovarian cancer. Patient 10 discussed the peace of mind she found from RRSO:

> "Just feeling at this point it will also [bring] a peace of mind because really there is no screening, so I didn't want to put it off any longer." – Patient 10

Patient 12 discussed her hysterectomy in the following quote with a similar decision-making style:

> "With the hysterectomy, it was almost like there was no choice, like we need to do this because there was no screening for it – there is nothing." – Patient 12

For several participants, their personal diagnosis of cancer impacted their risk management decisions. The following is what one woman had to say about the impact her BRCA mutation had on her surgical decision making:

> "I had no decision to make, when you have cancer, that decision is made for you. When I had my mastectomies, I didn't have to have the right one off. [However], that decision was made as far as I'm concerned because I have the BRCA gene. When I met with [the

surgeon] with the results of my biopsy he said, "I would recommend you have the right breast off too" and I said, "don't worry about it", I had no problem with that. I was only too glad to get rid of that, rather than end up in surgery on another breast. I was sort of regretting at that point that I hadn't gone on and had the [preventative] surgery before. It wouldn't have been as invasive" – Patient 7

Several women also discussed having 'people who get it' with regards to making decisions about risk management options. For some individuals, support groups offered encouragement and information when debating risk management options and often provided insight from people who could understand what they were going through.

"One of the support groups I'm on now is international, it's not just Canadian ... I am a member of [Young Adult Cancer Canada], and other support groups as well. Just having that side of it of people who get it versus your family who doesn't." – Patient 9

Other patients discussed how they were able to cope with making hard decisions regarding surgical prevention because of their family support. Patient 6 said, "if they can do it, I can do it. You know?"

Patient 10 discussed the emotional support her family offered each other when trying to make risk management decisions:

"… my family as a whole … It has brought us together to kind of deal with it or to cope with it. Talking about it helps. If one person has gone through the surgery, we can go to them and having a closer relationship with them, as opposed to someone maybe on a

website who has gone through the surgeries. So, it has brought us together in that way … I think it would be quite different [without family] because I wouldn't be able to just talk to somebody about what they are going through. Talking to somebody about their experiences with surgery … even if we don't have the answers, just being able to talk to somebody you trust and who can be there for you." – Patient 10

For others, their personality style has been the driver for their adherence to screening and prevention recommendations:

"I'm very, I don't know what to call it, very decisive about things … I don't understand anyone having something and leaving it and leaving it and leaving it until it turns into something. Deal with it now. Deal with stuff … I don't like to spend my life worrying. I'm not a worrier but I was worrying about this all the time and that was part of the decision." – Patient 13

"I think always having been kind of a problem solver I would have found a way to make it work this way. I think if I had gone back to work not having the surgery, knowing it's going to be a long time, I would have been constantly thinking, 'is it growing, is it there now, do I have it?' … It would be a huge source of anxiety." – Patient 9

"[my family] are amazed with the fact that all that I have been through, I've never, in terms of being diagnosed with cancer and my surgeries, … it was never despair. It really wasn't, and it was never shocking, even the first time I was diagnosed with cancer. A lot of people go through this shock and I guess with my family history, it was like, 'oh, well

it's finally happened'. It was like, 'ok I'm going to have the surgery and I'll do what I have to do' and hopefully everything is going to turn out. That's the way it has always been." – Patient 7

### 4.3.2 Deterrents and Barriers Towards Risk-Management

For individuals who have been less adherent to guidelines, they discussed what prevented them from following recommendations. A variety of reasons emerged as to why participants delayed surgical prevention or had limited adherence to screening guidelines. Hesitation regarding surgery and fear of side effects were two of the major deterrents identified in the data. For other participants, not having completed childbearing, lack of a strong support system, or perception of low cancer risk deterred them from proper risk management behaviors.

Some participants were simply hesitant to undergo surgery:

"I don't know why I haven't done it ... because I look at, you know I've had friends who have had their breasts removed, some have gone through it and it's been fine and had reconstruction, and some has been a nightmare. So, I guess I keep putting it off."

– Patient 12

"I had a partial hysterectomy … It took me a year to decide, but after I decided to have the complete [hysterectomy] … after being cut as many times as I've been cut, it's like 'again?' Just the whole idea of being cut. If I hear the word cut now, I just want to throw up." – Patient 1

> "Once you do get your gene test done, if you are positive, do your screenings. Do everything you possibly can. Once you're ready to get your surgery then go ahead, but don't do your surgery until you are mentally ready." – Patient 4

Recommended preventative surgeries can have side effects including surgically induced menopause after RRSO, and recovery time for both RRSO and mastectomy. Several participants who were nervous of these side effects delayed surgical decision making:

> "I had a partial oophorectomy because I wasn't ready to go into menopause … [the] emotional, sexual, weight gain, there is all sorts of stuff … I'm not looking forward to the emotional rollercoaster. The other stuff I can handle. I'm just trying to figure out what I can do to offset the mental instability and fatigue" – Patient 1

*Low Cancer Worry*

For some individuals, their low perception of cancer risk or limited cancer worry caused risk management options to slip their mind. For example, when asked about how often she gets her mammograms, patient 3 said, "trying annually, I seem to kind of miss the annual date."

Patient 7 discussed this in more detail when she spoke about the challenges of scheduling her breast MRI appointments. It is important to note that breast MRI for screening must be done at a specific time of the menstrual cycle. Women are required to call and schedule an appointment on the first day of their menstrual cycle; these appointments cannot be scheduled in advance.

> "I've been getting testing done, but I'm not the best at following up on those things or noticing if I am gone past. That's my concern, I don't think about it a lot. Every now and

again it will pop into my head, 'My god, when's the last time I had a test? I haven't heard anything from anyone in a while.' I've had a letter to get a breast MRI done now for a few months. When my period times I keep forgetting to call until I'm 4 days in."

– Patient 7

*Childbearing*

For some participants, planning for a RRSO was put on hold until after they completed childbearing. The following quotes illustrate the perspectives several participants had regarding waiting for until they finished having their children to avail of surgical ovarian cancer prevention.

"I'm 33 now and we're still trying to decide about children. That kind of plays a part in it to. My idea has always been if we have kids in a couple years then, probably by the time I am 40-42, I would probably have a hysterectomy or oophorectomy, and breast probably."

– Patient 7

"I'd say, right now the biggest effect that it has had on my life, is not the worrying about the cancer. It's like, God, now I have to think about having kids." – Patient 6

*Zone of Relevance*

As with pursing genetic testing, risk reducing surgeries can be affected by other relevant life events and situations. When risk management is not in the forefront, it can get put on the back burner. As described by patient 12, "life takes over". Several other women discussed how they have not adhered as closely to risk management suggestions as they could have and have equated this to a busy life:

> "My brother had an appointment the same day as I did and, once again, I laid it aside with intentions of getting it done. I was supposed to have a mammogram done and when my mammogram date came due, I was going in to get stiches out, so they recommended I wait, and I just haven't bothered since. My brother got sick and once again it slipped."
>
> – Patient 1

> "Sometimes I really want to but … life takes over because you get busy and, at the time, the kids were younger. Now they're older, and I'm thinking like it's a year downtime … So, I'm always like one minute I'm saying yeah, I'm going to do it, and then next minute it's like no, and then life happens." – Patient 12

When discussing surgery, patient 2 described:

> "At the time, there were also relationship issues. I was dealing with a lot of other stress at the time as well, so I didn't want it compounded on top of that. Even now I'm starting a business so it's not great timing, but I don't really have a choice now." – Patient 3

*Social Perceptions*

Another factor participants mentioned regarding risk management was the impact people in their lives who did not understand what they were going through had on their decision making:

> "How many times do you hear, 'Well you didn't have cancer, so you didn't have to deal with the same issues. We had cancer so we're different, we're more important' … that type of thing. I had a really hard time deciding to have my ovaries … I actually had my best friend say to me, "oh my god, I'd never have that surgery done, that's what makes

you a woman" … that's what you had to deal with, that type of thing. I don't discuss anything with anyone." – Patient 13

"I think a lot of people live in this world where sickness is weakness and you are going to create something that does not exist. I can't tell you the amount of people that said to me, "well, you don't have cancer" … I think that people are just hesitant and there is so much confusion around it that anyone who is thinking about it is like, 'well, people are going to think I'm faking something or I'm trying to get attention' … it really made me think about how many people in my life are thinking, 'why is she doing this?'" – Patient 3

"My mother, she was having those mammograms every six months … and then fretting herself because she was waiting for the call. So, she was like, 'screw it, I'm going to have the mastectomy'. And [my uncle] was like, 'no, I really don't think you should - there are so many risks, this is a big surgery', not knowing anything, really, but just was like 'why would you have this surgery when there's no need?' … he didn't know it was every six months to be waiting to hear if you have an aggressive cancer or what not. Not that she did not have support, but even that can, like [impact decisions]." – Patient 6

*Practical or Logistical Factors*

For some participants, logistical challenges prevented them from receiving access to screening and prevention services. For example, two of the 15 women interviewed had weight restrictions that prevented them from accessing the MRI machines. Patient 3 stated, "I am too heavy for the machines here."

> "Breast MRI, that didn't work for me and I couldn't get into the machine … you know they stress the important of having the MRI and I've been given the information that … it would be more benefit for me to have it, but I just can't do it. It's unfortunate that, like I said, the machines can't accommodate anybody outside the average person. It's unfortunate." – Patient 14

Other logistical challenges participants faced included employment and financial barriers, as well as scheduling difficulties. The following data reveal what participants said about these issues:

> "I think people's financial state is very relevant to being able to partake in a lot of this because if they can't take a week or two off work, they can't get the surgery. I would think that is one of the things that is much overlooked. No matter how much people might want to, you can't … So, what do you do? Take care of your health or lose your livelihood? There's not really a choice for some people." – Patient 2

> "If it was an [employment insurance] situation for me right now, my husband lost his job a year and a half ago because he injured himself and that's just it, it wouldn't be a choice anymore. It [RRSO] wouldn't be happening." – Patient 3

Patient 9 discussed how she had to undergo RRSO at a time that was not ideal for her, but she had to schedule it around the time she could get off work:

> "Because I had the two surgeries, chemo, and radiation, I am in the negative with my sick time. I'm still trying to build my way back out of that. It would take years to build up

enough sick time to be able to go off on leave to have the surgery done. Being off on maternity leave, I know it's not ideal, but this would be the best case for me, so [the doctor] agreed." – Patient 9

Individuals discussed the challenges of booking an MRI and how these challenges prevented them from receiving testing within the recommended timeframe:

"I did have difficulty. It took me three months to get the MRI just because where they had to plan it around my cycle and stuff. So that was tricky." – Patient 6

"I even had called, maybe it was a couple of times and they couldn't fit me in so it would be another month, and maybe I would forget the next month. That part I found really challenging because it wasn't like, "oh we can fit you in." Even when I did have it, it was very close to the cut off for getting it done" – Patient 10

### 4.3.3 Healthcare Experience

Patients spoke about their experience navigating the healthcare system with regard to access to timely services, perceived physician BRCA mutation knowledge, and satisfaction with availability of screening and prevention services.

"The ovarian [surgery] was fine because I was dealing with [gynecological oncologist] all the time, so I knew that I could phone her and ask her anything to deal with because … she is a different doctor … I believe 100% that [gynecological oncologist] made the difference." – Patient 13

> "I've always felt that I could talk to [doctor] ... and they have been pretty forthright with information that they've had … I'm not one to stick my head in the sand, you know if there's something new, whether it be positive or negative, I'd like to know … I want to know. The more information I have, the better I am able to fight and cope."
>
> – Patient 15

*Access issues*

When asked if there was anything with regard to her BRCA mutation that she felt she needed but had difficulty accessing, patient 13 discussed how there are limited mental health supports and felt her doctor, "doesn't understand the mental aspects of it all – he is just dealing with as long as the incision looks good and whatever."

> "I have a really good gynecologist who orders my appointments too … She knows all about BRCA as well, which is really helpful. I've spoken to her a couple of times and said, "I haven't got anything in the mail in a long time I don't know if I'm overdue, so she has ordered. She has ordered the last few MRIs for me, so I'm not on my own."
>
> – Patient 8

> "It felt like there was too many arms of this that weren't coming together. It felt like you either had to deal with a genetic doctor, or you had to deal with a breast doctor, or you had to deal with an ovarian … it felt like too many of those were off on a tangent, that they weren't together. There should be one spot that you can go to and someone is there for counselling saying, this is what's available, this is the percentages, this is the thing … it just seems like you got this deal with it."
>
> – Patient 13

> "Say I get an MRI. Ok I get it done, I don't know if someone received it or not. I don't know if someone notices that I haven't had a mammogram in 8 or 9 months. Should I call someone and ask them if they have track of that, you know? Is someone noticing that I don't get a mammogram when I need to get it, because I might not necessarily notice myself." – Patient 8

> "Like I said, I feel like all the doctors are off in different corridors. There is no central registry, that's what it feels like." – Patient 13

*Feeling informed*

When asked if she thought she had enough information to make informed decisions about how to manage her cancers and appropriate surgeries, patient 2 said:

> "I would say for me, no. I would say for me, that is because … I spent a lot of time doing my own personal research. That's based on my perspective of what I needed to know … as for informing me, often times people who are experts in their field, their knowledge is so far up there that they tend not to be able to really meet a person on their own level. I think there was an overview but nothing really in depth." – Patient 2

> "I thought [the doctor] provided the current evidence, enough up to date research to sort of provide the information and then also, from the first-hand experience of relatives and things who have gone through it. I thought I had enough to go by." – Patient 10

"I just walked out like, "oh my god". I felt like not only did [the doctor] gave us more information, but it was less clinical and more personal and that is so important. I feel I have resources now." – Patient 3

"Not really, no. I get different information … I don't know, like I think I did, but then a lot of it I researched myself online and then I had to stop because it just goes on and on." – Patient 12

"I got more information from the ladies that were in the [support] group than I got from any doctor." – Patient 13

## 4.4 Inherited Cancer Registry

When asked about their opinion on a province-wide inherited cancer registry, all participants expressed their willingness and support for the development. Patient 1 stated, "If this registry in any way, shape or form, however small or large it might be, we need to do it."

### 4.4.1 Advantages

Participants were asked if they could foresee any advantages to an inherited cancer registry. Participants noted a number of positive benefits including not feeling alone, providing a system

for reminding patients about upcoming screening and appointments, and a centralized healthcare service. The following are illustrative quotes:

> "I find that there's too many people think that they're alone. They think that it's only them, or it's only their family. If they understood that there was more in it, if there were more doctors that like, when they went with a cancer and realized that in the registry your family is in this, like have you been tested? … They don't, there's too many doctors [that] don't know it. So, I'm thinking it would be effective that way." – Patient 13

> "If there is anything, I think I wish that existed here is just simply that reminder phone call. I think anyone who is going to do the screening, is going to do the screening and anyone who is not, is not. At some point, it's up to the patient who ultimately has to do it. If there was just some annual reminder … there is something about it having that person call you once a year and say, 'Hey, it's that time'." – Patient 3

> "Well, I think even sometimes people just don't really, I guess, aren't proactive about it for themselves. So even if somebody was there to, I guess remind them or take the initiative to say you need to get your appointment, get your screening done."
>
> – Patient 4

> **"**They need to have someone that knows more about every aspect of it … like a central group that says, if you decide to have your breasts done, we're going to send you this way, but you could come back to us because we understand this is what is there … and [if] you want reconstruction, these are the steps that's going to be involved, because you don't always get that from the doctor that is just dealing with the breast, you don't get that part

of it. So, if you had this one person, because you're more comfortable talking to one than going in and talking to 10 different doctors and saying almost the same thing every single [time] … after a while people don't share information because you're burnt out with it. So, if you had one spot that you could sort of, it would be in your file … I think there should be something there." – Patient 13

#### 4.4.2 Disadvantages

There were only two concerns patients listed when asked about inherited cancer registry, the privacy of their personal information and who would have access to it, and the concern of insurance companies gaining access to their information. Patient 10 noted:

> "I guess sometimes it's the compiling all the information together, it would mostly be who is looking at it. I mean, I can see the benefits in it, but when you talk about personal information. If it is insurance companies or if they somehow got it, it's a lot of very personal information. I know it can be beneficial, but it could also somehow be misused and could be used in harmful ways." – Patient 10

Patient 3 echoed this. When asked if she had any concerns about a registry, she replied, "With the security stuff with the stuff being leaked out and whatever, I guess. Too many medical records now being [accessed]".

## 4.5 Research Priority Areas

Patents were asked about their key research priority areas following discussion about an inherited cancer registry. Many patients simply stated they would be interested in anything that has to do with BRCA-associated cancers and risk reduction, as voiced by patient 15, "my main concern right now, I think it would be anything to do with the BRCA gene." However, other participants were very specific in which areas were of priority to them. For example, several patients spoke about research in terms of outcomes:

> "Outcomes for sure. With these surgeries, when I found out having an oophorectomy helped reduce cancer in other areas, my mind was blown. I think that in the beginning stages when you are trying to make all these decisions, it's so hard and having data to back up, "ok people have made this decision" … there is no right or wrong."
>
> – Patient 3

> "Whether and how people are being screened, if changes are being made, if they are updated, [if] people are receiving the proper information that's being recommended. And I guess, the outcomes and how people have benefited from [care]." – Patient 10

> "Mostly on the percentage or the rate of breast cancer over 50 with a full hysterectomy with BRCA1. That would probably what I would be more interested in now, and then the second thing … would be … what other preventative things should I be doing or taking besides what I'm doing now." – Patient 12

Patient 6 was most interested in "research like this" referring to qualitative research. She continued to say that she liked "reading about experiences … It is nice to read about other people

… I have people in the family who have gone through it, but it is still nice to read someone who I'm not emotionally attached to talk about it."

Patient 10 viewed research regarding health care interactions and quality of care to be of vital importance to her:

> "… Health care professional interactions, because this involves, could be family physicians, geneticist, surgeons, and it can be emotional at times or sensitive. There could be research into … the emotional side as well. Some people are more sensitive to this topic and then other people might be different, depending on what kind of health care professional you are talking to … especially if it's prophylactic surgery, you don't have cancer yet so just sort of deciding to do it. It is significant because you feel like you are having surgery to prevent something, but you are also healthy. I don't know if that made sense. I guess just the interactions with the health care professionals around this topic."
>
> – Patient 10

## 4.6 Living with BRCA

It was important to the research team to have a section in the interview devoted to discussing how people are living and coping with their BRCA mutation. This section is meant to give insight into the impact BRCA mutations can have on individuals' perceived quality of life and their views on life post-BRCA genetic testing.

### 4.6.1 Quality of Life

Patients were asked to describe their perceived quality of life in relation to their health and wellbeing since the discovery of their BRCA mutation. The majority of patients described their quality of life as being good; however, several women still struggled many years after identification of mutation carrier status. The following quotes reveal how patients described their quality of life:

> "I'm determined and just refuse to give up. My quality of life is good."
>
> – Patient 1

> "I don't think it impacts my quality of life in any way. I feel that everyone has something, right? … When I think back to how scary it was when I first heard of it, compared to how comfortable I am now … It's empowering now that I have this information. Prior to that it was like "oh you're going to get cancer". I don't think it has a negative impact on my quality of life". – Patient 3

> "I mean, I have a good quality of life. I'm not really hindered in any way."
>
> – Patient 8

> "Generally, I would say my quality of life is fair, it's not like a daily basis, but there are moments where it impacts it significantly, where it could be more emotional. It's more sporadic, and it's unfortunate, but at the same time everyone has a certain genetic makeup and some people don't even know." – Patient 10

> "If anything, I probably have a better quality of life because of it, because I'm conscious of that as a risk factor. It forces me to try and live healthier, which doesn't always work …

I don't let myself think about it. Sometimes it does creep in, you know if you have a weird pain or your period is weirder than normal. Stuff like that, I think it's easier for your imagination to maybe run away a bit more … it probably has affected me a little bit, I can be a little bit more paranoid about what's happening with my body. I was kind of like that any way." – Patient 8

### 4.6.2 Perspective on Life After BRCA Testing

Individuals discussed their perspectives on life in the aftermath of BRCA genetic testing and risk management navigation. When asked about the impact of her carrier status, patient 6 described how it has not changed much in her life yet, as she is still young:

"It means conversations, with my partner. Besides that, it's not kind of ruling my life at this point." – Patient 6

Additional quotes from patients 4 and 7 discuss their perspective on how their lives have been impacted because of their BRCA mutation.

"Ah, well mentally, my mind is at ease, much more than before. It played on my mind every single day … I think the ovarian cancer scared me a lot more than the breast cancer knowing that with ovarian cancer, once you find it, it's too late which to me, it's just a death sentence. Whereas with breast cancer, at least you know you have a chance."

– Patient 4

"Like I never had cancer, really. I'm probably even looking after myself a bit better."

– Patient 7

### 4.6.3 Impact of Time on Feelings About Mutation

Patients discussed how their opinions and attitude towards their mutation shifted over time. This was not a question on the interview guide but came up naturally during several conversations. The following is what two participants said about how the passing of time impacted their feelings towards their BRCA mutation:

> "As the years go on, the stress gets less and less, for me anyway. I think as well, if there is anything going to happen, it would happen, I don't know how to explain it. To me, if I'm going to get cancer again, it's going to be now, not 10 years down the road or something like that. It seems like every year that I live without it, it lessens my worries or whatever … If I can get two years in with no cancer, then it's not coming back. That's what I feel. Well, it'd have to come back now, so it's not going to come back. I know that's not a way to feel because there are people here who went 38 years and then ended up with it again. It just seems like I worry less as the years go on." – Patient 11

> "The older you get, the [risk] goes down, especially with a full hysterectomy … I remember it was something that was on my mind almost 24/7, right to the point that it was overwhelming… I still think about it, but it's not like an everyday thing that I'm thinking about, but there for a while it was." – Patient 12

### 4.6.4 Views on Life with BRCA

Participants were asked to reflect on life with BRCA to close out the interview. This was an open-ended question without any prompts. Patients spoke about the impact of their BRCA mutation on

their life, on what they would have done differently, and on advice they would offer to somebody going through BRCA genetic testing or management.

*It's not a death sentence*

Participants spoke with great conviction about not viewing their genetic mutation as a death sentence. These individuals understood that with proper screening and prevention strategies, they could continue to live healthy lives:

> "I don't let it affect my day to day life because I think everybody is at risk for cancer. I think that, obviously, I'm just at a higher risk, but … I look at it as a good thing that I know because we can't be screened for everything, but by me knowing, I'm more in control than if I didn't know … I'm in better control to do something about it before I even get it … I don't look at it as a negative thing, I think it's a positive thing for me to know … the only advice I'd give, again it's not a death sentence, it's power to know and it's a good thing to know, it's a positive thing." – Patient 14

> "I think the biggest thing is that it's not a death sentence in any way. I definitely felt that way and you are ultimately in control; take the information and use it to your advantage. … You're in control and you can take charge and decide what's best for you and rely on the supports that are available. I think there are more [supports] now than ever before. It's easy to say that to someone, 'oh don't let it get you down, you'll be fine' but going back to that empowerment idea - take it and take control." – Patient 2

"For a while I was just stuck in cancer, and I think you need to start living and get on with it but be aware that it is there and that you need to either get screened or do whatever needs to be done." – Patient 12

*Knowledge is power*

Another common phrase the participants repeated was the notion of knowing they had a BRCA mutation gave them power in their healthcare.

"For me, not knowing was more of a burden than knowing, to be honest with you. So just that, knowing gives you a power to be proactive. That would be my big thing. It's something that nobody wants to hear they have, but if you do have it then you have choices available to you." – Patient 5

"You know, my biggest thing I could say to someone is, don't be scared because you have the gene … I always say knowledge is the best thing you could ever have. You know what? I think it scares people if you don't have the proper knowledge. If you're not well informed, how can you make an opinion on what you want to go ahead and do? … Try to find out what you can to help yourself and anybody else who is affected by the gene." – Patient 15

*A BRCA mutation does not define you*

For other individuals, it was important for them to acknowledge that their BRCA mutation was not a defining feature in themselves.

"When I think of myself, it's not something I would put on the poster of who I am. If I had cancer it would probably be different, and if I get cancer, it will probably be different. The

older I get the more I think about it because it's closer to the age of when my sister had it. The only thing my mind goes to usually is my daughter." – Patient 2

*Make your own decisions*

For patient 9, autonomy in decision making was something she valued when reflecting on life with a BRCA mutation:

"My advice would be if you have any inkling that there is a possibility that you have it I would get it done, because it's so much better to know than not know, because if you know at least then you can make an informed decision on that you want to do with it. Why leave it to chance? It's such a high chance if you do have it. If someone told me that for some reason maybe, I could have had it done at 25, I might not have had to go through everything what I went through. It might have been a very different path for me, but it would have been my decision. I think being able to make your own decisions is very important." – Patient 9

## Section II: Descriptive Survey

This section presents the results from the descriptive survey sent to known BRCA mutation carriers in NL. The postal survey included items about individuals' perceived adherence to screening and prevention services, their perceived understanding and knowledge of BRCA mutations and appropriate risk management behaviours, and their opinions about an inherited cancer registry. As mentioned previously, an administrative error outside the research team's control at the time of survey mailout meant not all respondents' survey data could subsequently

be linked with their corresponding patient data. As a result, some initial surveys were posted without being properly coded. Only 44 of the 69 returned surveys were able to be identified and linked to patients' clinical and demographic data. As described shortly, few differences in survey responses were observed between those who were identifiable and those who were not or non-respondent, and all surveys were retained for descriptive analysis. However, only information from identified respondents (n=44) was utilized in any inferential statistics. The NL BRCA population has not been questioned about their screening and prevention attitudes prior to the current study, as this is the first empirical research exploring risk management perception and behavior in this population. The study team saw great value in presenting the descriptive information collected, even with the administrative error.

Chi-squared test was used to compare identified responders and non-responders across a number of clinical and demographic variables. The non-respondent category technically includes some individuals who sent back surveys but could not be identified, and therefore their information remained included in the non-respondent group.

Identified responders (n=44) and non-responders (n=94, including the non-identified surveys) did not differ with regards to mutation type (*BRCA1* vs. *BRCA2*), location of residence (rural vs. urban), number of individuals who had first-degree relatives with cancer, personal cancer history, access to a family doctor, or distance from screening services. The only variable that was significantly different was having had a risk reducing salpingo oophorectomy. Those who had had a RRSO were more likely to return a survey than those who had not had a RRSO ($p = 0.002$). Chi- squared test results are captured in Table 3.

Table 3: Responders vs. Non-Responders

| Variable | Responders (n=44) | Non- Responders (n=94) | p-value | Chi-Squared Value (df=1) |
|---|---|---|---|---|
| **BRCA1 vs. BRCA 2** | | | | |
| BRCA1 | 20 | 31 | .157 | 2.002 |
| BRCA2 | 24 | 63 | | |
| **Urban vs. Rural** | | | | |
| Urban | 23 | 57 | .431 | .621 |
| Rural | 20 | 37 | | |
| **Risk Reducing Salpingo-Oophorectomy** | | | | |
| Yes | 31 | 40 | .002# | 9.341 |
| No | 13 | 54 | | |
| **Greater than 2hrs Distance for RRSO Services** | | | | |
| Yes | 5 | 11 | .888 | .020 |
| No | 36 | 73 | | |
| **Greater than 2hrs Distance for MRI Services** | | | | |
| Yes | 6 | 13 | .902 | .015 |
| No | 35 | 71 | | |
| **First-Degree Relative with Breast Cancer** | | | | |
| Yes | 21 | 41 | .838 | .042 |
| No | 17 | 36 | | |
| **First-Degree Relative with Ovarian Cancer** | | | | |
| Yes | 8 | 15 | .843 | .039 |
| No | 30 | 62 | | |
| **Personal Diagnosis of Breast Cancer** | | | | |
| Yes | 15 | 31 | .859 | .032 |
| No | 28 | 62 | | |
| **Personal Diagnosis of Ovarian Cancer** | | | | |
| Yes | 4 | 3 | .188 | 1.734 |
| No | 28 | 58 | | |
| **Mammogram in the Last 18 Months** | | | | |
| Yes | 17 | 28 | .374 | .790 |
| No | 24 | 56 | | |

# statistically significant at p = .005

Independent sample t-tests were used to assess if identified responders and non-responders differed by age or days since genetic testing. Neither was statistically significant. The average age of responders was 56.9 and 55.8 for non-responders (p=0.681). The average number of days since testing for responders was 2965.74 and 2994.21 for non-responders (p=0.919). Independent samples Kruskal-Wallis test was used to analyze if responders and non-responders differed on their level of compliance, which was not significantly different (p=0.967).

An individual's level of compliance is captured in the BRCA clinical database and was defined according to clinical guidelines and informed by clinical judgement of the physicians on the team and following prior work with the *BRCA1/2* mutation population in NL (manuscript in preparation). A non-adherent label was given to women 25 to 75 years of age with no breast screening or preventative surgery (RRM) and no RRSO (if eligible). Women were considered very adherent if they were aged 25 to 75 years and were both adherent to breast guidelines and had completed RRSO (if eligible). Individuals were considered moderately adherent when they had followed at least one guideline recommendation, but not all. For RRM, eligibility criteria were women 25 to 75 years of age with breast(s) at the time of genetic testing. For MRI and mammogram, eligibility was similar – women with breast(s) at time of data analysis and 25 to 75 years of age (MRI), and 30 to 75 years of age (mammogram). Women with ovaries at the time of genetic testing were considered eligible for RRSO if 35-75 years with *BRCA1* mutations and 40 to 75 years of age if *BRCA 2* mutation carriers.

Participants who completed the survey had a mean age of 56.9 $\pm$ 12.1 years old and it had been 8.12 $\pm$ 3.19 years since they underwent genetic testing. Nearly half carried *BRCA1* (n=20) and half carried *BRCA2* (n=24) mutations. With regard to location, 20 individuals reported they were

living in rural communities and 23 reported they lived in an urban centre. Five were considered not compliant, eight were somewhat compliant, and 28 were compliant. The following sections discuss survey responses in greater detail.

## 4.7 Self-Perceived BRCA Knowledge

Several survey items measured patients' self-perceived BRCA mutation knowledge and awareness of risk management recommendations. The majority of patients either agreed or strongly agreed with all the statements (Figure 2). Most patients perceived their understanding of ovarian and breast cancer risk and prevention to be quite high. Women listed 'I am too young' (8.8%), 'I want to have more children' (7.4%), and 'Afraid of menopause' (4.4%) as driving factors for having not received preventative ovarian surgery.

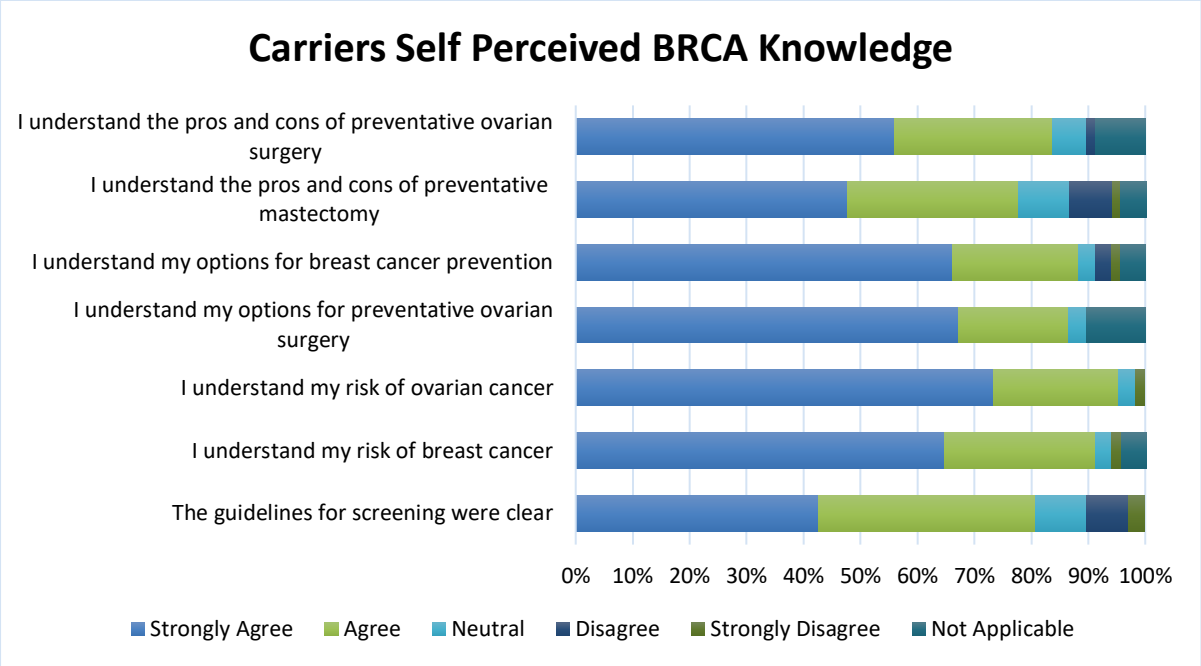



Figure 2: Carriers Self-Perceived BRCA Knowledge (n=69)

## 4.8 Satisfaction with Health System

Patients were asked questions that focused on healthcare access and risk management services. Their responses are recorded in Table 4. Almost two thirds (65%) of patients agreed or strongly agreed that they would like reminders about what screening and prevention they could be doing. Similarly, 65% of patients agreed or strongly agreed that they would like to combine doctor's appointments and tests. Of patients who were eligible for MRI, 45% felt they had trouble getting breast MRI, while 76% reported they were able to book breast MRI appointments. An encouraging 91% agreed or strongly agreed that they received clear information about the results of their genetic testing, and 60% felt their family doctor was knowledgeable about BRCA mutations.

Table 4: Health System Access Questionnaire Responses (n=69)

| | Mean | SD | Missing (%) | Responses (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree | Not Applicable |
| I had trouble getting breast MRI appointments | 4.36 | 1.654 | 12 | 8.2 | 13.1 | 3.3 | 16.4 | 27.9 | 31.1 |
| I was able to book MRI appointments | 2.89 | 2.057 | 8.7 | 41.3 | 17.5 | 3.2 | 9.5 | 6.3 | 22.2 |
| I would like reminders about what screening or prevention I could be doing | 2.52 | 1.858 | 4.3 | 45.5 | 19.7 | 9.1 | 3.0 | 9.1 | 13.6 |
| I would like to combine doctor's appointments and tests | 2.02 | 1.622 | 5.8 | 53.8 | 10.8 | 18.5 | 3.1 | 6.2 | 7.7 |
| I wait too long for tests or appointments because of wait lists | 3.55 | 1.640 | 5.8 | 16.9 | 10.8 | 16.9 | 24.6 | 16.9 | 13.8 |
| My family doctor was knowledgeable about BRCA mutations | 2.34 | 1.188 | 2.9 | 28.4 | 31.3 | 25.4 | 7.5 | 7.5 | 0 |
| I felt that I received clear information about the results of my genetic testing | 1.53 | .889 | 1.4 | 63.2 | 27.9 | 4.4 | 1.5 | 2.9 | 0 |
| I do not know where to get information or support about my personal cancer prevention | 4.15 | 1.439 | 5.8 | 7.7 | 9.2 | 4.6 | 33.8 | 27.7 | 16.9 |

## 4.9 Inherited Cancer Registry

Patients were also asked their opinion about an inherited cancer registry as a tool to help with the management of BRCA cancer risks. Items measured interest in being a part of a registry and its usefulness. An open-ended item allowed patients to add any additional thoughts regarding the possibility of registry development. Figure 3 displays patients' responses to questions addressing their willingness to become part of an inherited cancer registry, as well as whether they perceived any benefit from such a registry. Responses to the three questions were overwhelmingly positive (Figure 3).

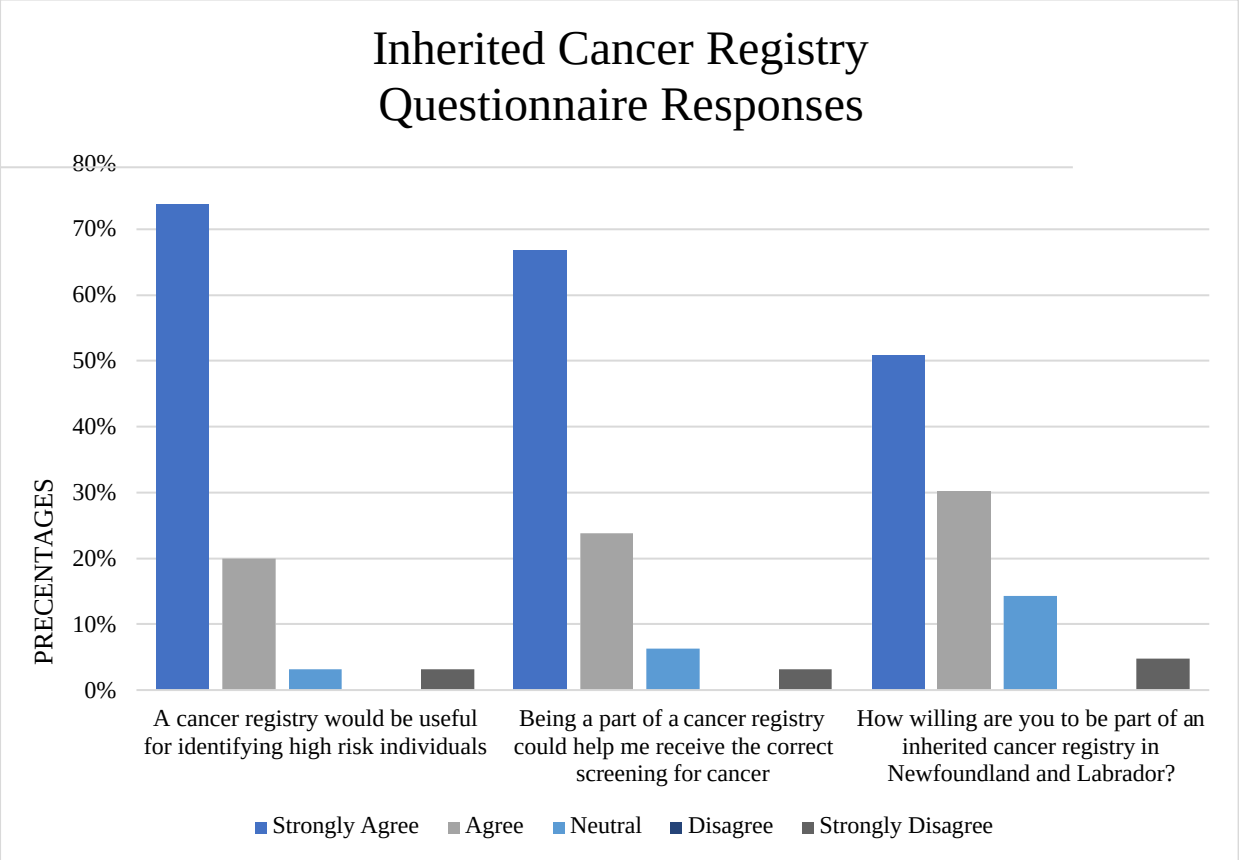



Figure 3: Inherited Cancer Registry (n=69)

The majority of patients either agreed or strongly agreed that there were benefits to a cancer registry. One patient noted it was, “extremely important to have a registry for others to be diagnosed/identified early to provide higher success rates in prevention and treatment.” The majority of respondents were willing to be part of such a registry.

Patients were also asked if they had any concerns with regards to the development of an inherited cancer registry. Patients’ responses to these questions were more variable, as revealed in Figure 4.

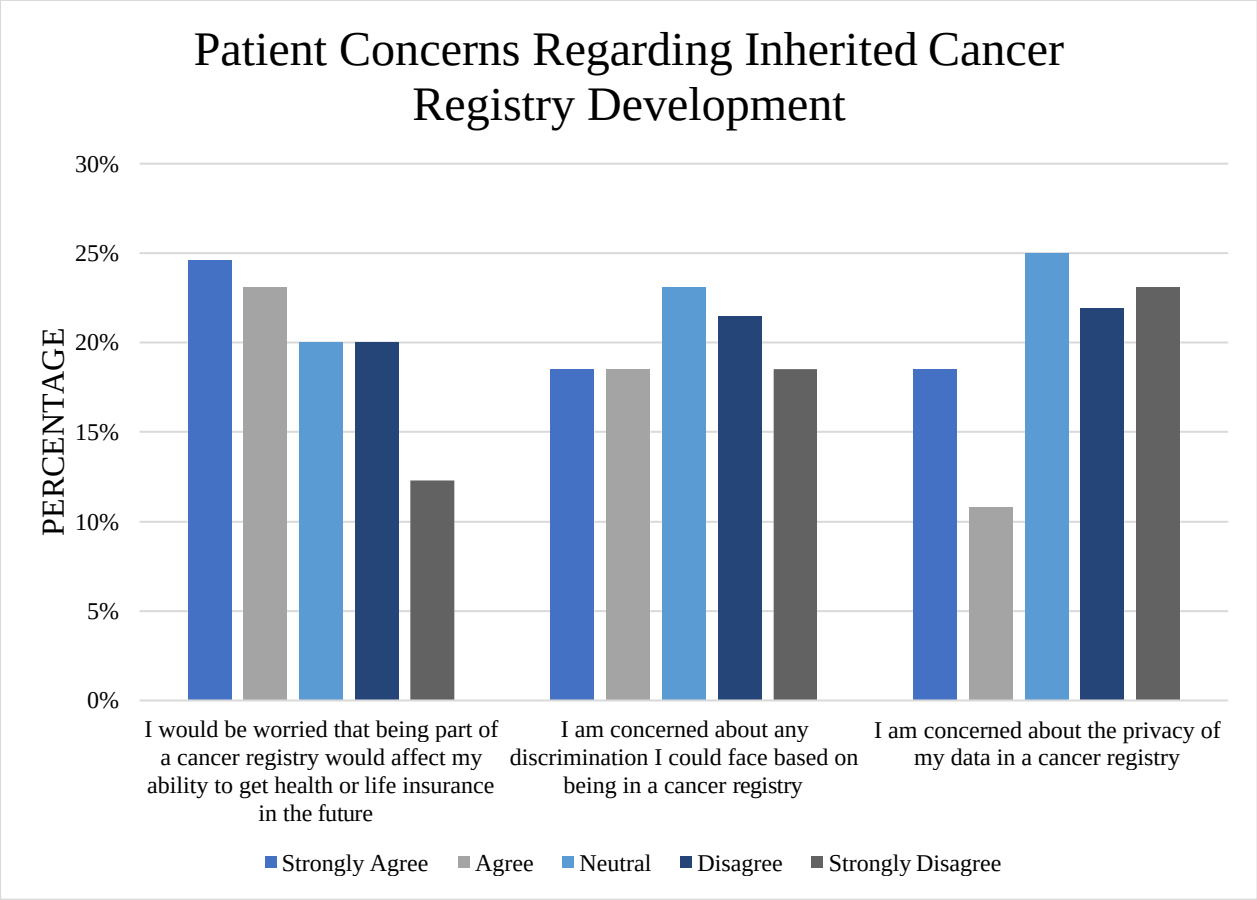



Figure 4: Concerns Regarding Inherited Cancer Registry (n=69)

Regarding a cancer registry in Newfoundland and Labrador, one survey respondent commented that she would agree with a registry "if controls were put in place for privacy and to prevent insurance coverage or life insurance issues from happening." Another participant noted time was needed to consider this option: "I can't answer at this time; I would have to think about this for a while."

## 4.10 Adherence

Clinical and demographic information was utilized to investigate whether very adherent individuals differed in their clinical or demographic information than those who were not fully adherent to guidelines. Only one variable was statistically related to an individual's level of adherence, whether an individual reported they lived in a rural or urban community, $X2$ ($df=1$, $N=40$) = 3.647, $p=.05$. Adherent individuals were more likely to live in an urban centre than rural communities.

Survey questionnaire responses were compared between very adherent respondents and those not fully adherent using Kruskal-Wallis tests. The only item that had a statistically significant difference in the distribution of adherent and non-adherent individuals was in response to the question, "Guidelines for screening were clear" ($p=.018$). Very adherent respondents had a higher median response to this item.

# Chapter 5.0 Discussion

This project utilized data from qualitative interviews in conjunction with a province-wide survey to gather insight into female BRCA mutation carrier's experiences and needs throughout NL. The following chapter discusses the main themes that emerged from the data and illustrates participants' perception of their lived experience with BRCA mutations. The chapter is organized by the overarching themes identified through data analysis. Study limitations, as well as implications for care and future research are noted.

## 5.1 Family and personal history of cancer shapes willingness to undergo genetic testing and the ability to cope with testing results

Genetic testing decision-making is complex and multifaceted, as revealed by the breadth of experiences reported by study participants. These experiences included a variety of personal and family histories of cancer, variable timing of receiving a BRCA mutation diagnosis, and a range of coping styles upon receipt of a positive mutation status.

Individuals who knew from a young age they were at risk for a BRCA mutation were generally better prepared to cope with their results. These individuals often referred to their testing as a confirmation of something they already knew they were likely to have; these individuals were less surprised than those who did not anticipate being a BRCA mutation carrier, and hence better able to cope. These findings are consistent with other studies which found length of familiarity and knowledge of the family history of Huntington disease directly influenced how people approached genetic testing and coped with their test results (80); similar results have been reported in inherited cancer populations (81). The implication of this finding is that discussing the family history of disease and for how long patients have known about it may help clinicians

anticipate which patients could experience shock and distress, and help clinicians prepare these patients to better cope with the process. Such discussions might therefore allow important anticipatory guidance for carriers and help mitigate potential psychological distress.

Hesse-Biber et al. (82) previously reported a strong negative relationship between family support with age of testing for BRCA mutations; the participants in our study who had strong family support were often tested earlier than those without these supports. However, some individuals who were aware of their risk neglected and avoided testing, as it felt obscure and hard for to them to comprehend. Participants who lost a close family member to cancer were more likely to be adamant about getting testing, sometimes seeking private testing options to avoid waitlists. These results echoed the finding from a study by Allen et al. (48) which found predictors of the likelihood of having undergone genetic counselling included level of familial risk, perceived cancer risk, and personal history of cancer. A 2014 systematic review of predictors of genetic testing decisions (81) highlighted that information regarding decision making about genetic testing decisions is incomplete. The review did find, however, that family history was the most consistent objective predictor of decisions; individuals with a family history of a disorder were more likely to pursue disorder-specific genetic testing.

In line with a recent review of the literature by Lombardi et al. (83), carriers' feelings regarding their test result varied widely. Participants' ability to cope with a positive test result was challenging for most individuals in this study, although those with strong family history of cancer often found it easier, as they had been more expectant of positive results. Individuals who were tested later in life, or who received testing after a single incidence of cancer, were more likely to report that they struggled with the news because they feared the cancer would return. Individuals

who had multiple incidences of cancer were often not shocked by the results and sometimes mentioned they were grateful to know their results so they could inform their family about their risks. While study participants struggled with their positive status initially, most suggested they were coping well. Previous research reported that general quality of life appears not to be affected in BRCA mutation carriers in the long term, and most carriers report a good quality of life despite their mutation status (31,53). Our findings concur with these studies.

*Family dynamics and personal relationships*

It is important to consider how family relations are affected by the worry of genetic testing. BRCA mutation carriers are responsible for providing their family members with information regarding their risk and information about genetic counselling and testing (84). However, this can strain family relationships, specifically when individuals opt not to test. Most participants discussed their BRCA testing results with family members with whom they had close personal relationships, which supports previous findings of high rates of results disclosure with at least one family member, normally first-degree relatives (84,85).

Participants who described tension in the family as a result of BRCA mutations mentioned that conflict was heightened in situations where there was a personal diagnosis of cancer, or if a previous family member had passed away due to a BRCA-associated cancer. As reported previously, a BRCA mutation diagnosis can have numerous impacts on family relationships, including negative impacts such as stress and hardship, but also more positive impacts such as increasing the strength of family communication and relationships (79,84,86,87). Genetic counsellors and clinicians must consider the additional challenges for families that extend beyond the proband after learning of a positive test result. The literature suggests communication is less

likely with second- and third-degree relatives and additional support may be needed for probands to assist in reaching all at risk family members (75, 76).

The quality of personal relationships was an important factor for mutation-positive women and their coping and management of their increased cancer risk, as seen in previous research (88,89). Female family members were a source of strength and provided a sense of not being alone for individuals navigating their cancer risk and screening recommendations (84). However, numerous participants described similar benefits when discussing their mutation status with close friends who had undergone similar processes, support groups that provided a sense of community and trust, and care providers who made them feel listened to and supported; it was also clear from our findings that individuals' need for support vary over time and by severity, as reported by others (89,90).

Relating with other carriers about shared experiences was helpful to participants; several individuals noted they were more likely to seek information from these sources, as opposed to their care providers (88). Participants discussed the comfort found in personal relationships with individuals who they trusted and who understood what they were going through. Other participants discussed the challenges of not having these types of supports in their lives. These results are reminiscent of earlier research which has found that individuals who were single at genetic testing were more likely to experience emotional distress, which they attributed to lack of social support (51), and that women who expressed distress and uncertainty about their supports and available medical choices were less likely to undergo surgical prevention and more likely to continue surveillance (82). A study by Dean et al. (91) highlighted the different information needs that cancer patients and survivors have that differs from unaffected carriers. It was this difference

in needs, both emotional and educational, that left certain unaffected BRCA carriers feeling isolated.

### 5.2 Lived experiences and personality coping style impacts individuals' risk management behaviours

Study participants discussed the complicated process of making decisions about surgical prevention for BRCA-associated cancers. Many factors play a role when navigating these complex issues, including an individual's lived experiences and their personality coping style (92). For some participants, their life experience involved having lost a parent or loved one to cancer, which has been reported previously (93). For these individuals, decisions regarding risk management surgeries were challenging, but came quicker than those without these experiences. These individuals had seen the reality of BRCA-associated cancers and knew how serious a diagnosis could be. Many of the women who had undergone preventive surgery cited their children as main motivators for getting the procedures done, which has been previously reported in the literature (82,94). A study by Haroun (55) et al. found that women were more likely to forgo screening and opt for an RRM if they had a high cancer risk or a history of breast cancer in a first- degree relative; De Leeuw et al. (94) found that uptake of prophylactic bilateral mastectomy was correlated to the number of relatives an individual had who died of breast cancer.

Several individuals discussed how their personality and coping style impacted their willingness to undergo preventative surgeries. Some participants considered themselves as having anxious and worried personalities, and for them, living with the possibility of breast or ovarian cancer was

challenging to cope with. These individuals felt that undergoing surgical removal of their breast and/or ovaries allowed them to have peace of mind and to not feel consumed by their carrier status. Elevated cancer worry and anxiety have been reported in the literature as predictors of prophylactic mastectomy and oophorectomy (94–96). For other individuals in the study, a lack of a nervous personality type lead to sometimes forgetting or missing screening appointments and delaying surgery for some time.

In participants with low adherence, there were many factors that influenced their decisions about screening and prevention. For some participants, health issues and health related barriers prevented surgery at the time, such as high BMI that prevented them from getting MRIs and risk reducing surgeries. Participants also noted fear of surgery, early menopause, and wanting to maintain fertility as reasons they avoided risk management recommendations (55, 97). Furthermore, logistical challenges such as time off work and having children impacted participants' ability to seek surgical prevention.

Financial barriers, such as not being able to afford to take time off work or to pay for childcare during surgery and recovery periods, were noted by some study participants as barriers to surgical adherence. Limited social support was discussed as impacting an individual's willingness to undergo the procedures. Participants also discussed being too young and wanting to have children as reasons they had not undergone RRSO, similar to other studies (e.g., 87).

*Role of healthcare providers*

Several participants in this study mentioned they felt their care providers neglected the emotional component that a BRCA mutation and related surgeries entail, whereas others discussed the benefit of having a care provider who was compassionate to patients' emotional and psychosocial health/concerns. Additionally, several participants discussed that they did not feel they had enough information to make informed decisions regarding surgical prevention, or they were not given enough information regarding the side effects and recovery following the surgeries, as reported in other studies (96). This information was echoed in the survey results, where 17% of respondents either strongly agreed or agreed that they did not know where to get information or support about their personal cancer prevention. For those who felt they had adequate information, they were likely to specifically name a handful of medical oncologists and obstetricians who were passionate about caring for the province's BRCA carriers.

Previous research has demonstrated that individuals with adequate information pre-surgery reported being more prepared for surgery and having less sexual distress than those without proper information (98). This is in line with additional research that suggests BRCA positive individuals undergoing prophylactic surgery want more information, including post-surgery information, relating to both physical and emotional expectations, impacts, and supports (96,99).

### 5.3 Adherence to risk management recommendations impact feelings regarding cancer worry and quality of life

For participants who were well adherent to risk management recommendations, their feelings regarding their cancer worry and the impact BRCA had on their quality of life was often different than individuals who were less adherent. If an individual had undergone both a prophylactic

bilateral mastectomy and a prophylactic bilateral salpingo-oophorectomy, their breast and ovarian cancer risks are nearly eliminated. In these cases, women often discussed the relief that came from not having to worry about whether they would develop cancer (100). Those participants who had forgone surgical intervention described that while breast screening did give them some peace of mind, waiting for testing results every six months, having to remember to schedule their appointments, and the challenges of getting MRI appointments often caused them a lot of anxiety.

For other participants, undergoing a prophylactic mastectomy was worth not having to go through the struggles of testing every six months, as seen in other studies. However, most patients discussed the challenges that accompanied a bilateral mastectomy, including body image, recovery time, and surgical complications. Bilateral prophylactic mastectomy (RRM) is a complicated and serious surgery, and prior research (56) in BRCA populations found that some women selected breast cancer screening methods over RRM, which was also seen in our study population.

Participants who had received an RRSO were mostly grateful to have done so, repeatedly mentioning the overwhelming anxiety that came from the lack of screening for ovarian cancer and the lethal nature of the disease. Although these individuals mentioned side effects, such as impact on sexual desire, not being able to have children, and surgical menopause, most felt the peace of mind that accompanied the procedure far outweighed the negatives (96,100). A Cochrane Review (101) concluded that RRSO may improve quality of life with regard to ovarian cancer risk perception, and the narratives of women in our study would seem to concur.

Individuals often reflected on previous times in their lives, before prophylactic surgery, when their cancer worry was overwhelming and ever-present. For these individuals, prophylactic surgery was as much about their mental and emotional well-being, as it was their physical health (96). This is in line with earlier studies that found individuals' quality of life and emotional wellbeing are increased after prophylactic surgery, and their cancer related worry and anxiety is reduced (95,102).

*Self-advocacy*

The importance of self-advocacy and resiliency was evident through the narratives of the lived experiences of individuals in this study. Participants often acknowledged the challenges of moving through the healthcare system and feeling that if they had not advocated for themselves, nobody would have. As a result, many of the highly adherent participants sought out information and research to educate themselves about cancer risk and prevention options. Self-motivated individuals in this study often described having a good quality of life, greater acceptance of their BRCA mutation status, and a more positive outlook about managing their risk. Individuals were more likely to return a mail-out survey if they had undergone an RRSO. This may be a result of them being well educated and informed about BRCA mutations, as suggested by their adherence to surgical prevention guidelines. Importantly, it highlights that many women who are less engaged remain at high risk of avoidable cancers partly because they do not have sufficient health system support and navigation.

*Inherited cancer registry*

Previous research on cancer registries has highlighted the benefits of a dedicated inherited cancer service, such as increasing screening rates and decreasing mortality, as well as facilitating access to timely research (60,68,103).

Interview participants and survey respondents were overwhelmingly positive and supportive of a NL inherited cancer registry. Individuals noted the benefit of a registry would reach far beyond themselves to all BRCA mutation carriers in the province. This information is vital for decision and policymakers. It is noteworthy to clinicians that a proportion of the BRCA population feels they are not properly managed and desire a more cohesive and comprehensive management plan for them and their family members. Participants believed that being a part of an inherited cancer registry would help them receive coordinated, appropriate and timely care and risk management that could ultimately help prevent cancer.

A minority of individuals noted concerns about insurance coverage and potential information leaks with joining a registry. This brings to attention the limited awareness patients have regarding Bill S-201 Genetic Non-Discrimination Act, which prohibits and prevents genetic discrimination. This bill prevents insurance providers from adjusting process or coverage based on a genetic predisposition, nor can they mandate individuals to take a genetic test. It would be important to ensure all efforts to create a registry, inform the public, and enroll individuals would specifically target these concerns and educate the public, as well as care providers, on Bill S-201.

# Chapter 6.0 Strengths, Limitations, and Future Research

This chapter presents the strengths, limitations, and implications of the study, suggests areas for future research, and concludes the thesis.

*Strengths*

This study contributes to the literature on the experiences of female, mutation-positive BRCA carriers with regards to their access to support, their need for personalized care, and their emotional and physical well-being. This research aimed to highlight the differences in experiences positive-mutation carriers have throughout their lives and in particular, explore barriers to the receipt of evidence-based care.

This study utilized two data collection methods, interviews and surveys, and was able to capture the voices of individuals with a wide range of demographic and clinical characteristics. The population in the interviews ranged with regard to their age, location, personal history of cancer, and prophylactic surgeries. The population who completed the surveys appeared largely representative of the NL BRCA female population. The survey had a response rate of 50%, and responders and non-responders did not differ with regards to most demographic and clinical variables. The only exception was that individuals who had undergone RRSO were more likely to return the questionnaire. It is reasonable to assume that the narratives presented in this thesis represent the broad, collective experiences of the BRCA mutation carriers in the province. This population has not been studied in great depth; thus, the information in this project provides previously undocumented information about this population. The information gathered can inform clinicians and decision-makers regarding how to best care for and support this population

and should be of use in preparing supportive and informational resources provided by local cancer authorities. Moreover, this study provides an in-depth, patient-oriented picture of the lived experiences of the BRCA carriers in the province with how they navigate the healthcare system, the areas they feel support them well, and the areas they identified for improvements in order for them to have the best quality of care. The inclusion of patient partners in development and analysis of the study is a strength, contributing to capacity building in patient-oriented research, but also ensuring the study aligned with the priorities and concerns of patients.

Our project population presents stronger data than other jurisdictions because it is a complete inclusion of a population-based cohort, with all women in the province being identified by central cancer care, central genetics services, and province-wide electronic medical records.

*Limitations*

The number of study participants remains relatively small; study findings are based on individuals living in one health jurisdiction NL and thus, the information presented may not be generalizable to other populations. It is encouraging, however, that study findings are consistent with the larger BRCA literature.

Participation in this project was entirely voluntary; it is likely to assume that individuals who are more motivated to participate in screening and prevention services, as well as those who highly engage with their mutation status, would be most likely to engage in research. Therefore, the information gathered from the interviews may be skewed towards carriers who are generally more adherent. Multiple efforts were made by study team members to recruit non-adherent participants;

this was challenging and largely unsuccessful. However, the results from this study (interviews + surveys) provide valuable insight likely to help support the majority of carriers in the province.

A limiting factor of the small sample size for the qualitative interview component is that there are only small samples of *BRCA1* and *BRCA2* patients and the cancer risks and management recommendations, and likely the family histories, of women with *BRCA*1 mutations will be different than those with *BRCA*2 mutations; we are unable to fully explore any differences in decision making among women with these different mutations. Therefore, we are unable to make any large generalizations about how these two groups differ with regards to the unique factors that impact their risk management decision making. However, it is encouraging that survey responses did not differ between women who carried a *BRCA1/2* mutation. In addition, we purposefully focused on female BRCA mutation carriers because they have the highest risk of cancers. We recognize that BRCA mutations and the associated cancer risk management is relevant to men and the recommendations for male carriers are decidedly less complex; however, we cannot speak to the male carrier experience through this study. Focused research on male BRCA mutation carriers would be useful, however, to better elucidate their experiences and contribute to their care (and that of their at-risk relatives).

Two of the interview participants were related and interviewed together. While this may have impacted how they responded to the interview questions, we have no way of analyzing in what ways (if at all) their answers would have differed. While their responses did not seem to differ from those of the other participants, we cannot be sure that they would not have responded differently had they been interviewed separately.

Given that 25 surveys could not be linked to the patients who reported the information, this is a limitation of the study, as we could not link these participants' clinical and demographic information with their survey responses. However, as responders and non-responders did not present differently in these variables, the information gathered from the unidentified surveys likely presents a broad representation of the NL BRCA population. Given this work has not been undertaken with the BRCA population in the province previously, survey results have descriptive value. Two questions ('I had trouble getting breast MRI appointments' and 'I was able to book MRI appointments') had missing responses upwards of 10%, which may suggest these questions were difficult to understand, were worded in a way that was difficult for the participants, or were not perceived as relevant to those largely adherent to MRI guidelines. The survey used was not a validated questionnaire; instead, it was comprised of descriptive questions aimed to gather a broad picture of the experiences of BRCA carriers in the province. However, as this was a patient-oriented research project, patient study team members reviewed all study instruments and did not note difficulties with item comprehension.

Naturalistic inquiry and qualitative description were the guiding frameworks for data analysis. Every effort was made to ensure that a thorough, systematic, and rigorous analysis of data was completed. It is worth mentioning that limitations can occur within qualitative analysis including researchers' personal biases, skills of the researcher, and the researcher's presence during data gathering which can affect participants' responses (104). Every effort was made during data collection and analysis to acknowledge and suspend researcher biases (e.g., ensuring no judgement was made towards participants' preventative behaviors, having a very experienced qualitative researcher assisting in analysis) and allowing participants to tell their stories in their own words.

*Future Research*

Further long-term research should be conducted to follow this population throughout their lives. Data collected provide a snapshot of current experiences of BRCA carriers, with insight into their previous experiences. There is an urgent need for further work regarding development of an inherited cancer registry. Individuals who live with BRCA and elevated cancer risk have clearly expressed support for the development of a registry in our jurisdiction. Survey responses were overwhelmingly positive, and interview data revealed similar support. Descriptive survey results clearly highlight majorities who would like to have better coordination of risk management appointments and ongoing care, benefits of registries reported in the literature (60, 68, 103). A majority agreed they did not receive clear information about their testing results. Research that is focused on the information needs of BRCA mutation carriers and their preference for modality delivery would be valuable, as would focused intervention research for the return of genetic information. Research that investigates other inherited cancer syndromes in the province should be conducted to gather a full picture of mutation carriers and to identify if a registry would be appropriate for these groups as well or to explore if their information needs and preferences differ.

Focused research regarding how to best reach and engage with at risk individuals who are non-adherent is critically needed. It is encouraging that the majority of our respondents were adherent to risk management guidelines; however, this still leaves a significant minority who were not adherent (and potentially other at-risk family members of theirs). This is a difficult population to reach, but a population which is not currently benefiting from following evidence-based

guidelines for the management of inherited cancer risk. It would be very valuable to engage with this population to identify barriers and potential solutions to adherence. A patient-oriented research approach, conducted in partnership with patient partners who are adherent, could begin to inform a research agenda in this important and currently under-researched area.

*Implications and Recommendations*

Study results have implications for both healthcare providers and patients. These implications, particularly regarding how we educate clinicians and patients about inherited cancers and their management, are important in light of the newer cancer mutations (such as *PALB2, RAD51C, RAD51D*). Findings can provide clinicians with information regarding patient concerns, educational and information needs, and attitudes towards genetic testing processes. Careful attention to the themes raised might allow care providers to provide anticipatory guidance in interactions with high risk individuals. Understanding concerns, needs, and attitudes can assist healthcare providers in their discussions with families about inherited cancers and help proactively identify patients who might be at risk of distress or have difficulty coping with a positive carrier status. Such understanding should also help promote informed patient decisions about inherited cancer risk management.

The findings of this study fit well into the broader literature regarding how healthcare providers can be better supported in providing care to families at risk of hereditary cancers. This information may be particularly helpful for clinicians when dealing with newly diagnosed individuals, with regards to information gaps and additional supports that are needed.

The finding that some women noted their care providers were uninformed about BRCA mutations is particularly important due to the geographic sparsity of the NL population and accessibility of healthcare services; a large number of BRCA mutation carriers receive their information from family physicians. Thus, for many female BRCA carriers, initial discussions about inherited cancer risk, as well as follow up management subsequent to genetic testing, will be handled in primary care. This underlines the importance of ongoing continuing educations programs, such as the Gynecologic Oncology Canada BRCA course, which delivers in-depth BRCA mutation management teaching to gynecologists, oncologists, and family physicians nationwide, and the biannual patient BRCA mutation education course in Montreal as part of the BRCA Symposium. The distribution of online resources for healthcare professionals working with patients carrying cancer mutations, as well as family medicine physicians is an important tool to help increase health providers' BRCA mutation knowledge and awareness.

Study findings help contribute to the awareness of the impact of living with inherited cancer risk. For example, younger women or those with larger family histories of cancer approached screening and surgeries differently. It is imperative that care providers explore patient perceptions and provide adequate information to ensure decision-making about prophylactic surgery is informed and in line with patients' values. In addition, engagement with support groups Canada-wide, such as Ovarian Cancer Canada, the Canadian Cancer Society, and Young Adult Cancer Canada is helpful for generating continued knowledge regarding the lived experience of those with BRCA mutations.

Psychosocial implications and knowledge needs of BRCA mutation carriers is important information for primary healthcare providers who tend to these clients. The finding that an individual who was seen by a highly qualified and knowledgeable healthcare provider, found their BRCA experience better, is important when considering access to specialized care services or the implications of a registry, to which these patients could be referred. Other implications include the creation of support groups (or the sharing of information about current such groups) as a means to speak to others with lived experiences. This finding suggests that care providers should be mindful of the non-clinical implications of BRCA mutations (e.g., the emotional and social impacts) and provide resources beyond discussing surgeries and screenings. While clinical impacts and outcomes are clearly paramount in consultations, study findings suggest women would also find discussion about the non-clinical aspects of inherited cancer equally valuable.

We strongly recommend the careful and purposeful funding of an inherited cancer clinical service for BRCA mutation carriers in NL who would benefit from a comprehensive and centralized program to streamline their cancer risk management services. The results from both components of this study suggest that patients in high risk cancer families support a single coordinated service for their healthcare and information needs. Such a service can only come from dedicated and sustained healthcare funding. BRCA mutation carriers in NL could be better managed and supported through their cancer prevision services if such a program was created.

## Conclusion

The purpose of this research was to explore the experiences of female BRCA mutation carriers as they navigate and access screening and prevention in the Canadian health care system. The results of this project have made it clear that the current model of high-risk care is not fully meeting the

needs of these families, and that patients themselves are strongly supportive of coordinated care in a registry-based model. Patient experiences with health professionals impact an individual's ability to navigate and access cancer prevention. Participants in this research commented on both positive and negative experiences with healthcare. Females with BRCA mutations report that the level of care they receive is inconsistent, and physicians' knowledge varied.

Participants highlighted the challenges to properly adhering to screening guidelines, including breast MRI access and receiving hard-to-understand, and sometimes contradictory information, from their care providers. Data suggested that individuals were overwhelmingly in support of an inherited cancer registry and believed it would be of great benefit to them, their fellow BRCA mutation positive family members, and other mutation carriers.

This project has demonstrated that decisions are impacted by individuals' lived experiences, family history, and perception of cancer risk. Participants confirmed that knowledge of their increased cancer risk had an impact on their relationships, on their emotional well-being, and family planning, well beyond solely clinical impacts. Decisions regarding prophylactic surgeries were multifaceted and complex, driven largely by personal and family history of cancer, level of cancer worry, and children.

The results of this project described the experience of BRCA mutation carriers in NL as complicated by emotional factors such as family dynamics, lived and family experience of cancer, as well as access to specialty care. Patients reported the need for reliable access to medical expertise and care coordination that addresses their emotional needs, as well as their physical health needs, while protecting their privacy and confidentiality.

The study findings are based on a diverse province-wide sample and will help inform the broader healthcare community about the experiences of female BRCA mutation carriers when navigating the healthcare system and making decisions regarding their cancer risk management. This research will aid in identifying appropriate supports for this population and should help inform the development of ongoing research and care management recommendations.

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# Appendix A: NCCN Guidelines for Genetic Testing

NCCN Guidelines for testing criteria for high-penetrance breast and/or ovarian cancer susceptibility genes are as follows (8):

Testing is clinically indicated in the following scenarios:

**1. Individuals with any blood relative with a known pathogenic/likely pathogenic variant in a cancer susceptibility gene**

**2. Individuals meeting the criteria below but with previous limited testing (eg, single gene and/or absent deletion duplication analysis) interested in pursuing multi-gene testing**

**3. Personal history of cancer**

- Breast cancer with at least one of the following:
  - Diagnosed at age ≤45 y;
  - Diagnosed at age 46–50 y with:
    - ◊ Unknown or limited family history; or
    - ◊ A second breast cancer diagnosed at any age; or
    - ◊ ≥1 close blood relative[e] with breast, ovarian, pancreatic, or high-grade (Gleason score ≥7) or intraductal prostate cancer at any age
  - Diagnosed at age ≤60 y with triple-negative breast cancer;
  - Diagnosed at any age with:
    - ◊ Ashkenazi Jewish ancestry; or
    - ◊ ≥1 close blood relative[e] with breast cancer at age ≤50 y or ovarian, pancreatic, or metastatic or intraductal prostate cancer at any age; or
    - ◊ ≥3 total diagnoses of breast cancer in patient and/or close blood relatives Diagnosed at any age with male breast cancer
- Epithelial ovarian cancer (including fallopian tube cancer or peritoneal cancer) at any age
- Exocrine pancreatic cancer at any age
- Metastatic or intraductal prostate cancer at any age
- High-grade (Gleason score ≥7) prostate cancer with: Ashkenazi Jewish ancestry; or
  ≥1 close relative with breast cancer at age ≤50 y or ovarian, pancreatic, or metastatic or intraductal prostate cancer at any age; or
  ≥2 close relatives with breast or prostate cancer (any grade) at any age.
- A mutation identified on tumor genomic testing that has clinical implications if also identified in the germline
- To aid in systemic therapy decision-making, such as for HER2-negative metastatic breast cancer

**4. Family history of cancer**

- An affected or unaffected individual with a first- or second-degree blood relative meeting any of the criteria listed above (except individuals who meet criteria only for systemic therapy decision- making)
- An affected or unaffected individual who otherwise does not meet the criteria above but has a probability >5% of a *BRCA1/2* pathogenic variant based on prior probability model.

# Appendix B: Interview Guide

Open-ended questions are designed to elicit commentary on experiences with **cancer in the family** (first awareness of hereditary link, perceived personal risk, screening motivation) and **genetic testing** (decision-making, counselling experiences, reaction to status, understanding implications, impact on family). Additional questions evolve from adjusting to carrier status, screening experiences, and health care service needs.

5. **Please tell me about your family's experience with cancer.**

| **Questions:** | **Prompts:** |
|---|---|
| Can you tell me about your family history of cancer? | When do you recall hearing about BRCA? How did you find out about BRCA? |
| Can you tell me how you came to discover you personally were at risk for BRCA? | How was this explained to you? By whom? |
| Can you tell me about your genetic testing experience? | Who recommended genetic testing?<br>Did you understand the implications of BRCA for your health? For your family?<br>Did you feel satisfied with the level of information you received? |

1. **Can we talk about what having BRCA means for your health (and healthcare).**

| **Questions:** | **Prompts:** |
|---|---|
| What recommendations were given to you after being diagnosed with BRCA? | Was any kind of screening recommended? Was genetic testing of other relatives recommended? |
| What benefits of preventative gynecologic surgery were explained to you? | What disadvantages were explained to you? |

2. **I would like to talk about how you manage your cancer risk.**

| Questions: | Prompts: |
|---|---|
| What kinds of things have you been doing to manage your cancer risk? | Do you do any regular screening like mammograms or MRIs? |
| Have you had preventative surgery (e.g., gynecological or mastectomy?) | What was your experience like when trying to make that decision about surgery? Was this an easy decision to make? |
| Did you feel you had enough information to make an informed decision about how you have decided to manage your cancer risk? | Have you ever regretted your decision?<br>Is there anything you wish you would have done differently with regards to making decision about cancer risk management? |

**3. Tell me about life with BRCA.**

| Questions: | Prompts: |
|---|---|
| How would you describe your quality of life today? | Is it hard to manage your screening?<br>Are you worried about the risk of cancer?<br>How do you feel BRCA has impacted your family? |

**4. Healthcare needs**

| Questions: | Prompts: |
|---|---|
| Have there been any barriers to receiving the screening that has been recommended to you? | Is there anything you feel you need in relation to your BRCA status, but have difficulty accessing? |

**5. Inherited cancer registries**

"An inherited cancer registry is basically a database that stores medical and personal information, like how old you are, where you live and who your family doctor is, as well as test results. These registries have been shown to help in the ongoing management and clinical care of people

affected by BRCA and other inherited cancers. In NL, we do not have a formal inherited cancer registry."

| **Questions:** | **Prompts:** |
|---|---|
| If an inherited registry were set up, do you think you would agree to take part? | What do you think the advantages of a registry would be? Do you have any concerns? |
| What kinds of research would be most important to you from an inherited cancer registry? | No prompt, open ended. |

Please feel free to share any other thoughts you have on living with BRCA.

**Is there something you would like to share that we have not discussed in our interview?**

**Thank you very much for taking the time to talk with me today. Please touch base anytime with any other questions or concerns.**

# Appendix C: Study Information Sheet

**Screening and prevention for inherited cancer: Exploring the experiences of BRCA carriers in NL**

In Newfoundland and Labrador (NL), there are about 300 people with defects in the BRCA genes that cause very high rates of cancer. For women with BRCA, the risk of getting breast cancer can be as high as 75%, and the chance of getting ovarian cancer up to 40%. There are national guidelines about how these high-risk people can use screening and surgeries to lower their cancer risks or to find cancers earlier. Our research team has studied the care these families receive, and we found that more than 50% of women with BRCA in the province are not receiving care according to guidelines. It is not known why this is. Our team, which includes patient partners, would like to study what factors are responsible for this problem.
Our patient partners are former breast cancer patients whose input ensures patient priorities and expertise are a main component of our research. We wish to ask patients about their experiences and any barriers to health care access. Our hope is to gather information that could help improve care for these high-risk families.

We have brought together a research team of academic researchers, doctors who work in cancer care, and (former) breast cancer patients to help with this project.

**One of the key aims of this study is to** explore patients' thoughts about factors affecting screening and prevention choices when dealing with inherited cancer. We aim to hold focus groups in several communities (e.g., Burin, Bay Roberts, St. John's) or to hold individual interviews with people if they prefer. People can even take part by emailing their answers to our questions back to the research team.

Each person will be asked to take part in one discussion that will last about an hour. We will do our best to hold focus groups at a time and place that works for everyone. If you do not want to take part in a group discussion, but would like to be in the study, we are happy to arrange an individual interview with you instead (face-to-face or by telephone) or to email you our questions for you to answer at a time that works for you.

<u>If you are interested in finding out more or would like to take part, please contact:</u>

Ms. Jaclyn Hynes at jaclyn.hynes@mun.ca or her supervisors:
Dr. Holly Etchegary, holly.etchegary@med.mun.ca; 709-864-6605 Dr. Lesa Dawson, lmdawson@mun.ca; 709-749-9686

Thank you for your time.
Jaclyn Hynes, Masters student, Faculty of Medicine, Memorial University

# Appendix D: Health Research Ethics Authority (HREA) Study Approval

Ethics Office
Suite 200, Eastern Trust Building
95 Bonaventure Avenue
St. John's, NL
A1B 2X5

February 20, 2018

Faculty of Medicine

Dear Miss Hynes:

**Researcher Portal File # 20181585**
**Reference # 2018.010**

**RE: "Screening and prevention for inherited cancer: Exploring the experiences of BRCA carriers in NL"**

This will acknowledge receipt of your correspondence.

This correspondence has been reviewed by the Chair under the direction of the Health Research Ethics Board (HREB). ***Full board approval*** of this research study is granted for one year effective **February 1, 2018**.

**This is your ethics approval only. Organizational approval may also be required.** It is your responsibility to seek the necessary organizational approval from the Regional Health Authority (RHA) or other organization as appropriate. You can refer to the HREA website for further guidance on organizational approvals.

This is to confirm that the HREB reviewed and approved or acknowledged the following documents (as indicated):

- Application, approved
- Research proposal, approved
- Revised interview guide in person or telephone, approved
- Revised interview guide by email, approved
- Revised telephone script, approved
- Revised consent form BRCA interviews or focus groups dated Feb 12, 2018, approved

MARK THE DATE

**This approval will lapse on February 1, 2019 .** It is your responsibility to ensure that the Ethics Renewal form is submitted prior to the renewal date; you may not receive a reminder. The Ethics Renewal form can

be found on the Researcher Portal as an Event form.

*If you do not return the completed Ethics Renewal form prior to date of renewal:*

- ***You will no longer have ethics approval***
- *You will be required to stop research activity immediately*
- *You may not be permitted to restart the study until you reapply for and receive approval to undertake the study again*
- *Lapse in ethics approval may result in interruption or termination of funding*

**You are solely responsible for providing a copy of this letter**, along with your approved HREB application form; to **Research Grant and Contract Services** should your research depend on funding administered through that office.

**Modifications of the protocol/consent are not permitted without prior approval from the HREB. Implementing changes without HREB approval may result in your ethics approval being revoked, meaning your research must stop. Request for modification to the protocol/consent must be outlined on an amendment form (available on the Researcher Portal website as an Event form) and submitted to the HREB for review.**

The HREB operates according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2), the Health Research Ethics Authority Act (HREA Act) and applicable laws and regulations.

**You are responsible** for the ethical conduct of this research, notwithstanding the approval of the HREB.

We wish you every success with your study.

Sincerely,

Ms. Patricia Grainger (Chair, Non-Clinical Trials Health Research Ethics Board)
Dr. Joy Maddigan (Vice-Chair, Non-Clinical Trials Health Research Ethics Board)

CC: Dr. Holly Etchegary
Dr. Lesa Dawson

# Appendix E: Consent Form


**Consent to Take Part in Research**

**TITLE: Screening and prevention for inherited cancer: Exploring the experiences of BRCA carriers in NL**

**INVESTIGATOR(S)**: Ms. Jaclyn Hynes; Drs. Lesa Dawson and Holly Etchegary

SPONSOR: Patient-Oriented Research grant program, NL SUPPORT Unit, Faculty of Medicine, Memorial University

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. You can decide not to take part in the study. If you decide to take part, you are free to leave at any time. This will not affect your usual health care/normal treatment.

Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about for a while. Mark anything you do not understand or want explained better. After you have read it, please ask questions about anything that is not clear.

**The researchers will:**

- discuss the study with you
- answer your questions
- keep confidential any information which could identify you personally
- be available during the study to deal with problems and answer questions

**Introduction/Background:**

In Newfoundland and Labrador (NL), there are about 300 people with defects in the BRCA genes that cause very high rates of cancer. For women with BRCA, the risk of getting breast cancer can be as high as 75%, and the chance of getting ovarian cancer up to 40%. There are national guidelines about how these high-risk people can use screening and surgeries to lower their cancer risks or find cancers earlier. Our research team has studied the quality of care these families receive and we found that more than 50% of women with BRCA in the province are not getting care according to guidelines. It is not known why these people are not getting the care they need. Our team, that includes patient partners, would like to study what factors are responsible for this problem. We wish to ask patients about their experiences and any barriers to health care access. We hope to get information to help improve care for these high-risk families.

1. **Purpose of study:**

To better understand cancer screening in BRCA carriers and to ask patients what their priorities are for their care and research in this area.

2. **Description of the study procedures:**

If you agree to take part in this study, you will be asked to join one focus group with 4-5 other people who also carry the BRCA genes.

All focus groups will be held at a place and time that is good for you. If you wish a private interview, our team can set up a face-to-face or telephone interview if you prefer. We are also happy to email questions to you if you wish to type out your answers and send them back to us.

In any focus group or individual interview, we would like to tape record our talk to make sure we don't miss any important parts of the discussion. Recordings will be typed out and team members will also take notes during group sessions or interviews. No person's real name will be used in the notes or recordings.

3. **Length of time:**

The focus group or interview will take about an hour, but group discussions may last up to 90 minutes depending on how much the group wishes to talk. If you wish to give your answers over email, you can take as long as you wish in answering the questions.

4. **Possible risks and discomforts:**

Talking about cancer is hard for some people. We understand that talking about the inherited cancer in your family may upset you. Dr. Lesa Dawson is trained in counselling and has worked with many of the families in our province who are dealing with inherited cancer. If you would like to speak with her at any time during or after the study, we will arrange it right away.

5. **Benefits:**

It is not known whether this study will benefit you.

6. **Liability statement:**

Signing this form gives us your consent to be in this study. It tells us that you understand the information about the research study. When you sign this form, you do not give up your legal rights. Researchers or agencies involved in this research study still have their legal and professional responsibilities.

## 7. What about my privacy and confidentiality?

Protecting your privacy is an important part of this study. Every effort to protect your privacy will be made. However, it cannot be guaranteed. Other people taking part in this focus group may know your name and hear your comments. All members of the focus group will be reminded to

- respect the privacy of each member of the group
- treat all information shared with the group as confidential

When you sign this consent form you give us permission to

- Collect information from you
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

Access to records

The members of the research team will see study records that identify you by name.
Other people may need to look at the study records that identify you by name. This might include the research ethics board. You may ask to see the list of these people. They can look at your records only when supervised by a member of the research team.

Use of your study information

The research team will collect and use only the information they need for this research study.

This information will include your

- Age
- Address (only in general terms of which health authority region, e.g., Eastern, Western, Central or Labrador)
- type of surgeries you might have had in relation to inherited cancer (e.g., mastectomy)
- screening you have regularly (e.g., mammograms, breast MRI)
- information from study interviews and focus groups or email answers

Your name and contact information will be kept secure by the research team in Newfoundland and Labrador. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study.

Information collected for this study will be kept for five years.

If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. It may not be removed. This information will only be used for the purposes of this study.

Information collected and used by the research team will be stored with Ms. Jaclyn Hynes and Dr. Holly Etchegary in their locked offices of the medical school, located in the Craig L. Dobbin Genetics Research Centre at the Faculty of Medicine, Memorial University. Ms. Jaclyn Hynes and Dr. Etchegary are responsible for keeping all information secure.

Your access to records

You may ask the researcher to see the information that has been collected about you.

**8. Questions or problems:**

If you have any questions about taking part in this study, you can meet with the investigator who is in charge of the study. That person is:

**Principal Investigator's Name and Phone Number**

Ms. Jaclyn Hynes
Clinical Epidemiology Masters student, Faculty of Medicine Email: Jaclyn.hynes@mun.ca

Co-supervisors:

Dr. Lesa Dawson Tel: 749-9686
Email: lmdawson@mun.ca

Dr. Holly Etchegary Tel: 864-6605
E mail: holly.etchegary@med.mun.ca

Or you can talk to someone who is not involved with the study at all but can advise you on your rights as a participant in a research study. This person can be reached through:

Ethics Office at 709-777-6974 Email at **info@hrea.ca**

This study has been reviewed and given ethics approval by the Newfoundland and Labrador Health Research Ethics Board.

After signing this consent, you will be given a copy.

**Signature Page**

**TITLE: Screening and prevention for inherited cancer: Exploring the experiences of BRCA carriers in NL**

**Name of principal investigators**: Ms. Jaclyn Hynes

To be filled out and signed by the participant:

Please check as appropriate:

I have read the consent form and information sheet. Yes { } No { }

I have had the opportunity to ask questions/to discuss this study. Yes { } No { }

I have received satisfactory answers to all of my questions. Yes { } No { }

I have received enough information about the study. Yes { } No { }

I have spoken to a member of the research team and she answered my questions Yes { } No { }

I understand that I am free to withdraw from the study Yes { } No { }

- at any time
- without having to give a reason
- without affecting my future care

I understand that it is my choice to be in the study and that I may not benefit. Yes { } No { }

I understand how my privacy is protected and my records kept confidential Yes { } No { }

I agree to be audio taped Yes { } No { }

I agree to take part in this study. Yes { }No { }

| _____ | _____ | _____ |
|---|---|---|
| Signature of participant | Name printed | Year Month Day |

**<u>To be signed by the investigator or person obtaining consent</u>**

I have explained this study to the best of my ability. I invited questions and gave answers. I believe that the participant fully understands what is involved in being in the study, any potential risks of the study and that he or she has freely chosen to be in the study.

| _____ | _____ | _____ |
|---|---|---|
| Signature of investigator | Name printed | Year Month Day |

Telephone number: _____

## Appendix F: Survey Questionnaire

The purpose of this survey is to learn about feelings people have when they know that they have a disease-related gene. You are being asked to fill out this survey because you have tested positive for (or have recently learned that you carry) a gene that may be associated with an increased risk of cancer. All of your answers are confidential. There are no right or wrong answers, and people vary widely in their responses to these questions. **If there is anything that you are not comfortable answering, please leave it blank and indicate that you do not wish to answer. That way, I will know that you didn't accidentally miss it.**

| **Please read each item, then circle the number in the box with the response that best describes your feelings at this time.** | **Strongly Agree** | **Agree** | **Neutral** | **Disagree** | **Strongly Disagree** | **Not Applicable** |
|---|---|---|---|---|---|---|
| 1. I felt that I received clear information about the results of my genetic testing | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. My family doctor was knowledgeable about BRCA mutations | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. The guidelines for screening were clear | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. I understand my risk of breast cancer | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. I understand my risk of ovarian cancer | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. I understand my options for preventative ovarian surgery | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. I understand my options for breast cancer prevention | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. I understand the pros and cons of preventative mastectomy | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. I understand the pros and cons of preventative ovarian surgery | 1 | 2 | 3 | 4 | 5 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10. I have had preventative ovarian surgery | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. If you decided not to have preventative ovarian surgery, the reason why at this time. Please circle all that apply:<br>a. No doctor has recommended surgery<br>b. I am too young<br>c. I want to have more children<br>d. Afraid of menopause<br>e. Surgical Risks<br>f. Arranging time off of work<br>g. Childcare arrangements<br>h. Other surgeries required<br>i. Recovering from Cancer<br>j. Other_ | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12. I was able to book breast MRI appointments | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. I had trouble getting breast MRI appointments | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. If you had trouble, the reason why you had trouble getting breast MRI appointments. Please circle all that apply:<br>a. Travel<br>b. Time away from work<br>c. Childcare arrangements<br>d. Financial<br>e. MRI machine restrictions<br>f. Anxiety/Claustrophobia<br>g. Other_____ | | | | | | |
| 15. I would like reminders about what screening or prevention I could be doing | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. I would like to combine doctor's appointments and tests | 1 | 2 | 3 | 4 | 5 | 6 |
| 17. I do not know where to get information or support about my personal cancer prevention | 1 | 2 | 3 | 4 | 5 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18. I feel comfortable telling my relatives about BRCA mutation | 1 | 2 | 3 | 4 | 5 | 6 |
| 19. I feel that all my family members understand about BRCA | 1 | 2 | 3 | 4 | 5 | 6 |
| 20. I wait too long for tests or appointments because of waitlists | 1 | 2 | 3 | 4 | 5 | 6 |

21. In what income category would you place your household:
    a. Low income
    b. Middle income
    c. High income

22. What is the highest degree or level of education you have completed?
    a. Less than high school
    b. High school graduate (includes equivalency)
    c. Completed post-secondary training
    d. Completed university degree
    e. Masters or professional degree
    f. Ph.D.

The next set of questions are about inherited cancer registries:

An inherited cancer registry is basically a database that stores patient medical and personal information, like how old you are, where you live and who your family doctor is, as well as test results. These registries have been shown to help in the ongoing management and clinical care of people affected by BRCA and other inherited cancers. In NL, we do not have a formal inherited cancer registry. Please give us your thoughts on the following questions about inherited cancer registries.

| **Please read each item, then circle the number in the box with the response that best describes your feelings at this time.** | **Strongly Agree** | **Agree** | **Neutral** | **Disagree** | **Strongly Disagree** |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| A cancer registry would be useful for identifying high risk individuals. | 1 | 2 | 3 | 4 | 5 |
| Being a part of a cancer registry could help me receive the correct screening for cancer. | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I would be worried that being part of a cancer registry would affect my ability to get health or life insurance in the future. | 1 | 2 | 3 | 4 | 5 |
| I am concerned about any discrimination I could face based on being in a cancer registry. | 1 | 2 | 3 | 4 | 5 |
| I am concerned about the privacy of my data in a cancer registry. | 1 | 2 | 3 | 4 | 5 |
| How willing are you to be part of an inherited cancer registry in Newfoundland and Labrador? | 1 | 2 | 3 | 4 | 5 |

This last set of questions are about your most important research priorities for a cancer registry:

| **Please read each item, then circle the number in the box with the response that best describes the importance of the research topic to you** | **Not Important** | **Somewhat Important** | **Moderately Important** | **Very Important** | **Extremely Important** |
|---|---|---|---|---|---|
| The type and format of education for patients about inherited cancer risks | 1 | 2 | 3 | 4 | 5 |
| Research about what might help prevent cancers for people at high risk of inherited cancer | 1 | 2 | 3 | 4 | 5 |
| Research about the benefits of preventative gynecologic surgery (e.g., hysterectomy and oophorectomy which is the surgical removal of one or both ovaries) for women with inherited cancer | 1 | 2 | 3 | 4 | 5 |
| Research about disadvantages or long-term effects of preventative gynecologic surgery (hysterectomy and oophorectomy) for women with inherited cancer | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Research about screening for cancers for people at risk for inherited cancers | 1 | 2 | 3 | 4 | 5 |
| Research about the risks and benefits of genetic testing for inherited cancers | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Research about how the diagnosis of an inherited cancer affects choices about having a family | 1 | 2 | 3 | 4 | 5 |
| Research about the co-ordination of a program of care for patients with inherited cancers | 1 | 2 | 3 | 4 | 5 |
| Research about how inherited cancers affects quality of life | 1 | 2 | 3 | 4 | 5 |
| Research about how inherited cancers affect family relationships | 1 | 2 | 3 | 4 | 5 |
| Research about the long-term health outcomes of patients who are registered in a cancer registry | 1 | 2 | 3 | 4 | 5 |