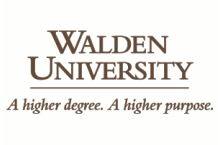

2020

Decision Making Process and Contralateral Prophylactic Mastectomy

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This is to certify that the doctoral dissertation by

Hala F. Alameddine

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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2020

Abstract

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by

Hala F. Alameddine

MSHA, Houston Baptist University, 2005

BSN, Lebanese University, 2000

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Services – Community Health Education

Walden University

February 2020

Abstract

The increased rate of contralateral prophylactic mastectomy (CPM) among women with early stage unilateral breast cancer has raised concerns particularly with the lack of evidence for a survival benefit related to the CPM procedure and with the low risk of developing contralateral breast cancer among women with early stage sporadic breast cancer. The purpose of this quantitative cross-sectional study, using normative decision theory as the framework, was to assess the influence of the partner, physician, and media on the decision of women with unilateral breast cancer who decided to undergo CPM. Women with stage 0 to III early stage unilateral breast cancer ages 20-60 years old who underwent CPM at MD Anderson Cancer Center in the U.S. between January of 2010 and December of 2017 were surveyed on factors influencing their decision to undergo CPM. Logistic regression (binomial distribution with logit link) was used to analyze the data. The results revealed that partners, physicians, and media all had significant influence ($p < 0.05$) on the decision-making process of women with unilateral breast cancer to undergo CPM. The findings of this study may inform policy by highlighting the need for decision aids, programs, or tools that help women with unilateral breast cancer make informed decisions that are evidence-based regarding the efficacy of CPM.

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Dedication

This dissertation is dedicated to my husband, my kids, my parents and my siblings whose unyielding love, support and continuous encouragement have inspired me to pursue my dream and complete this research study.

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unlearned gave me the total focus on continuing my education. I am also grateful to all my friends who inspired me and helped me through this milestone.

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Chapter 1: Introduction to the Study

Women with early stage unilateral breast cancer are electing to have contralateral prophylactic mastectomy (CPM) to reduce the risk of developing a contralateral breast cancer. In the United States, the CPM rate for the surgically treated women with stages I to III unilateral breast cancer increased dramatically from 1998 to 2003 (Baker et al., 2013). Another study showed that the rate of CPM among women with unilateral invasive breast cancer increased from 2.2% in 1998 to 11% in 2011 (Jemal et al., 2015). Breast cancer patients should understand the benefits versus the risks of CPM in order to make informed decisions. The purpose of this study was to examine the influence of physicians, partners, and media on the decision-making process of women with unilateral early stage breast cancer who decided to undergo CPM. This study was needed because breast cancer patients can be influenced by others and may not be making informed decisions about engaging in this aggressive and irreversible procedure (CPM). This chapter will include a discussion of the study background, problem statement, purpose of study, research questions and hypotheses, theoretical framework, nature of the study, definition of terms, assumptions, limitations and significance of the study.

Background of the Study

Contralateral prophylactic mastectomy (CPM) is a procedure that women may choose in order to prevent breast cancer in the healthy breast. The rate of CPM in the United States has more than doubled from 1.8% in 1998 to 4.5 % in 2003 (Tuttle, Habermann, Grund, Morris, & Virnig, 2007). The trend of the increasing rate of CPM among women with unilateral breast cancer has raised concern, particularly with the lack

of evidence for a survival benefit related to the CPM procedure (Tracy, Rosenberg, Dominici, & Partridge, 2013), and with the minimal (0.5%-0.75%) annual risk of women with early stage sporadic breast cancer for developing contralateral breast cancer (Brewster & Parker, 2011). Women might be choosing this procedure to ease their fear of recurrence, and by believing that CPM may improve their quality of life; others might be influenced by their physicians, partners, or even the media. In a small percentage of women, CPM is performed because of cancer in both breasts (Komen, 2012). The decision to undergo the CPM procedure should not be made without considerable thought (Komen, 2012). The National Comprehensive Cancer Network (NCCN) guidelines are discouraging women from considering CPM to help lower their incidence of developing breast cancer in their healthy breast and recommending that this procedure should only take place if women are considered at high risk of breast cancer (Komen, 2012).

Several clinical and pathological factors may be related to an increased risk for developing contralateral breast cancer in women with unilateral breast cancer. Some of these factors are young patient age, family history of breast cancer, chest radiation, lobular type histology, and multicentric cancer (Tuttle et al., 2007). In addition, patients who tested positive for BRCA1 and BRCA2 genetic mutations are at high risk for developing contralateral breast cancer. However, for most women with early stage sporadic unilateral breast cancer, the risk of a contralateral breast cancer is low (Brewster & Parker, 2011).

The increased rate of CPM is concerning among the group of women with low annual risk for developing contralateral breast cancer. CPM can greatly lower the risk of

developing breast cancer in the healthy breast but does not increase the overall survival rate and is not usually recommended (Komen, 2012). Tuttle et al. (2007) shared in their study that the effectiveness of CPM on reducing breast cancer mortality is still unclear and they suggested that further studies are critically needed in order to evaluate the patients' decision-making process that leads patients to consider CPM. Several factors can affect the decision-making process of women with unilateral breast cancer to undergo CPM but a gap exists in the literature because few studies have examined the influence of partner, physician and the media on the decision making process. The National Cancer Institute is discouraging this aggressive and irreversible procedure by stating that it is unnecessary for preventing contralateral breast cancer in most patients (NCI, 2007). The Mayo Clinic study demonstrated that many women have had unnecessary surgery (Siroky, 2012). This study was needed because the lack of information regarding the clinical benefits of CPM for women with sporadic or early stage breast cancer, as well as the influence of physicians, partner, or media on the CPM decision making process is a major area of public health concern. While researchers may know the factors that are influencing the decision-making process of women with unilateral breast cancer to undergo CPM, research was needed in order to develop a decision quality tool that helps women with unilateral breast cancer make an informed decision regarding their surgical choice. The decision quality tool could be a brochure that includes but not limited to the indication for the CPM procedure, the necessity and the medically unnecessary indication of the procedure, doctor's recommendation, the pro and cons of the procedure, the complications, and frequently asked questions, as well as feedbacks from patients who

did and did not choose CPM. The patient should have good knowledge regarding the irreversible procedure so they can make a shared informed decision about their treatment options.

Problem Statement

CPM is a procedure that women with unilateral breast cancer may choose because the scientific evidence suggests it might prevent breast cancer in the healthy breast. There are various reasons for the increase in CPM rates, but few studies have examined the influence of partner, physician, as well as the media on the women's decision-making process. Frost et al. (2005) identified in their study that the most frequently cited reasons for women with unilateral breast cancer to undergo CPM included the physician advice and the family history of breast cancer. Partners can also play a major role in the decision-making process. Women-partner shared decision-making is vital especially since the adjustment to body image after mastectomy can be a gradual and lengthy process. Physician-patient communication is also critically important in patients diagnosed with unilateral breast cancer. Women should be educated about their disease and the available treatment options so that they can make informed decisions related to their care.

The media may influence the decision-making process as well. The internet, television, radio, and advertising are easily accessible by individuals and can affect an individual’s decisions. The media sometimes quotes physicians, scientists, researchers, and many experts on the latest medical developments, so it might be difficult for people who do not have appropriate background knowledge to

disagree. Some medical companies may also use famous people to advertise for their products; these companies will publicize the fact that these celebrities agree with their point of view, product, or procedure, possibly because they believe that the general public holds celebrities in high regard. Some of the best-known examples for this trend are two famous actresses, Christina Applegate and Angelina Jolie. Christina Applegate was diagnosed with unilateral breast cancer in 2008 but opted to remove her healthy breast along with the affected breast (OSU, 2010). Applegate had a family history of breast cancer and tested positive for mutations in the BRCA gene. Angelina Jolie, who also tested positive for mutations in the BRCA1 gene, underwent a radical double mastectomy to lower her risk of developing cancer (Park, 2013). Kamenova et al. (2014) study highlighted the media's overwhelming positive slant toward Angelina Jolie's mastectomy while overlooked the other factors in her case, the challenges of "celebrity medicine," and how celebrities can influence people's medical decisions. Media don't usually gives details regarding BRCA mutation and what it means. Researchers from the University of Michigan analyzed 727 articles from major U.S. print publications that covered celebrities' breast cancer diagnoses and concluded that an increase in rate of women with breast cancer choosing double mastectomy may be influenced by media coverage of celebrities (Sabel & Dal Cin, 2016).

The BRCA mutations genetic test is not performed for every woman that is at risk of developing breast cancer; it is usually recommended by physicians for women of a younger age who may be at risk for developing breast cancer, or who

have several family members diagnosed with breast cancer. BRCA mutation testing is a very expensive test that can cost up to $3000 (Park, 2013) and insurance companies require that patients meet a threshold for needing the BRCA test before they consider covering its cost.

Despite knowing that CPM does not improve survival rate, many women with unilateral breast cancer are choosing this procedure in order to ease their fear and potentially extend their lives (Rosenberg et al., 2013). Rosenberg et al. (2013) suggested that evidence-based decision-making interventions are needed in order to improve risk communication. Several factors can affect the decision-making process of women with unilateral breast cancer to undergo a CPM, but to what extent was the decision, of a woman with unilateral breast cancer to have CPM influenced by the partner, physician, and media? There are several reasons for the increased rate in CPM, but few studies have examined the influence of partner, physician and the media on the decision-making process of women with unilateral breast cancer to undergo CPM. Breast cancer patients can be influenced by others and may not be making informed decision about engaging in this aggressive and irreversible procedure. Breast cancer patients should understand the benefits versus the risks of CPM in order to make informed decisions. This study is needed because the findings of the study could highlight the need for developing a decision quality tool that helps women with early stage unilateral breast cancer make informed decisions regarding their surgical choices and address an existing gap in the literature. The decision quality tool can be a brochure that includes but is not limited to the indication for the CPM procedure, the necessity and the medically

unnecessary indication of the procedure, doctor's recommendation, the pro and cons of the procedure, the complications, and frequently asked questions, as well as feedback from patients who did and did not choose CPM. The patient should have good knowledge regarding the irreversible procedure so they can make a shared informed decision about their treatment options.

Purpose of the Study

The purpose of this study was to assess the influence of the partner, physician, and media on the decision of women with unilateral breast cancer who decided to undergo CPM. The independent variables are the influence of partner, physician, and media; the dependent variable is the decision to undergo CPM.

Research Questions and Hypotheses

The research questions and hypotheses for this study were as follows:

Research Question 1: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by partners?

$H_0$1: Partners have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$1: Partners have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 2: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by physicians?

$H_0$2: Physicians have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$2: Physicians have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 3: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by the media?

$H_0$3: The media has no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$3: The media has a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Theoretical Framework

The decision theory was used as a theoretical framework to identify the impact of physician, partner and media on the decision-making process of breast cancer women to undergo CPM, as well as whether these women made the decision on their own, only by the physician; or whether the women and physicians exchanged information and preferences and made the decision together. By using the theoretical framework, the results of the study might move beyond the original questions and framework and might add something new to the body of the research.

Normative and Descriptive Decision Theories

The decision theory is founded on the connection between the rational preferences with certain structural properties (Buchak, 2013). The components of these theorems can be interpreted in different ways. Philosophy's interest in decision theory represents a union between two different lines of thought; one is centered around the question on how individuals ought to act, while the other is concerned with the action related to the actor’s

mental states (Buchak, 2013). As a result, philosophy has adopted this theory in two different uses, the normative use and the interpretive use. The subject of decision making has been active in psychological inquiry since the beginning of experimental psychology (Patel & Kaufman, 2002). Decision making research traces back to the 1940s and 50s (Patel et al., 2002). It was first inspired by Van Neumann and Morgenstern's theory of games (Patel et al., 2002). Social scientists in several different disciplines started to advance the systematic study of decision making and developed abstract theoretical models and conducted empirical studies (Patel et al., 2002). Other social science disciplines, including economics, business, psychology, sociology, and political science, dedicated significant effort in applying these models and refining them in order to investigate different phenomena and develop related applications (Patel et al., 2002).

The normative theories of decision making are based on two main types of models: the expected utility (EU) and the subjective expected utility (SEU; Patel et al., 2002). The idea behind these two models is that when making a decision, "one should maximize one's gain" (Patel et al., 2002, p. 55).The second type of model uses the notion of conditional probability as expressed "in the subjectivist, personalist, or Bayesian perspective" (Patel et al., 2002, p. 55). The aspects of these types of models are that they lay the standards of comparing and improving actual human decision-making and provide well defined mathematical models of rational decisions (Patel et al., 2002).

Shared Model of Decision-Making

The shared model of decision-making is the derivative of the normative decision theory. It integrates the feature that patients are consumers of medical care and have the

right to actively participate in the decision-making process concerning treatment choices and risk reduction strategies (Elwyn et al., 2012). Shared decision-making (SDM) has been defined as an approach in which physicians and patients jointly decide which medical treatment option is best based on current evidence and patient's preferences, needs, and values (Elwyn et al., 2012). The normative decision theory includes an active attempt in order to engage patient's values in the decision-making process. In order to accomplish this goal, patients are provided with decision aids such as informative brochures, videos, computer programs, as well as physician's inputs (Elwyn et al., 2012). This model is conceptualized as providing the patient with both objective medical information incorporated with their subjective values and opinions (Elwyn et al., 2012).

Nature of the Study

A quantitative cross-sectional survey design was used for this research. The survey design provided a numeric description (see Creswell, 2009) of the factors that are affecting the women decision to undergo CPM; as well as the influence of the partner, physician, and the media, on the woman's decision-making process. The survey for this study consisted of 16 questions that were adopted and modified from the Prophylactic Mastectomy Outcomes Study Survey (Geiger et al., 2006). Women with stage 0 to III early stage unilateral breast cancer ages 20-60 years old who underwent CPM at MD Anderson Cancer Center between January of 2010 and December of 2017 were the target population for this study. Excluded from the study were women who (a) had bilateral breast cancer before undergoing CPM; (b) had received any treatment for breast cancer before their initial visit to MD Anderson; (d) had bilateral breast cancer before

undergoing CPM; and (e) had incomplete documentation of diagnosis of breast cancer, hormone receptor status or metastatic disease were excluded from the study. The independent variables were the influence of partner, physician, and media; the dependent variable was the decision to undergo CPM. Descriptive statistics were used to analyze the characteristics of the patients, and binary outcomes modeled by logistic regression (binomial distribution with logit link) was used in order to assess the influence of doctors, partners and media on patient's decision to have CPM. For each outcome, inclusion of potential covariates was assessed by adding them to the model and comparing them to the model without the covariate based upon the Akaike Information Criteria (AIC); models including a covariate which did not improve (lower) the AIC with relation to the intercept-only model, implicitly showing no evidence of significant association between the outcome and that covariate.

Definition of Terms

The American Cancer Society website was used to define the following cancer-related terms (American Cancer Society, 2014).

Advanced Cancer/metastasis: "a general term describing stages of cancer in which the disease has spread from where it started (the primary site) to other parts of the body" (American Cancer Society, 2014, para. 27).

AJCC Staging System: "American Joint Committee on staging system (also called the TNM system), which is used to describe the extent of spread of many types of cancer, typically with the number 0 (zero) and Roman numerals I through IV" (American Cancer Society, 2014, para. 17).

Atypia: "not normal; refers to the appearance of cancerous or pre-cancerous cells under the microscope" (American Cancer Society, 2014, para. 70).

Bilateral: "on both right and left sides of the body" (American Cancer Society, 2014, para. 12).

Body image: "the way a person thinks about their body and how they think it looks to others" (American Cancer Society, 2014, para. 24).

BRCA1: "a gene which, when damaged (mutated), puts a person at a higher risk of developing breast, ovarian, and some other types of cancer when compared to people who do not have this mutation"(American Cancer Society, 2014, para. 35).

BRCA2: "a gene which, when damaged (mutated), puts a person at a higher risk of developing breast, ovarian, and some other types of cancer when compared to people who do not have this mutation" (American Cancer Society, 2014, para. 36).

Breast Cancer: "cancer that starts in the breast. The most common types of cancer are ductal carcinoma in situ, invasive ductal carcinoma, invasive lobular carcinoma, medullary carcinoma, and Paget disease of the nipple. Lobular carcinoma in situ is sometimes listed as non-invasive type of cancer, even though it is not a true cancer or pre-cancer" (American Cancer Society, 2014, para. 39).

Breast implant: "a sac used to increase the breast size or restore the shape of a breast after mastectomy (surgical removal of the breast). The sac is filled with silicone gel (a synthetic material) or sterile saltwater (saline)" (American Cancer Society, 2014, para. 41).

Breast Self-Exam (BSE): "a way to check your own breasts for lumps or suspicious changes" (American Cancer Society, 2014, para. 43).

Cancer: "a group of diseases which cause cells in the body to change and grow out of control. Most types of cancer cells from a lump or mass called a tumor" (American Cancer Society, 2014, para. 5).

Cancer cell: "a cell that divides and reproduces abnormally and can spread throughout the body, crowding out normal cells and tissue. Cancer cells develop because of damage to their deoxyribonucleic acid (DNA)" (American Cancer Society, 2014, para. 7).

Carcinoma in situ: "an early stage of cancer in which the cancer cells are only in the layer of cells where they first began, and have not grown into nearby tissues in other parts of the organ or spread to distant parts of the body" (American Cancer Society, 2014, par AJCC Staging System a. 20).

Decision quality tool: The decision quality tool can be a brochure that includes but not limited to the indication for the CPM procedure, the necessity and the medically unnecessary indication of the procedure, doctor's recommendation, the pro and cons of the procedure, the complications, and frequently asked questions, as well as feedbacks from patients who did and did not choose CPM. The patient should have good knowledge regarding the irreversible procedure so they can make a shared informed decision about their treatment options.

Fibrosis: "formation of scar-like tissues" (American Cancer Society, 2014).

Invasive ductal carcinoma: "a cancer that starts in the milk passages (ducts) of the breast and then breaks through the duct wall, where it grows into the fatty tissue of the breast. at this point, it can spread elsewhere. It is the most common type of breast cancer, accounting for about 80% of all invasive breast cancers" (American Cancer Society, 2014).

Invasive lobular carcinoma: "a cancer that starts in the milk-producing glands (lobules) of the breast and then breaks through the lobule walls and grows into the nearby fatty tissue. From there, it may spread elsewhere. About 1 in 10 invasive breast cancers are invasive lobular carcinomas. This type of cancer can be hard to detect by mammogram" (American Cancer Society, 2014).

Mammogram: "an x-ray of the breast; a method of finding breast cancer that can't be felt using the fingers" (American Cancer Society, 2014).

Mastectomy: "surgery to remove all or part of the breast and sometimes other tissue" (American Cancer Society, 2014).

Papilloma: "benign growth that extends out from a surface, such as wart" (American Cancer Society, 2014).

Prophylactic mastectomy: "is a mastectomy done before any evidence of cancer can be found, for the purpose of preventing cancer" (American Cancer Society, 2014).

Margin: "in cancer surgery or biopsy, the tissue beyond the visible edge of the tumor or abnormal tissue that is removed along with the tumor or abnormality, in an effort to get all of the cancer" (American Cancer Society, 2014).

Assumptions

This study helped identify the factors as well as the influence partner, physician, and media on the decision-making process of women with unilateral breast cancer to undergo a CPM. The following were the assumptions that were considered:

- The concern about breast cancer recurrence is one of the main factors that are driving the decision of women with unilateral breast cancer to undergo CPM.
- Surgeons could be influencing women with unilateral breast cancer to undergo CPM.
- Partners could be influencing women with unilateral breast cancer to undergo CPM.
- The media could influence women with unilateral breast cancer to make this drastic surgical decision to undergo CPM.

Because I used a survey to conduct my research study, I assumed that the patients would answer the questions truthfully. The consent that patients signed before answering the survey questions assured them that their anonymity and confidentiality was preserved and that they can withdraw from the study at any time with no ramifications. I also assumed that the sample that I chose was representative of the population I wanted to make inferences about. The assumption was the research provided a basis in order to develop theories as well as research instruments.

Scope and Delimitations

The women for the research study were identified from an existing cohort of breast cancer patients' age 20-60 years old, who were diagnosed with unilateral breast

cancer stage 0 to III, who had no clinical or radiographic evidence of contralateral breast cancer, and who underwent CPM between January of 2010 and December of 2017 at MD Anderson Cancer Center. Women who had bilateral breast cancer before undergoing CPM, received any treatment for breast cancer before their initial visit to MD Anderson, bilateral breast cancer before undergoing CPM, and patients with incomplete documentation of diagnosis of breast cancer, hormone receptor status or metastatic disease were excluded from the study. Based on the survey answers, I was able to identify who influenced the women to make their decision to undergo CPM and their satisfaction with their decision. Age diversity among participants created a better understanding of the different age group decision making process. The purpose of the time frame between January of 2010 and December of 2017 was to give time to the participants to cope with their decision-making process and have a clearer and unbiased answer to the survey questions. The results of my study may be valuable to other breast cancer treatment institutions with respect to their recommendations on the use of CPM for their own patients that are diagnosed with unilateral breast cancer. The shared model of decision making can be used in this kind of study since it is the derivative of the normative decision theory. The theory integrates the feature that patients are consumers of medical care and have the right to actively participate in the decision-making process concerning treatment choices and risk reduction strategies. I used the normative model because it helps in breaking complex problems down into component parts, which reduces the cognitive workloads; and link choices to norms external to decision problems in order to ensure rational choices (Brennan, 1995). The normative decision theory

helped promote patient satisfaction in three major ways: (a) it provided structures that helped patients understand and clarify decision problems and make choices based on their rationales and personal values; (b) it also helped providers to explicitly consider the patients' values and preferences in the process of making treatment recommendations, which increased the likelihood of the patient satisfaction with the treatment or plan of care; and (c) it supported the implementation of guidelines thank blended the multiple dimensions of patient satisfaction into a single, integrated judgment (Brennan, 1995).

Limitations

One possible limitation to my study was that the patients that were evaluated for my study are inherent to one single institution, which might affect the external validity or the generalizability of the study findings. The response bias might be the only bias that might affect my research; the breast cancer patients can consciously or unconsciously give responses that they think that the person conducting the research might want to see. The major methodological strength of this study was that all women who met criteria for the study received an e-mail to complete the survey; a larger sample size could lead to more reliable results. In order to address the response bias limitation, clear language was used in the survey to avoid a need for clarification to certain questions. The questions' words and phrases were chosen with care and the questions were not framed in a way that I would most likely get the answer I wanted to hear. Also, the amount of options were not confusing and I communicated why and how I was conducting this survey in the introduction part of the survey.

Significance

There are several factors that can affect the decision-making process of women with unilateral breast cancer to undergo a CPM. Some of the major factors are women younger than 50 years old, being White, a family history of breast cancer, BRCA1 and BRCA2 mutation testing, and the use of reconstruction as well as the genetic testing (Yi et al., 2010). Breast cancer patients should understand both the benefits and risks of CPM in order to make informed decisions. The patient decision should be influenced by knowledge; both their own and the information provided by their oncologist. Tutle et al. (2007) discussed the controversy of whether a physician should initiate a discussion about CPM when a patient could be treated with lumpectomy or unilateral mastectomy. Breast cancer patients can experience much stress around the time they are first diagnosed and may need to decide in a very short period of time; this decision about double mastectomy is irreversible (Tutle et al., 2007). Breast cancer patients should have more information about their disease and the treatment options and should be more involved in decisions about their care. Physicians should incorporate patient's values in the treatment decision. Patients may wish to undergo a process of shared decision-making with their provider to reach a final decision (Elwyn et al., 2012).

The purpose of this study was to assess the influence of the partner, physician, and media on the decision of women with unilateral breast cancer who decided to undergo CPM. The potential contribution of the study, to advance practice and promote positive social change, was that it could help in assessing the influence of the partner, physician, and media on the decision of women with unilateral breast cancer who decided

to undergo CPM. The findings could highlight the need of decision aids programs or tools that help breast cancer women increase their knowledge of their treatment options, reduce their decisional conflicts, and make informed decisions that align with their goals and values.

It is important for women with unilateral breast cancer to fully understand the benefits versus the adverse effects of CPM and make an informed decision regarding the irreversible surgical procedure. The starting point is the focus on improving the informed decision-making process (Rosenberg, & Partridge, 2014). Evidence-driven models are needed to better inform women about their risk of contralateral breast cancer in order to empower them in their active decision-making process (Yi et al., 2009).

Summary

Even though the CPM can be efficacious, the decision of a woman with unilateral breast cancer to undergo this irreversible procedure is substantial and requires that the patient weigh the risks and the benefits with their individual values before they make their final decision. The woman's role in the decision-making process to undergo CPM is still unclear. Information from this study may help in assessing the influence of the partner, physician, and media on the decision of women with unilateral breast cancer who decided to undergo CPM. Chapter 2 will discuss the current literature, literature search strategies, the theoretical framework, and critically evaluate the different studies that have been conducted and focused on CPM.

Chapter 2: Literature Review

Contralateral Prophylactic Mastectomy (CPM) is a procedure that women with unilateral breast cancer may choose because they believe it might prevent breast cancer in the healthy breast. The trend of the increasing rate of CPM among women with unilateral breast cancer has raised concern, particularly with the lack of evidence for a survival benefit related to the CPM procedure (Tracy, Rosenberg, Dominici, & Partridge, 2013), and with the minimal (0.5%-0.75%) annual risk of women with early stage sporadic breast cancer for developing contralateral breast cancer (Brewster & Parker, 2011). Women might be choosing this procedure to ease their fear of recurrence, and by believing that CPM may improve their quality of life; others might be influenced by their physicians, partners, or even the media. Despite knowing that CPM does not improve survival rate, many women with unilateral breast cancer are choosing this procedure in order to ease their fear and potentially extend their lives (Rosenberg et al., 2013). There are various reasons for the increase in CPM rates, but few studies have examined the influence of partner, physician, as well as the media, on the women's decision-making process. The purpose of this study was to identify the factors that affect the decision-making process of women who underwent CPM; and to what extent the decision, of a woman with unilateral breast cancer to have CPM was influenced by the partner, physician, and media. This chapter will include a discussion of the current literature, literature search strategies, the theoretical framework, and critically evaluate the different studies that have been conducted and focused on CPM.

Literature Search Strategy

I performed literature searches within several databases including PubMed, ACSO, NCBIMA, and ProQuest, as well as within online dissertations available at Walden University. Keyword combinations included: *prophylactic mastectomy, breast cancer screening, risk factors, risk reduction, decision making, surveillance, genetic testing, BRCA,* and *quality of life*. Thirty three articles that pertained to breast cancer and prophylactic mastectomies had distinctive gaps in the amount of information related to the influence of partner, physician, and media on the decision-making process of women with unilateral breast cancer who decided to undergo a high risk, irreversible prophylactic mastectomy in the healthy breast. For each journal article, a review of the abstracts was performed first, before a full-text study was reviewed. Several criteria were developed in order to narrow the focus of the search due to the availability of hundreds of studies related to prophylactic mastectomy. Studies were prioritized by eliminating studies that were performed before 2007. The articles that were not peer- reviewed were also eliminated, as well as the studies in which women were diagnosed with stage IV breast cancer and/or had clinical or radiographic evidence of contralateral breast cancer. Articles that involved women diagnosed with unilateral breast cancer stage 0 to III, who had no clinical or radiographic evidence of contralateral breast cancer, were given special attention.

Theoretical Foundation

Decision Science and Normative Decision Theory

Decision science claims its roots in economics, psychology, mathematics, and probability (Brennan, 1995). There are two recognized divisions of the decision theory: behavioral and normative (Brennan, 1995). Behavioral decision theory confirms that when the human's information-processing skills face a complex task, it will deteriorate, especially when judging uncertain situations (Brennan, 1995). The normative decision theory proposes ways "to compensate for the limitations of human information processing" (Brennan, 1995, p. 252). The normative models help in breaking complex problems down into component parts, which reduces the cognitive workloads and links choices "to norms external to decision problems" (Brennan, 1995, p. 252) in order to ensure rational choices. The normative decision theory helps promote patient satisfaction in major ways. First, it provides structures that help patients understand and clarify decision problems and make choices based on their rationales and personal values. Second, it can also help providers to explicitly consider patient values and preferences in the process of making treatment recommendations, which could increase patient satisfaction with the treatment or plan of care and support the implementation of guidelines that blend the multiple dimensions of patient satisfaction into a single, integrated judgment (Brennan, 1995).

Normative decision theory suggests that an individual's decision is made by unbiased, logical and measured assessment of the advantages and disadvantages surrounding a choice. Specifying criteria or evaluating standards for decision making is

what constitute a good decision (Patel et al., 2002). Rationale decision-making is the framing assumption of the normative decision (Patel et al., 2002). The normative models of the physician-patient relationship in the treatment decision-making process have been used, developed and advocated in several studies (Szasz & Hollander, 1956; Veatch, 1972; Quill, 1983; Emanuel & Emanuel, 1992; Deber, 1994).

Shared Model of Decision Making

The shared model of decision making is a derivative of the normative decision theory and was used in my research study as a theoretical framework. It integrates the feature that patients are consumers of medical care and have the right to actively participate in the decision-making process concerning treatment choices and risk reduction strategies. The normative decision theory includes an active attempt in order to engage patient values in the decision-making process. In order to accomplish this goal, patients are provided with decision aids such as informative brochures, videos, computer programs, as well as physicians' inputs. This model is conceptualized as providing the patient with both objective medical information incorporated with subjective values and opinions (Elwyn et al., 2012). The term shared decision making (SDM) was first introduced in a report entitled "President's Commission for The Study of Ethical Problems in Medicine and Biomedical Research" (AHRQ, 1998). This report focused on increasing interest in patient-centredness and on increasing the patient's autonomy in healthcare interaction since 1970s (AHRQ, 1998). Referring to a Consumer Bill of Rights, this report stated:

Consumers have the right and responsibility to fully participate in all decisions related to their health care. Consumers who are unable to fully participate in treatment decisions have the right to be represented by parents, guardians, family members, or other conservators. Physicians and other health professionals should: provide patients with sufficient information and opportunity to decide among treatment options consistent with the informed consent process; discuss all treatment options with a patient in a culturally competent manner, including the option of no treatment at all; ensure that persons with disabilities have effective communications with members of the health system in making such decisions; discuss all current treatments a consumer may be undergoing; discuss all risks, benefits, and consequences to treatment or non-treatment; give patients the opportunity to refuse treatment and to express preferences about future treatment decisions; discuss the use of advance directives -- both living wills and durable powers of attorney for health care -- with patients and their designated family members; abide by the decisions made by their patients and/or their designated representatives consistent with the informed consent process. Health plans, providers, and facilities should: disclose to consumers factors -- such as methods of compensation, ownership of or interest in health care facilities, or matters of conscience -- that could influence advice or treatment decisions; assure that provider contracts do not contain any so-called "gag clauses" or other contractual mechanisms that restrict health care providers' ability to communicate with and advise patients about medically necessary treatment options; be prohibited from

> penalizing or seeking retribution against health care professionals or other health workers for advocating on behalf of their patients (AHRQ, 1998, p.1).

Achieving SDM depends on building a good relationship between the physician and the patients in the clinical encounter in order for the information to be shared with the breast cancer patients and that the patients are supported to express and deliberate their preferences regarding their treatment options during the decision making process (Elwyn et al., 2012). The patient's decision should not only be influenced by a partner, physician, or the media. It should play an active role in making an informed decision regarding the treatment options. (SDM) has been defined as an approach in which physicians and patients jointly decide which medical treatment option is best based on current evidence and patient's preferences, needs and values (Elwyn et al., 2012). Patients' decision can be compromised and affected by the disease or the stressful situations, such as the new diagnosis of breast cancer. For this reason, patients should be provided with tools and education that help them make an informed decision.

Breast Cancer

Risk Factors

Breast cancer is a disease that affects one in eight women during their lifetime (NIH, 2013a). It is the second leading cause of death in women after lung cancer (NIH, 2013a). It is not well understood why some women are affected with breast cancer more than others, but there are some risk factors that could be the cause of breast cancer. Some of these risk factors include age, genes (BRAC1 and BRAC2), personal factors, such as women who begin their menstrual cycle before the age of 12 or go through menopause

after age 55, being overweight, hormone replacement therapy, birth control pills, consuming high amount of alcohol, not having the first child before the age of 35, or having dense breasts (NIH, 2013a). Symptoms of breast cancer can differ from one woman to another. These symptoms include a lump in the breast, changes in the shape and size of the breast, and/or nipple discharge (NIH, 2013a). Breast cancer may be found early through a self-breast exam, mammography, and/or clinical breast exam. If found early, there is better chance for breast cancer to be successfully treated (ACS, 2014). Treatment may consist of lumpectomy, mastectomy, chemotherapy, radiation, and/or hormonal therapy. Women who are at a very high risk of developing breast cancer may undergo a prophylactic mastectomy. In addition, the women who are diagnosed with breast cancer and have high risk of developing breast cancer in the healthy breast may consider CPM. Traditionally, CPM was performed on women with unilateral breast cancer with mutations in the BRAC genes (Jin, 2013, p. 1548) but in recent years more women with unilateral breast cancer who lack mutations are also undergoing CPM (Jin, 2013, p. 1548).

Breast Cancer Screening

The American Cancer Society's recommendations regarding breast cancer screenings are:

- Women aged 40 years and older should have a mammogram yearly and should continue to do so for as long as they are in good health (ACS, 2014).
- Women in their 20s should start Breast Self-Exam (BSE). They should be informed by their health professional regarding the benefits and limitations of

SBE. Any changes in their breast should be reported immediately to their health professional (ACS, 2014).

- Women in their 20s and 30s should have a clinical breast exam (CBE) as part of a periodic (regular) health exam by a health professional preferably every 3 years. Starting at age 40, women should have a CBE by a health professional every year (ACS, 2014).
- Women who are at high risk (greater than 20% lifetime risk) for breast cancer based on certain factors should get an MRI and a mammogram every year. Women who are at moderate risk (15% to 20% lifetime risk) should talk to their health professional regarding the benefits and limitations of adding MRI screening to their yearly mammogram. Yearly MRI screening is not recommended for women who are at a lifetime low risk (less than 15%) of developing breast cancer (ACS, 2014). Breast Cancer Risk Factors That Cannot Change Gender. Being a woman is one of the main risk factors for developing breast cancer. Men can also develop breast cancer but the disease much more common among women than men (ACS, 2014). This is due to the fact that men have less of the female hormones, estrogen and progesterone, which can promote the growth of breast cancer cells (ACS, 2014).
- Aging. Age is another risk factor for developing breast cancer. The risk of developing breast cancer increases as individuals get older (ACS, 2014). About 1 out of 8 invasive breast cancers are found in women younger than 45, and 2 of 3 invasive breast cancer are found in women age 55 and older (ACS, 2014).

- Genetic risk factors. Breast cancer can be hereditary; the American Cancer Society believes that 5% to 10% of breast cancer cases are thought to be hereditary (ACS, 2014), which is caused by inheriting gene defects/ mutations from a parent. Inherited BRCA1 and BRCA2 are the most common cause of hereditary breast cancer (ACS, 2014). In normal cells, BRCA1 and BRCA2 genes prevent cancer by making proteins that help keep the cells from growing abnormally (ACS, 2014); an inherited mutated copy of either gene from a parent, can result in a higher risk of developing breast cancer during a lifetime. Women who inherited these mutations are at high risk of developing breast cancer at a younger age and these mutations more often affect both breasts than cancers not linked to these mutations (ACS, 2014). Women with inherited BRCA1 and BRCA2 gene mutations are also at high risk of developing other cancers, and particularly ovarian cancer (ACS, 2014).

There are also changes in other genes that can put the women at a high risk of developing breast cancer, these gene mutations are rare but can cause inherited breast cancer as well (ACS, 2014). The following list defines various gene changes:

- ATM: The normal function of the ATM genes is to help repair damaged DNA (ACS, 2014); but inheriting one abnormal copy of the ATM gene can link to a high rate of breast cancer in some families (ACS, 2014, p.3).
- TP53: the role of this gene is to give instructions for making P53 protein that helps stop the growth of abnormal cells (ACS, 2014). Inherited P53 mutations

cause Li-Fraumeni syndrome. People who have the Li-Fraumeni syndrome have a higher risk of developing breast cancer as well as other types of cancer.

- CHEK2: the Li-Fraumeni syndrome can also be caused by inherited CHEK2 gene mutations, when mutated it can increase breast cancer risk about two-fold (ACS, 2014, p.3).

There are also other gene mutations like PTEN, CDH1, and STK11 that increase the risk of developing breast cancer (ACS, 2014).

Additional Risk Factors

Beyond biological and genetic factors found to influence developing breast cancer are other variables also have been found to resulting in enhanced risk. These factors include family history, race and ethnic, dense breast tissue, certain benign breast conditions, lobular carcinoma in situ (LCIS), early starting or late ending menstrual periods, previous chest radiation in women, and diethylstilbestrol (DES) exposure. In this section, I describe each of these factors.

Family history of breast cancer. Women that have close blood relatives who have breast cancer are at higher risk of developing this disease (ACS, 2014). Having a first-degree relative like mother, sister or daughter with breast cancer doubles the woman's risk for developing this disease (ACS, 2014) having more than one first-degree relative with this disease can increase the woman's risk about tree fold (ACS, 2014).

Race and ethnicity. Caucasian women are more likely to develop breast cancer than African American women, but African American Women are more likely to die from this disease (ACS, 2014). African American women 45 years of age and younger,

are more prone to have breast cancer (ACS, 2014). Native American, Hispanic, and Asian women are at lower risk of developing breast cancer.

Dense breast tissue. Several factors can affect breast density; some of these factors are age, genetics, hormonal therapy for menopause, and menopausal status. Women with dense breast tissues are at higher risk for developing breast cancer, when compared to women with less dense breast (ACS, 2014).

Certain benign breast conditions. Women who are diagnosed with certain benign breast conditions are at higher risk of developing breast cancer (ACS, 2014). The benign breast conditions are often divided into three groups; non-proliferative lesions (fibrosis, adenosis, non-sclerosing, mild hyperplasia, benign phyllodes tumor, single papilloma, fat necrosis, duct ectasia, periductal fibrosis, squamous and apocrine metaplasia, infection of the breast, and other benign tumors), proliferative lesions without atypia (ductal hyperplasia without atypia, adenosis, papilloma, or scar), and proliferative lesions with atypia (ductal hyperplasia (ADH), and lobular hyperplasia (ALH)) (ACS, 2014).

Lobular carcinoma in situ (LCIS). In LCIS, "cells that look like cancer cells are growing in the lobules of the milk-producing glands of the breast, but they do not grow through the wall of the lobules" (ACS, 2014, p.7). Women with LCIS are 7 to 11 times more prone to develop breast cancer in either breast (ACS, 2014).

Menstrual periods. According to the American Cancer Society (2014), women who had their first menstrual cycles before the age of 12 and/or went through menopause after age 55 are at higher risk of developing breast cancer. The increase in risk is due to

the fact that these women are more exposed during their lifetime to the hormones estrogen and progesterone (ACS, 2014).

Previous chest radiation, women. Who at a younger age were treated with radiation therapy to the chest due to another type of cancer like Hodgkin disease or non-Hodgkin lymphoma, are at higher risk of developing breast cancer. The younger (during adolescence) the woman was when she received chest radiation the higher the risk of developing breast cancer; this is due to the fact that the breasts were still developing (ACS, 2014). Radiation treatment after the age of 40 did not seem to increase the risk of breast cancer (ACS, 2014).

Diethylstilbestrol (DES) exposure. DES was an estrogen-like drug that was given to women from the 1940s through the early 1970s in order to lower their chances of miscarriage (ACS, 2014). These women have a slightly increased risk of developing breast cancer (ACS, 2014). In addition, women whose mothers took DES during pregnancy have a slightly higher risk of developing breast cancer (ACS, 2014).

Prophylactic Mastectomy on the Rise for Breast Cancer.

Many women who are diagnosed with unilateral breast cancer are choosing to undergo CPM in order to prevent breast cancer in the healthy breast. The rate of CPM in the United States has more than doubled from 1.8% in 1998 to 4.5 % in 2003 (Tuttle et al., 2007). The trend of increasing the rate of CPM among women with unilateral breast cancer has raised concern, especially with the lack of evidence for a survival benefit related to the CPM procedure (Tracy et al., 2013). Women may be choosing this procedure in order to ease their fears of recurrence. These women may also believe that

CPM may improve their quality of life. Tuttle et al. (2007) noted that CPM is another way to prevent breast cancer in the healthy breast; this procedure is on the rise, but is it really necessary? The rationale of CPM comes from the premise that women who are diagnosed with unilateral breast cancer have a better chance to survive the primary breast tumor, that the treatment used for the index cancer might leave the women with unilateral breast cancer at significant risk of developing contralateral breast cancer (CBC), and that CBC will compromise their survival (Khan, 2011). Two different population-based studies showed that in women first diagnosed with breast cancer before the age of 50, all CBC occurred at the annual rate of 0.1%, and for the same age group but with HR-negative first breast tumor, the rate was 0.2% (Kurian et al., 2009; Bouchardy et al., 2010). For women diagnosed with breast cancer after the age of 50 at first diagnosis, the CBC rate was even lower (Kurian et al., 2009). The second study showed that the overall rate of CBC is 0.3% per year; when the first breast tumor was HR-negative, the rate was 0.25%, whereas when the tumor was HR-positive, the rate was 0.65% (Bouchardy et al., 2010). The data from these two studies revealed that the risk of developing CBC is higher for women with an HR-negative first primary breast cancer. Thus, three different studies confirmed that HR negativity still did not emerge as a selection factor for CBC (Stucky et al., 2010; Arrington et al., 2009; King et al., 2011). Boughey et al. (2010) found that there is a non-significant breast cancer-specific survival advantage for CPM.

The effectiveness of CPM in reducing breast cancer mortality is still unclear. Tuttle et al. (2007) suggested that further studies are critically needed in order to evaluate the patients' decision-making process that is leading them to consider CPM, and to

understand the decision-making process behind this aggressive breast cancer surgery. Brewster and Parker (2011) also noted that the CPM rate in the U.S. among women with unilateral invasive breast cancer increased by 150% from 1993 to 2003; patients might overestimate the benefits of CPM and others may underestimate the severity of some of the side effects associated with this procedure. It is important for women with unilateral breast cancer to fully understand the benefits as well as the side effects that are associated with CPM in order to make informed and supported decisions, based on accurate understanding of the pros versus the cons of the procedure.

Efficacy of CPM

Prophylactic mastectomy can reduce the risk of breast cancer in women with strong family history of breast cancer, who have a mutation in the BRCA1 gene or BRCA2 gene, or who have other breast cancer associated mutations in other genes, such as TP53 and PTEN (NCI, 2013b). However prophylactic mastectomy is not considered an appropriate cancer prevention option for women who had breast cancer in one breast but are not at the highest risk of developing cancer in the healthy breast; such women may however consider the use of certain drugs to reduce their risk (NCI, 2013b). The risk of developing another breast cancer in the same breast or the contralateral breast is very small, especially if women receive adjuvant chemotherapy or hormone therapy as part of their cancer treatment (NCI, 2013b). Despite knowing that CPM does not improve survival rate, many women with unilateral breast cancer are choosing this procedure in order to ease their fear and extend their lives (Rosenberg et al., 2013). Rosenberg et al.

(2013) suggested that evidence-based decision-making interventions are needed in order to improve risk communication.

Factors Associated with CPM Decision-Making

Yi et al. (2010) were able to identify different factors that were associated with the decision-making process of women with unilateral breast cancer undergoing CPM. The major factors identified were women younger than 50 years old, white ethnicity, a family history of breast cancer, BRCA1 and BRCA2 mutation testing, and the use of reconstruction as well as the genetic testing. Women were not always informed of their absolute risk of developing contralateral breast cancer as well as the risk of recurrence from the primary breast cancer; Yi et al. (2010) suggested that evidence-driven models are needed to help women in their active decision-making process. Jones et al. (2009) also showed that women who are choosing to have CPM were younger, more highly educated, and more likely to have a family history of cancer (p. 2696). King et al. (2011) tried to determine in their study whether the increased rate of CPM was related to the recognition of risk factors for contralateral breast cancer or treatment factors related to the index lesion. The result of their study showed that the increased use of CPM was not associated with the increase recognition of the breast cancer patients who are at high risk for CBC. Treatment factors such as MRI, immediate reconstruction, and unsuccessful breast conservation attempts were associated with the increased rates of CPM (King et al., 2011). King et al. (2011) also suggested that patient education is needed in order to decrease the rates of unnecessary tests and optimize breast conservation.

Physicians Influence on CPM Decision Making Process

A breast cancer diagnosis can carry with it a fear of death, depression, and severe anxiety. The timing for these psychological factors could not be worse, as the women who are diagnosed with breast cancer must make complicated treatment decisions and pass through different treatment regimens. A significant number of women who are diagnosed with breast cancer choose to undergo CPM in order to reduce the risk of contralateral breast cancer (CBC; Yi et al., 2010). The decision-making process between surgeons and patients is complicated (Yi et al., 2010). The patient- physician relationship should shift from a traditional paternalistic model and in which all the decisions are made primarily by the physician to one in which patients are informed of their health care, risks, benefits, and treatment options and should participate in the decision-making process (Nekhlyudov et al., 2005). This approach is also known as "informed decision-making". In this process the patient knows the risks, and benefits of her disease and treatment options, and engages in the decision-making, or "shared decision making" (Nekhlyudov et al., 2005, p.55). Patient involvement is important since the effect of the decision may be substantial (Nekhlyudov et al., 2005). Assessing the patients for CBC risks, tumor histology, and multicentricity are key elements in the decision-making process. There are also other issues to consider which include reconstruction surgeries, and the ability to achieve symmetry if a patient only considers unilateral mastectomy and the projected oncologic outcome from the known ipsilateral breast cancer (Yi et al., 2010).

Katz and Morrow, in their article entitled "Contralateral Prophylactic Mastectomy for Breast Cancer Addressing Peace of Mind" (Katz & Morrow, 2013) believed that surgeons are not always clear about why they perform CPM for low risk women with unilateral breast cancer, and that they are increasingly uncomfortable with performing more extensive, irreversible surgeries that may be associated with additional morbidity and complications. The majority of these patients are prone to overtreatment, especially since the insurance companies cover CPM regardless of risk of secondary breast cancer, and reinforce the notion that CPM is clinically indicated; it also facilitates the patient self-referral to a surgeon who is willing to perform this procedure (Katz & Morrow, 2013). Katz and Morrow (2013) suggested that clinical indications for CPM are needed before the insurance companies provide coverage to patients; by doing so, the factors that may affect surgeons to address overtreatment will be reduced. Abbott et al. (2011) highlighted an important issue regarding CPM in their study and suggested that early physician counseling is needed in order to provide breast cancer patients with accurate information regarding their true contralateral breast cancer (CBC) risk. They also noticed that the rate of CPM is increasing; they decided to study and assess the perceptions of CBC risk among breast cancer women and to evaluate the risk factors associated with the risk perception. They concluded that the perceived risk of CBC was not associated with the cancer stage, family history, age, or CPM; that women with UBC, and at time of surgical evaluation overestimate their risk of CBC; however, this elevated risk perception was not associated with choosing CPM (Abbott et al., 2011).

Brewster and Parkers (2011) in their study "Current Knowledge on Contralateral Prophylactic Mastectomy among Women with Sporadic Breast Cancer" discussed the issue of the lack of information regarding the clinical value of CPM among breast cancer patients with sporadic breast cancer, and acknowledged the fact that there is an increase in the numbers of CPM in the United States among patients with unilateral invasive breast cancer between 1993 and 2003 (150% increase). They also discussed the conflicted evidence about whether CPM can reduce breast cancer mortality rates or overall death. They noted that there are gaps in knowledge regarding the clinical value of CPM including patient and physician related psychosocial factors that influence the decision-making process of breast cancer women with sporadic breast cancer to undergo CPM (Brewster, & Parker, 2011). NCI (2007) highlighted the importance for breast cancer patients to be aware of the higher risk of systemic metastases from unilateral breast cancer that exceeds the risk of contralateral breast cancer and that most patients will not experience any survival benefits from CPM (NCI, 2007). Komen (2012) provided information about the National Comprehensive Cancer Network (NCCN) guidelines that are discouraging women to consider CPM to lower their incidence of getting breast cancer in their healthy breast, and recommending that this procedure should only take place if women are considered at high risk of breast cancer which include patients who carry a BRAC1 or BRAC2 mutation or those with Li-Fraumeni Syndromes (Komen, 2012).

Preventative medicine is usually encouraged by physicians and by the media but choosing to remove both breasts in order to prevent breast cancer in the healthy breast

seems to be growing increasingly common (Breast Cancer, 2013). There is limited data in the literature characterizing the influence of physicians, partners, and the media on the decision-making process of women with unilateral breast cancer to undergo CPM.

Celebrities Influence on CPM Decision Making Process

The media may use celebrities' spokespersons in public health and marketing industries in order to influence the public about an issue or a new product. Spokespeople have more opportunities to influence behavior because the public is exposed more than ever to media messages (Shimp, 2007). Media's reports regarding celebrities' decision concerning the risk of developing breast cancer present bias toward CPM. This may say breast cancer patients' opinion about CPM, particularly when factors such as risk and genetic are excluded (Sabel, 2016).

Summary and Conclusions

When faced with life threatening diseases like breast cancer, patients might make uninformed decisions regarding their treatment. They might also overestimate the benefits of CPM and others may underestimate the severity of some of the side effects associated with this procedure. It is important for women with unilateral breast cancer to fully understand the benefits as well as the side effects that are associated with CPM in order to make informed and supported decisions, based on accurate understanding of the pros versus the cons of the procedure. Decision-making surrounding early diagnosis of breast cancer, with respect to CPM option, and by using a shared decision-making approach, gives patients and physicians the opportunity to jointly decide which medical treatment option is best based on current evidence and patient's preferences, needs and

values (Rosenberg, & Partridge, 2014). A clinical educational instrument is important to help women with unilateral breast cancer make informed decision regarding CPM, and to improve the quality of life of breast cancer survivors. Chapter 3 will describe the research design, methodology, data collection, and data analysis used in the research. Studies covered the various reasons for the increase in CPM rates, but few studies have examined the influence of partner, physician, as well as the media, on the women's decision-making process.

Chapter 3: Research Method

Introduction

The purpose of this study was to determine whether the decision made by women with unilateral breast cancer who underwent CPM was influenced by the physician, partner, or media, or whether it was a shared and informed decision made by the patient. This chapter describes the methods used in the proposed study in order to explore the influences of physicians, partners, and media on the decision-making process of women with unilateral breast cancer and who choose to undergo CPM. This chapter consists of seven sections which include: the research design, population and sample size, description of the study variables, instrumentation, data analysis, protection of patient information, and dissemination findings, and concludes with a summary.

Research Design and Rationale

I used a quantitative cross-sectional survey design. The survey design provided a description of the factors that affect a woman's decision to undergo CPM as well as the influence of the partner, physician, and the media, on the woman's decision-making process. The advantage of using a quantitative design in this research study is that the researcher can use a survey to ask questions without revealing a point of view, which can reduce potential bias (Creswell, 2009). A disadvantage to the quantitative design used in this research is that I could not discover insights into the breast cancer patients' feelings about the topic. The independent variables are the influence of partner, physician, and media; the dependent variable is the decision to undergo CPM. Time and resource

constraints are some of the barriers that I faced throughout my dissertation; my research required many visits to the hospital library and the data collection office.

Methodology

Population

The women for the research study were identified from an existing cohort of breast cancer patients, age 20-60 years old, who were diagnosed with unilateral breast cancer stage 0 to III, who had no clinical or radiographic evidence of contralateral breast cancer, and who underwent CPM between January of 2010 and December of 2017 at MD Anderson Cancer Center; the overall number of women available to survey was 1341. I excluded from the study, women who had bilateral breast cancer before undergoing CPM, who had received any treatment for breast cancer before their initial visit to MD Anderson, women who had bilateral breast cancer before undergoing CPM and patients with incomplete documentation of diagnosis of breast cancer, hormone receptor status or metastatic disease.

Sampling and Sampling Procedures

Women were selected from the surgical breast cancer database at MD Anderson Cancer Center. The sample size was calculated by using the creative research systems. In order to determine the sample size for the study, a power analysis was conducted to determine what an optimal sample size was. Power refers to the probability that the test used in the study will find a significant statistical difference when this difference exists (UMICH, 2015) and that the null hypothesis can be rejected, when it should, thus voiding

a type II error. Power should be 0.8 or greater (805) in order to find a statistically significant difference when there is one (UMICH, 2015).

The alpha for the test of this model was set at 0.05. In order to achieve power of 0.80 and a medium effect size, a sample of 384 was required in order to detect differences in the research study. The sample size was calculated by using the creative research systems (Conservation Gateway, 2015); I used a confidence level of 95 and a confidence interval level of 5 and got the sample size of 384.

Procedures for Recruitment, Participation, and Data Collection

Participants received a link to the survey using the Red Cap platform. The survey took approximately 15 minutes to complete. An informed consent was included on the first page of the survey. The survey allowed the participants for "no response "or "prefer not to respond" as an option for every survey question. The email invitation collector option was used as well in order to check if respondent has responded, opted out, or was bounced from the recipient section. After 2 days, a reminder email was sent to participants, and after 4 days, a second reminder email was sent to participants to remind them to complete the survey. No clinical data was collected for patients who did not consent to the survey.

Instrumentation and Operationalization of Constructs

The survey used in this research study included different sections that examined the preferences, knowledge, decision making, and experiences of women with breast cancer to have CPM; and in which participants had to check the one best answer to each of the questions. The survey consisted of 16 questions that were adopted and modified

from the "Prophylactic Mastectomy Outcomes Study Survey" (Geiger et al., 2006). The Prophylactic Mastectomy Outcomes Study Survey has been used in multiple studies (Nekhlyodov et al., 2005; Greene et al., 2006; Geiger et al., 2006a; Geiger et al., 2006b). The development of the original survey used in these studies listed above included expert and focus group review for validity and reliability (Nekhlyodov et al., 2005). "The instrument included the following domains: women's roles in the CPM decision, past and current satisfaction with CPM, current concern about getting breast cancer again, and depressive symptoms, as well as patient characteristics including age, race/ethnicity, education, marital status, breast cancer stage at CPM, and current perception of general health" (Nekhlyodov et al., 2005).

I used the modified Control Preference Scale in order to assess the women's decision-making process at the time of CPM. The modified Control Preference Scale was developed based on a grounded theory of how patients with life- threatening diseases make their decisions (Nekhlyudov et al., 2005).The scale had been previously validated to assess preferences for as well as the experiences in the decision making process, and was modified for the use in mailed and/or telephone-administered surveys (Nekhlyudov et al., 2005). The scale assesses patient involvement in decision making. Informed choice is where the patients seeks information and plays an active role in the decision-making process. SDM is where the patient and the provider exchange information and preferences and make joint decision. The paternalistic approach is where the patient takes a passive role and the decision is made by the provider (Nekhlyudov et al., 2005). I also included when a decision is made by the partner or influenced by the media to fall under

the paternalistic approach. In order to measure between the dependent variable (decision making) and the independent variables (influence of partner, physician, and media on the decision making process of women with early stage unilateral breast cancer); the participants were asked to describe their decision about the CPM and were asked to choose all that applied from the following list:

- I made the final decision to have surgery.
- I made the final decision to have surgery after seriously considering my doctor's opinion.
- My doctor and I shared responsibility for the final decision to have surgery.
- My doctor made the final decision about my surgery, but seriously considered my opinion.
- My doctor made the final decision about my surgery.
- I made the final decision to have surgery after seriously considering my partner's opinion.
- My partner made the final decision about my surgery.

Regarding the media influence; patients were asked to choose a number to indicate whether or not the media had influenced their decision making to undergo CPM with number one being *not at all* to number five being *very much.* Table 1 depicts the variable names and types that were used in this study.

Table 1

Variables Names and Types

Variables	Type of variables	Research Questions	Responses available
Partner's Influence on the decision-making process	Nominal	To what extent is the decision, of a woman with unilateral breast cancer, to have CPM influenced by partners?	1) the woman made the decision On Own, 2) the woman made the decision after considering the partner's opinion, 3) the woman shared the decision with the partner, and 4) the partner/doctor decided On Own.
Physicians' influence on the decision-making process	Nominal	To what extent is the decision, of a woman with unilateral breast cancer, to have CPM influenced by physicians?	1) the woman made the decision On Own, 2) the woman made the decision after considering the doctor's opinion, 3) the woman shared the decision with the doctor, and 4) the doctor decided On Own.
Media's Influence on the decision-making process	Ordinal	Please choose one number to indicate whether or not the media had influenced the decision of woman with unilateral breast cancer to undergo prophylactic mastectomy.	1) Not at All, 2) A Little Bit, 3) Somewhat, 4) Quite a Bit, 5) Very Much

Data Analysis

In order to assess the influence of doctors, partners, or media on patients' decision to have a CPM performed, four binary outcome variables were defined: Doctor-influenced versus self-choice [implying that the patient had checked at least one of the "doctor" related influence statements on the survey (doctor-influenced) versus having checked the "I made the final decision to have surgery" but none of the doctor-influenced statements (self-choice)], Partner-influenced versus self-choice [implying that the patient

had checked at least one of the "partner" related influence statements on the survey (partner-influenced) versus having checked the "I made the final decision to have surgery" but none of the partner-influenced statements (self-choice), for patients who indicated the presence of partners under the Marital Status section of the survey], Media-influenced versus self-choice [implying that the patient had checked at least one of the "media" related influence statements on the survey other than "*Not At All*" (media-influenced) versus having checked the "I made the final decision to have surgery" but none of the media-influenced statements (self-choice)], Any-influence versus self-choice [implying that the patient had checked at least one of the doctor, partner, or media related influence statements on the survey as with the above variables]. Henceforth these binary variables will be referred to as simply doctor-influenced, partner-influenced, media-influenced, and any-influenced.

Incidence of each of the binary outcomes was modeled by logistic regression (binomial distribution with logit link). For each outcome, inclusion of potential covariates was assessed by adding them to the model and comparing them to the model without the covariate based upon the Akaike Information Criteria (AIC); models including a covariate which did not improve (lower) the AIC with relation to the model without it implicitly show no evidence of significant association between the outcome and that covariate. Potential covariates considered included the presence of family history of breast cancer, age category, race, marital status, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as

the definitive surgery, tumor grade, and pathology stage. For the doctor-influenced and partner-influenced models, only the inclusion of the covariate for family history of breast cancer improved the model. For the media influenced model, none of the covariates yielded improved models over the intercept-only model. For the any-influence model, inclusion of the covariates for family history of breast cancer and pathology stage each improved the model and including both covariates yielded the most improved model. Further, inclusion of both of these variables in models for the other outcomes had little effect on the otherwise optimal model, so for consistency I will base final analysis summaries and figures on these two-covariate models. Note that the covariates for marital status and presence of partner were excluded from consideration of inclusion in the partner-influenced and any-influenced model due to confounding with partner-influence. Differences among levels of variables with 3 or more levels were assessed by Tukey-adjusted contrasts.

Additionally, for the sake of completion, fully-adjusted versions of the above models for each of the binary outcomes were produced, including the presence of covariates for family history of breast cancer, age category, race, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as the definitive surgery, tumor grade, and pathology stage, with the exception that the presence of partner was excluded from inclusion in the partner-influenced and any-influenced model due to confounding with partner-influence. These fully adjusted models had by far the highest AICs among the models considered for each

outcome, and were thus the worst among all models, plus may be subject to some lack of independence among the covariates.

Statistical analyses were performed using R statistical software (R Core Team, 2019, version 3.6.1). In all statistical tests, two-sided alpha=.05. Predictions and differences among factor levels in the logistic regression models were estimated using the "emmeans" package (Lenth 2018); this includes adjusted means weighted proportionally to covariate marginal frequencies. Catseye plots (Cumming 2014) were produced using the "catseyes" package (Andersen 2019).

For Research Question 1 (Quantitative): To what extent is the decision, of a woman with unilateral breast cancer, to have CPM influenced by partners?

Potential covariates considered included the presence of family history of breast cancer, age category, race, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as the definitive surgery, tumor grade, and pathology stage. For partner-influenced models, only the inclusion of the covariate for family history of breast cancer improved the model (p=0.014).

For Research Question 2 (Quantitative): To what extent is the decision, of a woman with unilateral breast cancer, to have CPM influenced by physicians?

Potential covariates considered included the presence of family history of breast cancer, age category, race, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as the definitive surgery, tumor grade, and

pathology stage. For the doctor-influenced models, only the inclusion of the covariate for family history of breast cancer improved the model (p=0.041).

For Research Question 3 (Quantitative): To what extent is the decision, of a woman with unilateral breast cancer, to have CPM influenced by the media? Potential covariates considered included the presence of family history of breast cancer, age category, race, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as the definitive surgery, tumor grade, and pathology stage. For the media-influenced models, only the inclusion of the covariate for pathological stage (II-0) improved the model (p=0.022).

The research questions that guided this study were:

The research questions and hypotheses for this study were as follows:

Research Question 1: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by partners?

$H_0$1: Partners have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$1: Partners have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 2: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by physicians?

$H_0$2: Physicians have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$2: Physicians have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 3: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by the media?

$H_0$3: The media has no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$3: The media has a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

The independent variables were the influence of partner, physician, and media; the dependent variable was the decision to undergo CPM. The woman's decision-making roles regarding CPM were divided into five categories: (a) the woman made the decision on her own, (b) the woman's decision to undergo CPM was influenced by the physician, (c) the woman shared the decision with her physician, (d) the woman's decision to undergo CPM was influenced by the partner, and (e) the woman's decision to undergo CPM was influenced by the media. Potential covariates considered included the presence of family history of breast cancer, age category, race, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as the definitive surgery, tumor grade, and pathology stage.

Threats to Validity

Experimental mortality and internal validity: there are several reasons why some patients might drop out of the research study. Some of these reasons are: death, no longer

willing to participate in the study, no longer available, and geographical move. The experimental mortality becomes a threat to internal validity when the number of dropouts is large, which can affect the sample size of the research study. Also, any factor that can affect the generalizability of the results will have a threat to external validity. Selection bias might be one of the factors that can have a threat to external validity since I was chose all the participants from only one cancer organization. When selection bias occurs, it is difficult to argue that the result might not be generalized to the wider population. Random irrelevancies in the experimental setting is a threat to the statistical conclusion validity since the patients that are answering the survey questions in this specific cancer facility might have a different experience than patients in different settings/facilities.

Ethical Procedures

MD Anderson, Breast Oncology Research department was contacted regarding the study. MD Anderson Institutional Review Board (IRB# PA18-0378) is the IRB of record for the research study and permission was obtained to contact the patients that meet the inclusion criteria of the study via e-mail. An informed consent was included on the first page of the survey. Since I emailed the survey questions using the Red Cap to participants, issues such as privacy can become a threat because of the use of the internet/ computer-based method to answer the survey questions. The use of technology might inappropriately limit the sample. Also, for patients who have had a mastectomy, completing a survey about their experience could trigger some unpleasant memories. Participants were reminded on the survey that their participation was voluntary. Patient's confidentiality was assured. The information gathered by each individual patient was used as part of a

larger statistical analysis. Patients were not harmed because data from individual patients were de-identified. Participants' data were stored in the principal investigator's computer, which was password protected. After study termination, data and identifiers were handled per applicable institutional policies. No adverse impacts were expected on rights or welfare of the subject because confidentiality was protected. Identifiers (name, medical record number, email address, location) were collected but were replaced by coded study numbers in the analytic file. Data will be destroyed after a 5-year period.

Summary

Three hundred eighty-four women with stage 0 to III early stage unilateral breast cancer age 20-60 years old who underwent CPM at the cancer center between January of 2010 and December of 2017 were the target population for this quantitative study which used a cross-sectional survey design. Descriptive statistics was used to analyze the characteristics of the patients, and binary outcomes modeled by logistic regression (binomial distribution with logit link) was used in order to assess the influence of doctors, partners and media on patient's decision to have CPM. For each outcome, inclusion of potential covariates was assessed by adding them to the model and comparing them to the model without the covariate based upon the Akaike Information Criteria (AIC); models including a covariate which did not improve (lower) the AIC with relation to the intercept-only model implicitly show no evidence of significant association between the outcome and that covariate. Chapter 4 will provide a summary of the results for this study.

Chapter 4: Results

Introduction

The purpose of this study was to assess the influence of the physician, partner, and media on women's decision making with regards to the utilization of CPM among women with early stage unilateral breast cancer and to determine to what extent their decision was influenced by their physician, partner, and media. The research questions and hypotheses for this study were as follows:

The research questions and hypotheses for this study were as follows:

Research Question 1: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by partners?

$H_0$1: Partners have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$1: Partners have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 2: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by physicians?

$H_0$2: Physicians have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$2: Physicians have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 3: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by the media?

$H_0$3: The media has no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$3: The media has a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

In Chapter 4, I describe the data collection process including the time frame, the response rates, the discrepancies in the data collection, the characteristic of the sample, validity, and inclusion criteria and variables. It will also discuss the challenges and the adverse events faced during the survey process, and the results of the analysis.

Data Collection

Using the prospectively maintained Breast Cancer Database Management System housed in the Department of Breast Medical Oncology at MDACC, I identified 1341 women with a diagnosis of early-stage (stage 0-III), breast cancer who underwent CPM between January of 2010 and December of 2017 at MDACC with no clinical or radiographic evidence of contralateral breast cancer. The database was developed and maintained prospectively in line with stringent quality controls and its structure is very similar to the national comprehensive cancer network (NCCN) database to which there has been major contributions over the last 2 decades. To avoid selection bias, I included those who had received their initial treatment and subsequent surveillance visits at MDACC and excluded those who had presented only for an initial consultation or a second opinion (see Sinha et al., 2017). I reviewed the electronic medical records of these women and extracted data on demographic characteristics, including ethnicity/race, family history of breast in first- and second-degree relatives, BRCA status, tumor

characteristics, including tumor stage, biomarkers and grade and treatment received (type of surgery, radiotherapy, and endocrine therapy). Patients self-reported their race at the time of registration. Following the inclusion criteria, all the patients were aged 20 to 60 years at diagnosis. I excluded patients who had received any treatment for breast cancer before their initial visit to MD Anderson, women who had bilateral breast cancer before undergoing CPM and patients with incomplete documentation of diagnosis of breast cancer, hormone receptor status or metastatic disease. Also excluded were individuals incapable or unwilling to sign the informed consent.

The tumor stage was determined using the seventh edition of the American Joint Committee on Cancer guidelines (Edge & Compton, 2010). Biomarkers of tumors were those that were either estrogen receptor positive or negative (ER + or ER-) or progesterone receptor positive or negative (PR + or PR -) as determined by immunohistochemistry using institutional cutoffs. Human epidermal receptor (HER2) status was assessed by immunohistochemistry or fluorescence in situ hybridization when available and determined as positive or negative on the basis of institutional cutoffs and guidelines that were current at the time of diagnosis (Wolff et al., 2013).

This study was conducted under MD Anderson Institutional Review Board (#PA18-0378), and an informed consent was obtained from all participants. All the women who met the criteria of the sampling from the database at the Cancer Center were asked to complete the survey. The survey included different sections that examined the preferences, knowledge, decision making, and experiences of women with breast cancer to have CPM. Participants had to check the one best answer to each of the questions. The

survey consisted of 16 questions that were adopted and modified from the "Prophylactic Mastectomy Outcomes Study Survey." The instrument includes the following domains: women's roles in the CPM decision, satisfaction with CPM, current concern about getting breast cancer again, and depressive symptoms, as well as patient characteristics including age, race/ethnicity, education, marital status, breast cancer stage at CPM, and current perception of general health" (Geiger et al., 2006).

Survey data were collected and managed using REDCap electronic data capture tools hosted at MD Anderson cancer center (Harris et al., 2009). REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

Results

Descriptive Statistics

Descriptive statistics were performed on the women who were enrolled in the study. Following are the results of the analysis related to age, race, education, and marital status.

Table 2 illustrates the results of the descriptive analysis related to age.

Table 2

Age of women who underwent CPM

Age Group	Counts	Frequency
20 to 30	10	2.80%
31 to 40	91	25.20%
41 to 50	161	44.60%
51 to 60	99	27.40%
Total	361	100%

Table 3 illustrates the results of the descriptive analysis related to Race.

Table 3

Race of women who underwent CPM

Age Group	Counts	Frequency
Asian or Pacific Islander	13	3.6%
Black or African American	15	4.2%
Hispanic, Latino	40	11.1%
Native American or Alaskan	3	0.8%
White or Caucasian	285	78.9%
Other	5	1.4%
Total	361	100%

Table 4 illustrates the results of the descriptive analysis related to the level of education.

Table 4

Highest level of education of women who underwent CPM

Education Level	Counts	Frequency
Less than or some high school	0	0%
High school or GED	29	8.1%
Trade or technical school	13	3.6%
Junior college or some college	64	17.9%
College graduate	132	36.9%
Post graduate work or degree	120	33.5%
Total	358	100%

Table 5 illustrates the results of the frequency analysis related to the marital status.

Table 5

Marital status of women who underwent CPM

Marital status	Counts	Frequency
Married	305	81.8%
Lived together but not married	12	3.2%
Separated or divorced	28	7.5%
Widowed	10	2.7%
Never married	18	4.8%
Total	373	100%

Table 6 illustrates the results of the frequency analysis related to women's concern.

Table 6

Concern level of women who underwent CPM

Concern levels	Counts	Frequency
Very concerned	135	36.4%
Concerned	73	19.7%
Not very concerned	78	21.0%
Not concerned at all	85	22.9%
Total	371	100%

Three research questions guided this study:

The research questions and hypotheses for this study were as follows:

Research Question 1: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by partners?

$H_0$1: Partners have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$1: Partners have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 2: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by physicians?

$H_0$2: Physicians have no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$2: Physicians have a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

Research Question 3: To what extent is the decision of a woman with unilateral breast cancer to have CPM influenced by the media?

$H_0$3: The media has no significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

$H_1$3: The media has a significant influence on the decision-making process of women with unilateral breast cancer to undergo CPM.

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The decision-making process and the effect of physician, partner, and media, the percentages were calculated using the relative frequency of the responses to the questions (n = 372). Table 7 illustrates the percentages of the relative frequency analysis related to the decision-making process and the effect of physician, partner, and media, on the decision-making process of women who underwent CPM.

Table 7

Decision-making process and the effect of physician, partner and media of women who underwent CPM

Decision	Counts	Frequency
I made the final decision to have surgery	201	54%
I made the final decision to have surgery after seriously considering my doctor's opinion.	165	44.4%
My doctor and I shared responsibility for the final decision to have surgery.	60	16.1%
My doctor made the final decision about my surgery, but seriously considered my opinion.	2	0.5%
My doctor made the final decision about my surgery.	4	1.1%
I made the final decision to have surgery after seriously considering my partner's opinion.	59	15.9%
My partner made the final decision about my surgery.	1	0.3%
Total	373	100%

The probability of doctor-influenced CPM decision per logistic regression is illustrated in figure 1; the overall probability is shown at left, followed by separate probabilities based upon family history of breast cancer at right. The distribution of the model-adjusted means is illustrated by catseye plots with shaded +/- standard error and have been transformed from the logit scale to the probability scale such that distributions near 0% or 100% are asymmetrically distorted accordingly.

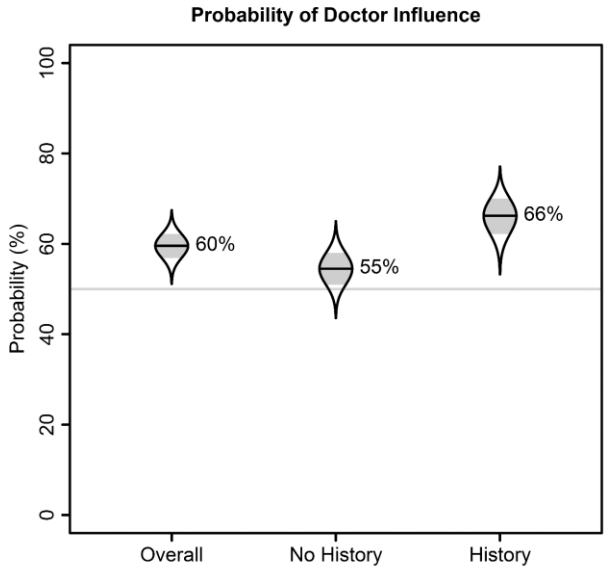

Figure 1. Probability of Doctor-Influenced CPM Decision per Logistic Regression

The probability of partner-influenced CPM decision per logistic regression is illustrated in figure 2. The overall probability is shown at left, followed by separate probabilities based upon family history of breast cancer at right. The distribution of the model-adjusted means is illustrated by catseye plots with shaded +/- standard error and have been transformed from the logit scale to the probability scale such that distributions near

0% or 100% are asymmetrically distorted accordingly. The shaded horizontal line indicates 50% probability.

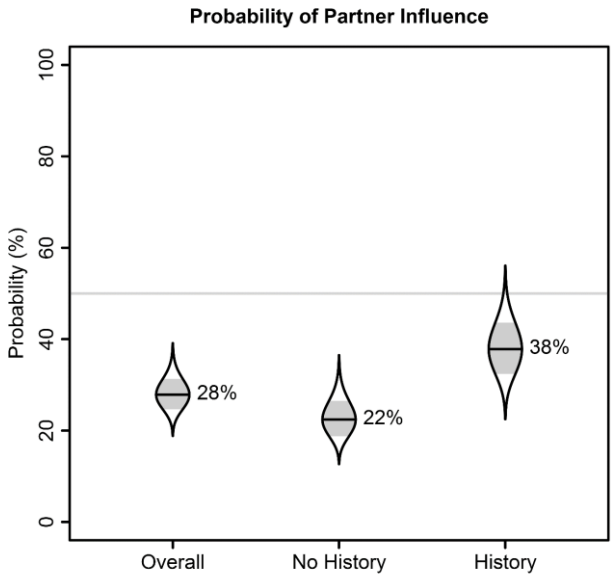

Figure 2. Probability of Partner-Influenced CPM Decision per Logistic Regression

The probability of media-influenced CPM decision per logistic regression is illustrated in figure 3. The distribution of the model-adjusted mean is illustrated by catseye plot with shaded +/- standard error and has been transformed from the logit scale to the probability scale such that distributions near 0% or 100% are asymmetrically distorted accordingly. The shaded horizontal line indicates 50% probability

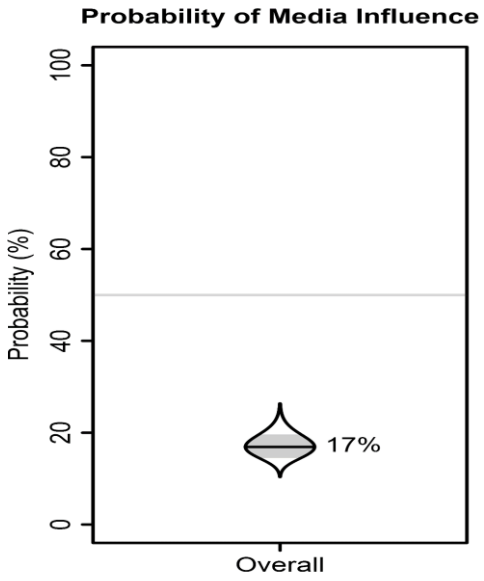

Figure 3. Probability of Media-Influenced CPM Decision per Logistic Regression.

The probability of any influenced CPM decision per logistic regression is illustrated in figure 4. The overall probability is shown at left, followed by separate probabilities based upon family history of breast cancer at right. The distribution of the model-adjusted means is illustrated by catseye plots with shaded +/- standard error and have been transformed from the logit scale to the probability scale such that distributions near 0% or 100% are asymmetrically distorted accordingly. The shaded horizontal line indicates 50% probability.

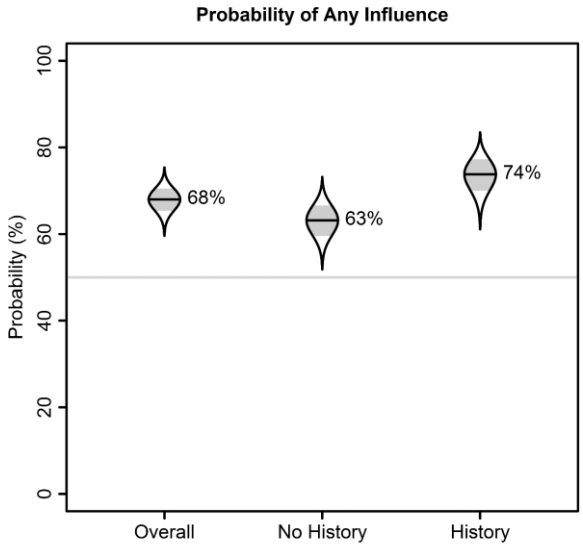

Figure 4. Probability of Any-Influenced CPM Decision per Logistic Regression.

In order to assess the influence of doctors, partners, or media on patients' decision to have a CPM performed, four binary outcome variables were defined: Doctor-influenced versus self-choice [implying that the patient had checked at least one of the "doctor" related influence statements on the survey (doctor-influenced) versus having checked the "I made the final decision to have surgery" but none of the doctor-influenced statements (self-choice)]; Partner-influenced versus self-choice [implying that the patient had checked at least one of the "partner" related influence statements on the survey (partner-influenced) versus having checked the "I made the final decision to have surgery" but none of the partner-influenced statements (self-choice), for patients who indicated the presence of partners under the Marital Status section of the survey]; Media-influenced versus self-choice [implying that the patient had checked at least one of the "media" related influence statements on the survey other than "Not At All" (media-influenced) versus having checked the "I made the final decision to have surgery" but

none of the media-influenced statements (self-choice)]; Any-influence versus self-choice [implying that the patient had checked at least one of the doctor, partner, or media related influence statements on the survey as with the above variables]. Henceforth these binary variables will be referred to as simply doctor-influenced, partner-influenced, media-influenced, and any-influenced.

Incidence of each of the binary outcomes was modeled by logistic regression (binomial distribution with logit link). For each outcome, inclusion of potential covariates was assessed by adding them to the model and comparing them to the model without the covariate based upon the Akaike Information Criteria (AIC); models including a covariate which did not improve (lower) the AIC with relation to the model without it implicitly show no evidence of significant association between the outcome and that covariate. Potential covariates considered included the presence of family history of breast cancer, age category, race, marital status, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as the definitive surgery, tumor grade, and pathology stage. For the doctor-influenced and partner-influenced models, only the inclusion of the covariate for family history of breast cancer improved the model. For the media influenced model, none of the covariates yielded improved models over the intercept-only model. For the any-influence model, inclusion of the covariates for family history of breast cancer and pathology stage each improved the model and including both covariates yielded the most improved model. Further, inclusion of both of these variables in models for the other outcomes had little

effect on the otherwise optimal model, so for consistency I will base final analysis summaries and figures on these two-covariate models. Note that the covariates for marital status and presence of partner were excluded from consideration of inclusion in the partner-influenced and any-influenced model due to confounding with partner-influence. Differences among levels of variables with 3 or more levels were assessed by Tukey-adjusted contrasts.

Additionally, for the sake of completion, fully-adjusted versions of the above models for each of the binary outcomes were produced, including the presence of covariates for family history of breast cancer, age category, race, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), whether the CPM was performed on a different versus the same day as the definitive surgery, tumor grade, and pathology stage, with the exception that the presence of partner was excluded from inclusion in the partner-influenced and any-influenced model due to confounding with partner-influence. These fully adjusted models had by far the highest AICs among the models considered for each outcome, and were thus the worst among all models, plus may be subject to some lack of independence among the covariates.

Statistical analyses were performed using R statistical software (R Core Team, 2019, version 3.6.1). In all statistical tests, two-sided alpha=.05. Predictions and differences among factor levels in the logistic regression models were estimated using the "emmeans" package (Lenth 2018); this includes adjusted means weighted proportionally

to covariate marginal frequencies. Catseye plots (Cumming 2014) were produced using the "catseyes" package (Andersen 2019).

Overall, 203/343 patients reported some doctor influence on the CPM decision. The logistic regression model of the incidence of doctor-influence demonstrated significantly higher overall influence on the CPM decision due to doctors compared to self-determination alone (p=.0006), suggesting that 59% of patients' decisions were influenced by doctors. The model also showed that patients with a family history of breast cancer had significantly higher odds of doctor-influence than those without (p=.029). There was no evidence of association with pathology stage. These results are summarized in table 8.

Table 8

Logistic Regression Model Summary for Incidence of Doctor-Influence.

	Adj. Mean	SE	Probability	CI95Min	CI95Max	*p*-value
Overall	0.38	0.11	0.59	0.54	0.65	0.0005

Overall probability of doctor Influence

Difference due to family history of breast cancer

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
True - False	0.50	0.23	1.64	1.05	2.57	0.029

Difference due to pathology stage (note that these are Tukey-adjusted p –values). The overall Type III p=0.27

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
I-0	-0.28	0.31	0.75	0.41	1.39	0.80
II-0	-0.55	0.34	0.58	0.30	1.12	0.37
II-I	-0.26	0.27	0.77	0.45	1.31	0.77
III-0	-0.70	0.42	0.50	0.22	1.13	0.34
III-I	-0.42	0.37	0.66	0.32	1.36	0.67
III-II	-0.16	0.39	0.86	0.40	1.83	0.98

Overall, 53/189 patients with partners reported some partner influence on the CPM decision. The logistic regression model of the incidence of partner-influence demonstrated significantly lower overall influence on the CPM decision due to partners compared with self-determination alone ($p<.0001$, same with Hommel adjustment), suggesting that 27% of patients' decisions were influenced by partners. The model also showed that patients with a family history of breast cancer had significantly higher odds of partner-influence than those without ($p=.0015$). There was no evidence of association with pathology stage. These results are summarized in table 9.

Table 9

Logistic Regression Model Summary for Incidence of Partner-Influence.

	Adj. Mean	SE	Probability	CI95Min	CI95Max	*p*-value
Overall	-.99	0.17	0.27	0.21	0.34	<.0001

Overall probability of partner influence

Difference due to family history of breast cancer

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
True - False	0.81	0.33	2.25	1.17	4.34	0.015

Difference due to pathology stage (note that these are Tukey-adjusted p –values). The overall Type III p=0.46

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
I-0	-0.13	0.43	0.88	0.38	2.03	0.99
II-0	-0.67	0.50	0.51	0.19	1.38	0.55
II-I	-0.54	0.44	0.58	0.25	1.38	0.61
III-0	-0.63	0.62	0.53	0.16	1.79	0.74
III-I	-0.50-	0.57	0.61	0.20	1.85	0.82
III-II	0.04	0.63	1.04	0.30	3.55	1

Overall, 36/213 patients reported some level of media influence on the CPM decision. The logistic regression model of the incidence of media-influence demonstrated significantly lower overall influence on the CPM decision due to media compared with self-determination alone ($p<.0001$), suggesting that 16% of patients' decisions were influenced by media. The model also showed that patients with a family history of breast cancer trended higher in incidence of association with media influence, but this trend lacked evidence of significance ($p=.59$). There was no evidence of association with pathology stage. These results are summarized in table 10.

Table 10

Logistic Regression Model Summary for Incidence of Media-Influence.

	Adj. Mean	SE	Probability	CI95Min	CI95Max	*p*-value
Overall	-1.68	0.20	0.16	0.11	0.22	<.0001

Overall probability of media influence

Difference due to family history of breast cancer

	Adj. Mean	SE	OddsRatio	CI95Min	CI95Max	*p*-value
Overall	0.21	0.38	1.23	0.59	2.58	<.059

Overall probability of media influence

Difference due to pathology stage (note that these are Tukey-adjusted p –values). The overall Type III p=0.08

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
I-0	-0.66	0.44	0.52	0.22	1.22	0.44
II-0	-1.19	0.54	0.30	0.10	0.88	0.13
II-I	-0.53	0.52	0.59	0.21	1.62	0.73
III-0	-1.54	0.81	0.21	0.04	1.05	0.23
III-I	-0.88	0.79	0.41	0.09	1.95	0.68
III-II	-0.35	0.86	0.71	0.13	3.78	0.98

Overall, 224/332 patients reported some level of any influence on the CPM decision. The logistic regression model of the incidence of any-influence demonstrated significantly higher overall influence on the CPM decision due to any-influence compared with self-determination alone ($p<.0001$), suggesting that 68% of patients' decisions were influenced by some combination of doctor, partner, or media. The model

also showed that patients with a family history of breast cancer had significantly higher odds of any-influence than those without (p=.040). Additionally, this model showed evidence that patients with lower pathology stage tended to have higher probability of any-influence on their decision, and a trend of declining influence with higher stage. These results are summarized in table 11.

Table 11

Logistic Regression Model Summary for Incidence of Any-Influence.

	Adj. Mean	SE	Probability	CI95Min	CI95Max	*p*-value	Hommel *p*-value
Overall	.75	0.12	0.68	0.63	0.73	<.0001	<0.0001

Overall probability of any influence

Difference due to family history of breast cancer

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value	Hommel *p*-value
True - False	0.50	0.24	1.64	1.02	2.64	0.040	0.040

Logistic Regression Model, with Logit Link

Table 12

DecisionDoctorVsSelf FamHis, Age,Race,Partner Education, Receptor, Lymphatic_Invasion, DiffDaySurg, Tumor Grade, PathStage

Coefficients	Estimate	Std. Error	*p*-value
(Intercept)	-0.381	0.835	0.65
FamHist (TRUE - FALSE)	0.490	0.239	*0.041
Age (41 to 50 years old - 31 to 40 years old)	0.265	0.290	0.36
Age (20 to 30 years old - 31 to 40 years old)	0.695	0.763	0.36
Age (51 to 60 years old - 31 to 40 years old)	0.005	0.320	0.99
Race (Hispanic/Latino - White or Caucasian)	-0.577	0.381	0.13
Race (Black or African American - White or Caucasian)	-0.666	0.608	0.27
Race (Asian or Pacific Islander - White or Caucasian)	0.040	0.612	0.95
Race (Other - White or Caucasian)	0.139	0.761	0.86
Partner (TRUE - FALSE)	0.309	0.331	0.35
Education (Trade or technical school - High school or GED)	0.714	0.745	0.34
Education (Junior college, or some college - High school or GED)	0.610	0.486	0.21
Education (College graduate - High school or GED)	0.569	0.444	0.20
Education (Postgraduate work or degree - High school or GED)	0.753	0.446	0.09
Receptor (TRUE - FALSE)	0.261	0.311	0.40
Lymphatic Invasion (POS - NEG)	0.184	0.283	0.51
DiffDaySurg (TRUE - FALSE)	-0.173	0.320	0.59
TumorGrade (II - I)	-0.270	0.500	0.59
TumorGrade (III - I)	0.017	0.513	0.97
PathStage (I - 0)	-0.417	0.347	0.23
PathStage (II - 0)	-0.742	0.381	0.052
PathStage (III - 0)	-0.807	0.486	0.10

Table 13

DecisionPartnerVsSelf FamHis, Age,Race, Education, Receptor, Lymphatic_Invasion, DiffDaySurg, Tumor Grade, PathStage

Coefficients	Estimate	Std. Error	*p*-value
(Intercept)	-0.595	1.182	0.61
FamHist (TRUE - FALSE)	0.884	0.359	*0.014
Age (41 to 50 years old - 31 to 40 years old)	-0.345	0.431	0.42
Age (20 to 30 years old - 31 to 40 years old)	0.335	1.351	0.80
Age (51 to 60 years old - 31 to 40 years old)	-0.370	0.480	0.44
Race (Hispanic/Latino - White or Caucasian)	-0.122	0.558	0.83
Race (Black or African American - White or Caucasian)	0.388	0.937	0.68
Race (Asian or Pacific Islander - White or Caucasian)	0.327	0.816	0.69
Race (Other - White or Caucasian)	-15.787	1187.688	0.99
Education (Trade or technical school - High school or GED)	-0.138	1.115	0.90
Education (Junior college, or some college - High school or GED)	0.559	0.752	0.46
Education (College graduate - High school or GED)	0.239	0.692	0.73
Education (Postgraduate work or degree - High school or GED)	0.235	0.711	0.74
Receptor (TRUE - FALSE)	0.145	0.451	0.75
Lymphatic Invasion (POS - NEG)	0.602	0.422	0.15
DiffDaySurg (TRUE - FALSE)	-0.623	0.512	0.22
TumorGrade (II - I)	-0.726	0.750	0.33
TumorGrade (III - I)	-0.591	0.772	0.44
PathStage (I - 0)	-0.068	0.480	0.89
PathStage (II - 0)	-0.892	0.583	0.13
PathStage (III - 0)	-0.675	0.726	0.35

Table 14

DecisionMediaVsSelf FamHis, Age,Race,Partner, Education, Receptor, Lymphatic_Invasion, DiffDaySurg, Tumor Grade, PathStage

Coefficients	Estimate	Std. Error	p-value
(Intercept)	-0.497	1.440	0.73
FamHist (TRUE - FALSE)	0.318	0.414	0.44
Age (41 to 50 years old - 31 to 40 years old)	-0.137	0.479	0.77
Age (20 to 30 years old - 31 to 40 years old)	0.755	1.055	0.47
Age (51 to 60 years old - 31 to 40 years old)	-0.662	0.584	0.26
Race (Hispanic/Latino - White or Caucasian)	-0.374	0.690	0.59
Race (Black or African American - White or Caucasian)	1.395	0.766	0.069
Race (Asian or Pacific Islander - White or Caucasian)	0.693	0.814	0.39
Race (Other - White or Caucasian)	-14.595	1066.555	0.99
Partner (TRUE - FALSE)	0.311	0.642	0.63
Education (Trade or technical school - High school or GED)	-0.039	1.435	0.98
Education (Junior college, or some college - High school or GED)	0.845	0.943	0.37
Education (College graduate - High school or GED)	0.810	0.865	0.35
Education (Postgraduate work or degree - High school or GED)	0.500	0.885	0.57
Receptor (TRUE - FALSE)	-0.145	0.529	0.78
Lymphatic Invasion (POS - NEG)	0.107	0.518	0.84
DiffDaySurg (TRUE - FALSE)	-0.217	0.614	0.72
TumorGrade (II - I)	-0.730	0.754	0.33
TumorGrade (III - I)	-1.521	0.819	0.063
PathStage (I - 0)	-0.824	0.528	0.12
PathStage (II - 0)	-1.552	0.675	*0.022
PathStage (III - 0)	-1.663	0.929	0.07

Table 15

DecisionAnyVsSelf FamHis, Age,Race,Partner, Education, Receptor, Lymphatic_Invasion, DiffDaySurg, Tumor Grade, PathStage

Coefficients	Estimate	Std. Error	p-value
(Intercept)	0.507	0.852	0.55
FamHist (TRUE - FALSE)	0.519	0.258	*0.044
Age (41 to 50 years old - 31 to 40 years old)	0.098	0.311	0.75
Age (20 to 30 years old - 31 to 40 years old)	1.797	1.128	0.11
Age (51 to 60 years old - 31 to 40 years old)	-0.042	0.343	0.90
Race (Hispanic/Latino - White or Caucasian)	-0.403	0.414	0.33
Race (Black or African American - White or Caucasian)	0.163	0.722	0.82
Race (Asian or Pacific Islander - White or Caucasian)	-0.270	0.622	0.66
Race (Other - White or Caucasian)	-0.138	0.763	0.86
Education (Trade or technical school - High school or GED)	0.958	0.786	0.22
Education (Junior college, or some college - High school or GED)	0.989	0.523	0.059
Education (College graduate - High school or GED)	0.722	0.473	0.13
Education (Postgraduate work or degree - High school or GED)	0.885	0.481	0.066
Receptor (TRUE - FALSE)	0.297	0.341	0.38
Lymphatic Invasion (POS - NEG)	0.092	0.298	0.76
DiffDaySurg (TRUE - FALSE)	-0.224	0.334	0.50
TumorGrade (II - I)	-0.063	0.525	0.91
TumorGrade (III - I)	0.000	0.542	1.00
PathStage (I - 0)	-0.975	0.413	*0.018
PathStage (II - 0)	-1.235	0.451	*0.006
PathStage (III - 0)	-1.545	0.536	*0.004

Fully Adjusted Model: For each outcome, inclusion of potential covariates was assessed by adding them to the model and comparing them to the model without the covariate based upon the Akaike Information Criteria (AIC); models including a covariate which did not improve (lower) the AIC with relation to the intercept-only model implicitly show no evidence of significant association between the outcome and that covariate. Potential covariates considered included the presence of family history of breast cancer, age category, race, marital status, presence of partner, education category, presence of estrogen or progesterone receptor, presence of lymphovascular invasion (LVI), and whether the CPM was performed on a different versus the same day as the definitive surgery. Except for family history of breast cancer for the doctor-influenced, media-influenced, and any-influenced outcomes, inclusion of each of the covariates alone or in combination with family history resulted in a worsened model (higher AIC) compared to the intercept-only model. Note that the covariates for marital status and presence of partner were excluded from inclusion in the partner-influenced and any-influenced model due to confounding with partner-influence. The results of the adjusted models are illustrated in the tables below.

Table 16

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Family History

FamHist	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	-0.11	0.39	0.47	0.29	0.66
True	0.38	0.41	0.59	0.4	0.77

Decision Doctor Vs Self Fully Adjusted Model Differences due to Family History The overall Type III p=0.041

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
True - False	0.49	0.24	1.63	1.02	2.61	0.041

For doctor versus self, inclusion of family history was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to family history was illustrated in table 16 and showed significant influence in the fully adjusted model of decision doctor versus self for patients with family history of breast cancer.

Table 17

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Age

Age	Adj. Mean	SE	Probability	CI95Min	CI95Max
31 to 40 years old	-0.11	0.4	0.47	0.29	0.66
41 to 50 years old	0.16	0.37	0.54	0.36	0.71
20 to 30 years old	0.59	0.8	0.64	0.27	0.9
51 to 60 years old	-0.1	0.4	0.47	0.29	0.67

Decision Doctor Vs Self Fully Adjusted Model Differences due to Age
The overall Type III p=0.62

Contrast	Estimate	SE	OddsRatio	CI95 Min	CI95 Max	*p*-value
41 to 50 years old-31 to 40 years old	0.27	0.29	1.3	0.74	2.3	0.80
20 to 30 years old - 31 to 40 years old	0.69	0.76	2	0.45	8.95	0.80
20 to 30 years old - 41 to 50 years old	0.43	0.75	1.54	0.35	6.66	0.94
51 to 60 years old - 31 to 40 years old	0	0.32	1	0.54	1.88	1
51 to 60 years old - 41 to 50 years old	-0.26	0.29	0.77	0.44	1.35	0.80
51 to 60 years old - 20 to 30 years old	-0.69	0.76	0.5	0.11	2.23	0.80

For doctor versus self, inclusion of age was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to age was illustrated in table 17 and showed no significant influence in the fully adjusted model of decision doctor versus self despite the age range of the patients.

Table 18

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Race

Race	Adj. Mean	SE	Probability	CI95Min	CI95Max
White or Caucasian	0.35	0.33	0.59	0.42	0.73
Hispanic/Latino	-0.23	0.46	0.44	0.24	0.66
Black or African American	-0.32	0.66	0.42	0.17	0.72
Asian or Pacific Islander	0.39	0.68	0.6	0.28	0.85
Other	0.49	0.81	0.62	0.25	0.89

Decision Doctor Vs Self Fully Adjusted Model Differences due to Race
The overall Type III p=0.51

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
Hispanic/Latino – White or Caucasian	-0.58	0.38	0.56	0.27	1.18	0.55
Black or African American – Hispanic/Latino	-0.67	0.61	0.51	0.16	1.69	0.81
Black or African American - Hispanic/Latino	-0.09	0.68	0.92	0.24	3.45	1
Asian or Pacific Islander - White or Caucasian	0.04	0.61	1.04	0.31	3.46	1
Asian or Pacific Islander - Hispanic/Latino	0.62	0.69	1.85	0.48	7.16	0.90
Asian or Pacific Islander - Black or African American	0.71	0.85	2.03	0.38	10.72	0.92
Other - White or Caucasian	0.14	0.76	1.15	0.26	5.11	1
Other - Hispanic/Latino	0.72	0.83	2.05	0.4	10.46	0.91
Other - Black or African American	0.8	0.95	2.24	0.34	14.53	0.92
Other - Asian or Pacific Islander	0.1	0.96	1.1	0.17	7.2	1

For doctor versus self, inclusion of race was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to race was illustrated in table 18 and showed no significant influence in the fully adjusted model of decision doctor versus self despite the race of the patients.

Table 19

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Partner

Partner	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	-0.02	0.46	0.5	0.29	0.71
True	0.29	0.38	0.57	0.39	0.74

Decision Doctor Vs Self Fully Adjusted Model Differences due to Partner The overall Type III p=0.35

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	0.31	0.33	1.36	0.71	2.61	0.35

For doctor versus self, inclusion of partner was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to partner was illustrated in table 19 and showed no significant influence in the fully adjusted model of decision doctor versus self despite whether the patient has a partner or not.

Table 20

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Education

Education	Adj. Mean	SE	Probability	CI95Min	CI95Max
High school or GED	-0.39	0.54	0.4	0.19	0.66
Trade or technical school	0.32	0.68	0.58	0.27	0.84
Junior college, or some college	0.22	0.46	0.55	0.33	0.75
College graduate	0.18	0.4	0.54	0.35	0.72
Postgraduate work or degree	0.36	0.41	0.59	0.39	0.76

Decision Doctor Vs Self Fully Adjusted Model Differences due to Education
The overall Type III p=0.57

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
Trade or technical school-High school, or GED	0.71	0.75	2.04	0.47	8.8	0.87
Junior college, or some college-High school or GED	0.61	0.49	1.84	0.71	4.77	0.72
Junior college, or some college-Trade or technical school	-0.1	0.68	0.9	0.24	3.42	1
College graduate-High school or GED	0.57	0.44	1.77	0.74	4.22	0.70
College graduate-Trade or technical school	-0.15	0.64	0.86	0.25	3.05	1
College graduate-Junior college or some college	-0.04	0.34	0.96	0.49	1.87	1
Postgraduate work or degree-High school or GED	0.75	0.45	2.12	0.89	5.09	0.44
Postgraduate work or degree-Trade or technical school	0.04	0.65	1.04	0.29	3.71	1
Postgraduate work or degree-Junior college or some college	0.14	0.35	1.15	0.59	2.27	0.99
Postgraduate work or degree-College graduate	0.18	0.28	1.2	0.7	2.07	0.96

For doctor versus self, inclusion of education was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to education was illustrated in table 20 and showed no significant influence in the fully adjusted model of decision doctor versus self despite the education levels of the patients.

Table 21

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Receptor

Receptor	Adj. Mean	SE	Probability	CI95Min	CI95Max
FALSE	0.01	0.45	0.5	0.29	0.71
TRUE	0.27	0.38	0.57	0.38	0.73

Decision Doctor Vs Self Fully Adjusted Model Differences due to Receptor The overall Type III p=0.40

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	0.26	0.31	1.3	0.71	2.39	0.40

For doctor versus self, inclusion of receptor was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to receptor was illustrated in table 21 and showed no significant influence in the fully adjusted model of decision doctor versus self despite the receptor status of the patients.

Table 22

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Lymphatic_Invasion

Lymphatic_Invasion	Adj. Mean	SE	Probability	CI95Min	CI95Max
NEG	0.04	0.38	0.51	0.33	0.69
POS	0.23	0.44	0.56	0.35	0.75

Decision Doctor Vs Self Fully Adjusted Model Differences due to Lymphatic_Invasion The overall Type III p=0.51

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
POS-NEG	0.18	0.28	1.2	0.69	2.09	0.52

For doctor versus self, inclusion of lymphatic invasion was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to lymphatic invasion was illustrated in table 22

and showed no significant influence in the fully adjusted model of decision doctor versus self despite the lymphatic invasion whether it is positive or negative.

Table 23

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for DifDaySurg

DifDaySurg	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	0.22	0.38	0.56	0.37	0.73
True	0.05	0.45	0.51	0.3	0.72

Decision Doctor Vs Self Fully Adjusted Model Differences due to DifDaySurg
The overall Type III p=0.59

Contrast	Estimate	SE	Odds Ratio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	-0.17	0.32	0.84	0.45	1.58	0.59

For doctor versus self, inclusion of different day surgery was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to different day surgery was illustrated in table 23 and showed no significant influence in the fully adjusted model of decision doctor versus self despite the choice of the patients to have CPM the same day of the surgery or in a different day of the surgery.

Table 24

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Tumor Grade

Tumor Grade	Adj. Mean	SE	Probability	CI95Min	CI95Max
I	0.22	0.58	0.55	0.29	0.79
II	-0.05	0.42	0.49	0.29	0.68
III	0.24	0.36	0.56	0.39	0.72

Decision Doctor Vs Self Fully Adjusted Model Differences due to Tumor Grade The overall Type III p=0.53

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
II-I	-0.27	0.5	0.76	0.29	2.04	0.85
III-I	0.02	0.51	1.02	0.37	2.78	1.00
III-II	0.29	0.27	1.33	0.79	2.25	0.53

For doctor versus self, inclusion of tumor grade was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to tumor grade was illustrated in table 24 and showed no significant influence in the fully adjusted model of decision doctor versus self despite the tumor grade.

Table 25

Decision Doctor Vs Self Fully Adjusted Model Logistic Regression for Path Stage

Path Stage	Adj. Mean	SE	Probability	CI95Min	CI95Max
0	0.63	0.47	0.65	0.43	0.83
I	0.21	0.41	0.55	0.36	0.73
II	-0.11	0.43	0.47	0.28	0.68
III	-0.18	0.49	0.46	0.24	0.69

Decision Doctor Vs Self Fully Adjusted Model Differences due to Path Stage
The overall Type III p=0.22

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
I-0	-0.42	0.35	0.66	0.33	1.3	0.63
II-0	-0.74	0.38	0.48	0.23	1	0.21
II-I	-0.33	0.29	0.72	0.41	1.27	0.67
III-0	-0.81	0.49	0.45	0.17	1.16	0.35
III-I	-0.39	0.4	0.68	0.31	1.5	0.77
III-II	-0.06	0.41	0.94	0.42	2.1	1

For doctor versus self, inclusion of pathological stage was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision doctor versus self, fully adjusted model differences due to pathological stage was illustrated in table 25 showed no significant influence in the fully adjusted model of decision doctor versus self despite the pathological stage of the tumor.

Table 26

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Family History

FamHist	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	-4.34	237,54	0.01	0	1
True	-3.45	237.54	0.03	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to Family History
The overall Type III p=0.014

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
True - False	0.88	0.36	2.42	1.2	4.89	0.014

For partner versus self, inclusion of family history was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to family history was illustrated in table 26 and showed significant influence in the fully adjusted model of decision partner versus self for patients with family history of breast cancer.

Table 27

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Age

Age	Adj. Mean	SE	Probability	CI95Min	CI95Max
31 to 40 years old	-3.8	237.54	0.02	0	1
41 to 50 years old	-4.14	237.54	0.02	0	1
20 to 30 years old	-3.46	237.54	0.03	0	1
51 to 60 years old	-4.17	237.54	0.02	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to Age
The overall Type III p=0.80

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
41 to 50 years old-31 to 40 years old	-0.34	0.43	0.71	0.3	1.65	0.85
20 to 30 years old - 31 to 40 years old	0.34	1.35	1.4	0.1	19.74	1
20 to 30 years old - 41 to 50 years old	0.68	1.35	1.97	0.14	27.58	0.96
51 to 60 years old - 31 to 40 years old	-0.37	0.48	0.69	0.27	1.77	0.87
51 to 60 years old - 41 to 50 years old	-0.02	0.44	0.98	0.41	2.32	1
51 to 60 years old - 20 to 30 years old	-0.7	1.35	0.49	0.03	6.98	0.95

For partner versus self, inclusion of age was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to age was illustrated in table 27 and showed no significant influence in the fully adjusted model of decision partner versus self despite the age range of the patients.

Table 28

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Race

Race	Adj. Mean	SE	Probability	CI95Min	CI95Max
White or Caucasian	-0.85	0.54	0.3	0.13	0.55
Hispanic/Latino	-0.98	0.71	0.27	0.09	0.6
Black or African American	-0.47	1.05	0.39	0.07	0.83
Asian or Pacific Islander	-0.53	0.91	0.37	0.09	0.78
Other	-16.64	1187.69	0	0	NA

Decision Partner Vs Self Fully Adjusted Model Differences due to Race
The overall Type III p=0.98

Contrast	Estimate	SE	Odds Ratio	CI95 Min	CI95Max	*p*-value
Hispanic/Latino – White or Caucasian	-0.12	0.56	0.89	0.3	2.64	1
Black or African American – Hispanic/Latino	0.39	0.94	1.47	0.24	9.25	0.99
Black or African American - Hispanic/Latino	0.51	1.05	1.67	0.21	13.1	0.99
Asian or Pacific Islander - White or Caucasian	0.33	0.82	1.39	0.28	6.86	1
Asian or Pacific Islander - Hispanic/Latino	0.45	0.94	1.57	0.25	9.92	0.99
Asian or Pacific Islander - Black or African American	-0.06	1.22	0.94	0.09	10.35	1
Other - White or Caucasian	-15.79	1187.69	0	0	Inf	1
Other - Hispanic/Latino	-15.67	1187.69	0	0	Inf	1
Other - Black or African American	-16.18	1187.69	0	0	Inf	1
Other - Asian or Pacific Islander	-16.11	1187.69	0	0	Inf	1

For partner versus self, inclusion of race was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to race was illustrated in table 28 and showed no significant influence in the fully adjusted model of decision partner versus self despite the race of the patients.

Table 29

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Education

Education	Adj. Mean	SE	Probability	CI95Min	CI95Max
High school or GED	-4.07	237.54	0.02	0	1
Trade or technical school	-4.21	237.54	0.01	0	1
Junior college, or some college	-3.51	237.54	0.03	0	1
College graduate	-3.83	237.54	0.02	0	1
Postgraduate work or degree	-3.84	237.54	0.02	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to Education
The overall Type III p=0.92

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
Trade or technical school-High school, or GED	-0.14	1.12	0.87	0.1	7.75	1
Junior college, or some college-High school or GED	0.56	0.75	1.75	0.4	7.64	0.95
Junior college, or some college-Trade or technical school	0.7	0.99	2.01	0.29	14.08	0.96
College graduate-High school or GED	0.24	0.69	1.27	0.33	4.93	1
College graduate-Trade or technical school	0.38	0.94	1.46	0.23	9.21	1.00
College graduate-Junior college or some college	-0.32	0.5	0.73	0.27	1.94	0.97
Postgraduate work or degree-High school or GED	0.23	0.71	1.26	0.31	5.09	1
Postgraduate work or degree-Trade or technical school	0.37	0.95	1.45	0.23	9.32	1
Postgraduate work or degree-Junior college or some college	-0.32	0.51	0.72	0.27	1.95	0.97
Postgraduate work or degree-College graduate	0	0.43	1	0.43	2.31	1

For partner versus self, inclusion of education was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information

Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to education was illustrated in table 29 and showed no significant influence in the fully adjusted model of decision partner versus self despite the education levels of the patients.

Table 30

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Receptor

Receptor	Adj. Mean	SE	Probability	CI95Min	CI95Max
FALSE	-3.97	237.54	0.02	0	1
TRUE	-3.82	237.54	0.02	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to Receptor
The overall Type III p=0.75

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	0.14	0.45	1.16	0.48	2.8	0.75

For partner versus self, inclusion of receptor was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to receptor was illustrated in table 30 and showed no significant influence in the fully adjusted model of decision partner versus self despite the receptor status of the patients.

Table 31

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Lymphatic_Invasion

Lymphatic_Invasion	Adj. Mean	SE	Probability	CI95Min	CI95Max
NEG	-4.19	237.54	0.01	0	1
POS	-3.59	237.54	0.03	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to Lymphatic_Invasion The overall Type III p=0.15

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
POS-NEG	0.6	0.42	1.83	0.8	4.17	0.15

For partner versus self, inclusion of lymphatic invasion was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to lymphatic invasion was illustrated in table 31 and showed no significant influence in the fully adjusted model of decision partner versus self despite the lymphatic invasion whether it is positive or negative.

Table 32

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for DifDaySurg

DifDaySurg	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	-3.58	237.54	0.03	0	1
True	-4.2	327.54	0.01	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to DifDaySurg The overall Type III p=0.22

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	-0.62	0.51	0.54	0.2	1.46	0.22

For partner versus self, inclusion of different day surgery was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to different day surgery was illustrated in table 32 and showed no significant influence in the fully adjusted model of decision partner versus self despite the choice of the patients to have CPM the same day of the surgery or in a different day of the surgery.

Table 33

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Tumor Grade

Tumor Grade	Adj. Mean	SE	Probability	CI95Min	CI95Max
I	-3.45	237.54	0.03	0	1
II	-4.18	237.54	0.02	0	1
III	-4.04	237.54	0.02	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to Tumor Grade
The overall Type III p=0.62

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
II-I	-0.73	0.75	0.48	0.11	2.11	0.60
III-I	-0.59	0.77	0.55	0.12	2.52	0.73
III-II	0.14	0.42	1.15	0.51	2.59	0.94

For partner versus self, inclusion of tumor grade was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to tumor grade was illustrated in table 33 and showed no

significant influence in the fully adjusted model of decision partner versus self despite the tumor grade.

Table 34

Decision Partner Vs Self Fully Adjusted Model Logistic Regression for Path Stage

Path Stage	Adj. Mean	SE	Probability	CI95Min	CI95Max
0	-3.48	237.54	0.03	0	1
I	-3.55	237.54	0.03	0	1
II	-4.38	237.54	0.01	0	1
III	-4.16	237.54	0.02	0	1

Decision Partner Vs Self Fully Adjusted Model Differences due to Path Stage
The overall Type III p=0.31

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
I-0	-0.07	0.48	0.93	0.36	2.39	1
II-0	-0.89	0.58	0.41	0.13	1.29	0.42
II-I	-0.82	0.48	0.44	0.17	1.13	0.32
III-0	-0.68	0.73	0.51	0.12	2.11	0.79
III-I	-0.61	0.64	0.55	0.15	1.92	0.78
III-II	0.22	0.68	1.24	0.33	4.7	0.99

For partner versus self, inclusion of pathological stage was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision partner versus self, fully adjusted model differences due to pathological stage was illustrated in table 34 showed no significant influence in the fully adjusted model of decision partner versus self despite the pathological stage of the tumor.

Table 35

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Family History

FamHist	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	-4.39	213.31	0.01	0	1
True	-4.07	213.31	0.02	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Family History The overall Type III p=0.44

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
True - False	0.32	0.41	1.37	0.61	3.1	0.44

For media versus self, inclusion of family history was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to family history was illustrated in table 35 and showed no significant influence in the fully adjusted model of decision media versus self for patients with family history of breast cancer

Table 36

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Age

Age	Adj. Mean	SE	Probability	CI95Min	CI95Max
31 to 40 years old	-4.22	213.31	0.01	0	1
41 to 50 years old	-4.36	213.31	0.01	0	1
20 to 30 years old	-3.47	213.31	0.03	0	1
51 to 60 years old	-4.88	213.31	0.01	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Age
The overall Type III p=0.52

Contrast	Estimate	SE	OddsRatio	CI95 Min	CI95 Max	*p*-value
41 to 50 years old-31 to 40 years old	-0.14	0.48	0.87	0.34	2.23	0.99
20 to 30 years old - 31 to 40 years old	0.75	1.05	2.13	0.27	16.81	0.89
20 to 30 years old - 41 to 50 years old	0.89	1.05	2.44	0.31	19.08	0.83
51 to 60 years old - 31 to 40 years old	-0.66	0.58	0.52	0.16	1.62	0.67
51 to 60 years old - 41 to 50 years old	-0.52	0.55	0.59	0.2	1.73	0.77
51 to 60 years old - 20 to 30 years old	-1.42	1.09	0.24	0.03	2.05	0.56

For media versus self, inclusion of age was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to age was illustrated in table 36 and showed no significant influence in the fully adjusted model of decision Media versus self despite the age range of the patients.

Table 37

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Race

Race	Adj. Mean	SE	Probability	CI95Min	CI95Max
White or Caucasian	-1.66	0.59	0.16	0.06	0.38
Hispanic/Latino	-2.03	0.87	0.12	0.02	0.42
Black or African American	-0.26	0.87	0.43	0.12	0.81
Asian or Pacific Islander	-0.96	0.96	0.28	0.05	0.71
Other	-16.25	1066.55	0	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Race
The overall Type III p=0.33

Contrast	Estimate	SE	Odds Ratio	CI95 Min	CI95Max	*p*-value
Hispanic/Latino – White or Caucasian	-0.37	0.69	0.69	0.18	2.66	0.98
Black or African American – Hispanic/Latino	1.39	0.77	4.03	0.9	18.1	0.36
Black or African American - Hispanic/Latino	1.77	0.96	5.87	0.9	38.41	0.35
Asian or Pacific Islander - White or Caucasian	0.69	0.81	2	0.41	9.85	0.91
Asian or Pacific Islander - Hispanic/Latino	1.07	1.02	2.91	0.4	21.32	0.83
Asian or Pacific Islander - Black or African American	-0.7	1.09	0.5	0.06	4.17	0.97
Other - White or Caucasian	-14.6	1066.55	0	0	Inf	1
Other - Hispanic/Latino	-14.22	1066.55	0	0	Inf	1
Other - Black or African American	-15.99	1066.55	0	0	Inf	1
Other - Asian or Pacific Islander	-15.29	1066.55	0	0	Inf	1

For media versus self, inclusion of race was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to race was illustrated in table 37 and showed no significant influence in the fully adjusted model of decision media versus self despite the race of the patients.

Table 38

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Partner

Partner	Adj.Mean	SE	Probability	CI95Min	CI95Max
False	-4.39	213.31	0.01	0	1
True	-4.08	213.31	0.02	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Partner The overall Type III p=0.63

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
True - False	0.31	0.64	1.37	0.39	4.8	0.63

For media versus self, inclusion of partner was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to partner was illustrated in table 38 and showed no significant influence in the fully adjusted model of decision media versus self despite whether the patient has a partner or not.

Table 39

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Education

Education	Adj.Mean	SE	Probability	CI95Min	CI95Max
High school or GED	-4.66	213.31	0.01	0	1
Trade or technical school	-4.7	213.31	0.01	0	1
Junior college, or some college	-3.81	213.31	0.02	0	1
College graduate	-3.85	213.31	0.02	0	1
Postgraduate work or degree	-4.16	213.31	0.02	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Education The overall Type III p=0.80

Contrast	Estimate	SE	Odds Ratio	CI95Min	CI95Max	*p*-value
Trade or technical school-High school, or GED	-0.04	1.44	0.96	0.06	16.01	1
Junior college, or some college-High school or GED	0.84	0.94	2.33	0.37	14.78	0.90
Junior college, some college-Trade or technical school	0.88	1.3	2.42	0.19	30.72	0.96
College graduate-High school or GED	0.81	0.86	2.25	0.41	12.24	0.88
College graduate-Trade or technical school	0.85	1.21	2.34	0.22	24.91	0.96
College graduate-Junior college or some college	-0.03	0.61	0.97	0.29	3.19	1
Postgraduate work or degree-High school or GED	0.5	0.88	1.65	0.29	9.34	0.98
Postgraduate work or degree-Trade or technical school	0.54	1.22	1.72	0.16	18.8	0.99
Postgraduate work or degree-Junior college or some college	-0.34	0.63	0.71	0.21	2.41	0.98
Postgraduate work or degree-College graduate	-0.31	0.47	0.73	0.29	1.84	0.97

For media versus self, inclusion of education was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to education was illustrated in table 39 and showed no significant influence in the fully adjusted model of decision media versus self despite the education levels of the patients.

Table 40

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Receptor

Receptor	Adj.Mean	SE	Probability	CI95Min	CI95Max
FALSE	-4.16	213.31	0.02	0	1
TRUE	-4.31	213.31	0.01	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Receptor The overall Type III p=0.78

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	-0.14	0.53	0.87	0.31	2.44	0.79

For media versus self, inclusion of receptor was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to receptor was illustrated in table 40 and showed no significant influence in the fully adjusted model of decision media versus self despite the receptor status of the patients.

Table 41

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Lymphatic_Invasion

Lymphatic_Invasion	Adj.Mean	SE	Probability	CI95Min	CI95Max
NEG	-4.29	213.31	0.01	0	1
POS	-4.18	213.31	0.02	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Lymphatic_Invasion The overall Type III p=0.84

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
POS-NEG	0.11	0.52	1.11	0.4	3.07	0.84

For media versus self, inclusion of lymphatic invasion was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to lymphatic invasion was illustrated in table 41

and showed no significant influence in the fully adjusted model of decision media versus self despite the lymphatic invasion whether it is positive or negative.

Table 42

Decision Media Vs Self Fully Adjusted Model Logistic Regression for DifDaySurg

DifDaySurg	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	-4.13	213.31	0.02	0	1
True	-4.34	213.31	0.01	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to DifDaySurg
The overall Type III p=0.72

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	-0.22	0.61	0.81	0.24	2.68	0.72

For media versus self, inclusion of different day surgery was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to different day surgery was illustrated in table 42 and showed no significant influence in the fully adjusted model of decision media versus self despite the choice of the patients to have CPM the same day of the surgery or in a different day of the surgery.

Table 43

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Tumor Grade

Tumor Grade	Adj. Mean	SE	Probability	CI95Min	CI95Max
I	-3.48	213.31	0.03	0	1
II	-4.21	213.31	0.01	0	1
III	-5	213.31	0.01	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Tumor Grade The overall Type III p=0.12

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
II-I	-0.73	0.75	0.48	0.11	2.11	0.60
III-I	-1.52	0.82	0.22	0.04	1.09	0.15
III-II	-0.79	0.49	0.45	0.17	1.18	0.24

For media versus self, inclusion of tumor grade was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to tumor grade was illustrated in table 43 and showed no significant influence in the fully adjusted model of decision media versus self despite the tumor grade.

Table 44

Decision Media Vs Self Fully Adjusted Model Logistic Regression for Path Stage

Path Stage	Adj. Mean	SE	Probability	CI95Min	CI95Max
0	-3.22	213.31	0.04	0	1
I	-4.05	213.31	0.02	0	1
II	-4.78	213.31	0.01	0	1
III	-4.89	213.31	0.01	0	1

Decision Media Vs Self Fully Adjusted Model Differences due to Path Stage
The overall Type III p=0.10

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
I-0	-0.82	0.53	0.44	0.16	1.24	0.40
II-0	-1.55	0.68	0.21	0.06	0.8	0.10
II-I	-0.73	0.57	0.48	0.16	1.48	0.58
III-0	-1.66	0.93	0.19	0.03	1.17	0.28
III-I	-0.84	0.84	0.43	0.08	2.26	0.75
III-II	-0.11	0.9	0.9	0.15	5.25	1

For media versus self, inclusion of pathological stage was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision media versus self, fully adjusted model differences due to pathological stage was illustrated in table 44 and showed no significant influence in the fully adjusted model of decision media versus self despite the pathological stage of the tumor.

Table 45

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Family History

FamHist	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	0.67	0.45	0.66	0.45	0.82
True	1.19	0.47	0.77	0.57	0.89

Decision Any Vs Self Fully Adjusted Model Differences due to Family History
The overall Type III p=0.044

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
True - False	0.52	0.26	1.68	1.01	2.79	0.044

For any versus self, inclusion of family history was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to family history was illustrated in table 45 and showed significant influence in the fully adjusted model of decision any versus self for patients with family history of breast cancer.

Table 46

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Age

Age	Adj. Mean	SE	Probability	CI95Min	CI95Max
31 to 40 years old	0.47	0.4	0.62	0.42	0.78
41 to 50 years old	0.57	0.37	0.64	0.46	0.78
20 to 30 years old	2.27	1.15	0.91	0.5	0.99
51 to 60 years old	0.43	0.42	0.61	0.4	0.78

Decision Any Vs Self Fully Adjusted Model Differences due to Age
The overall Type III p=0.43

Contrast	Estimate	SE	OddsRatio	CI95 Min	CI95 Max	*p*-value
41 to 50 years old-31 to 40 years old	0.1	0.31	1.1	0.6	2.03	0.99
20 to 30 years old - 31 to 40 years old	1.8	1.13	6.03	0.66	55	0.38
20 to 30 years old - 41 to 50 years old	1.7	1.11	5.47	0.62	48.55	0.42
51 to 60 years old - 31 to 40 years old	-0.04	0.34	0.96	0.49	1.88	1.00
51 to 60 years old - 41 to 50 years old	-0.14	0.31	0.87	0.47	1.6	0.97
51 to 60 years old - 20 to 30 years old	-1.84	1.13	0.16	0.02	1.44	0.36

For any versus self, inclusion of age was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information

Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to age was illustrated in table 46 and showed no significant influence in the fully adjusted model of decision any versus self despite the age range of the patients.

Table 47

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Race

Race	Adj. Mean	SE	Probability	CI95Min	CI95Max
White or Caucasian	1.06	0.39	0.74	0.58	0.86
Hispanic/Latino	0.66	0.52	0.66	0.41	0.84
Black or African American	1.23	0.8	0.77	0.42	0.94
Asian or Pacific Islander	0.79	0.7	0.69	0.36	0.9
Other	0.93	0.84	0.72	0.33	0.93

Decision AnyVs Self Fully Adjusted Model Differences due to Race
The overall Type III p=0.88

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
Hispanic/Latino – White or Caucasian	-0.4	0.41	0.67	0.3	1.51	0.87
Black or African American – Hispanic/Latino	0.16	0.72	1.18	0.29	4.84	1.00
Black or African American - Hispanic/Latino	0.57	0.8	1.76	0.37	8.39	0.95
Asian or Pacific Islander - White or Caucasian	-0.27	0.62	0.76	0.23	2.59	0.99
Asian or Pacific Islander - Hispanic/Latino	0.13	0.71	1.14	0.28	4.61	1
Asian or Pacific Islander - Black or African American	-0.43	0.93	0.65	0.1	4.05	0.99
Other - White or Caucasian	-0.14	0.76	0.87	0.2	3.88	1
Other - Hispanic/Latino	0.27	0.85	1.3	0.25	6.85	1.00
Other - Black or African American	-0.3	1.03	0.74	0.1	5.58	1.00
Other - Asian or Pacific Islander	0.13	0.96	1.14	0.17	7.52	1

For any versus self, inclusion of race was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to race was illustrated in table 47 and showed no significant influence in the fully adjusted model of decision any versus self despite the race of the patients.

Table 48

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Education

Education	Adj. Mean	SE	Probability	CI95Min	CI95Max
High school or GED	0.22	0.6	0.56	0.28	0.8
Trade or technical school	1.18	0.73	0.77	0.44	0.93
Junior college, or some college	1.21	0.53	0.77	0.54	0.9
College graduate	0.94	0.46	0.72	0.51	0.86
Postgraduate work or degree	1.11	0.48	0.75	0.54	0.89

Decision Any Vs Self Fully Adjusted Model Differences due to Education
The overall Type III p=0.39

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
Trade or technical school-High school, or GED	0.96	0.79	2.61	0.56	12.16	0.74
Junior college, or some college-High school or GED	0.99	0.52	2.69	0.96	7.5	0.32
Junior college, or some college-Trade or technical school	0.03	0.71	1.03	0.25	4.19	1
College graduate-High school or GED	0.72	0.47	2.06	0.82	5.2	0.55
College graduate-Trade or technical school	-0.24	0.68	0.79	0.21	2.97	1.00
College graduate-Junior college or some college	-0.27	0.36	0.77	0.38	1.55	0.95
Postgraduate work or degree-High school or GED	0.89	0.48	2.42	0.94	6.22	0.36
Postgraduate work or degree-Trade or technical school	-0.07	0.68	0.93	0.24	3.55	1
Postgraduate work or degree-Junior college or some college	-0.1	0.37	0.9	0.43	1.88	1.00
Postgraduate work or degree-College graduate	0.16	0.3	1.18	0.68	2.12	0.98

For any versus self, inclusion of education was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information

Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to education was illustrated in table 48 showed no significant influence in the fully adjusted model of decision any versus self despite the education levels of the patients.

Table 49

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Receptor

Receptor	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	-0.79	0.5	0.69	0.45	0.85
True	1.08	0.44	0.75	0.55	0.88

Decision Any Vs Self Fully Adjusted Model Differences due to Receptor
The overall Type III p=0.38

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	0.3	0.34	1.35	0.69	2.62	0.38

For any versus self, inclusion of receptor was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to receptor was illustrated in table 48 showed no significant influence in the fully adjusted model of decision any versus self despite the receptor status of the patients.

Table 50

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Lymphatic_Invasion

Lymphatic_Invasion	Adj. Mean	SE	Probability	CI95Min	CI95Max
NEG	0.89	0.44	0.71	0.51	0.85
POS	0.98	0.49	0.73	0.5	0.88

Decision Any Vs Self Fully Adjusted Model Differences due to Lymphatic_Invasion The overall Type III p=0.76

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
POS-NEG	0.09	0.3	1.1	0.61	1.97	0.76

For any versus self, inclusion of lymphatic invasion was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to lymphatic invasion was illustrated in table 50 and showed no significant influence in the fully adjusted model of decision any versus self despite the lymphatic invasion whether it is positive or negative.

Table 51

Decision Any Vs Self Fully Adjusted Model Logistic Regression for DifDaySurg

DifDaySurg	Adj. Mean	SE	Probability	CI95Min	CI95Max
False	1.05	0.44	0.74	0.55	0.87
True	0.82	0.5	0.69	0.46	0.86

Decision Any Vs Self Fully Adjusted Model Differences due to DifDaySurg The overall Type III p=0.50

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
TRUE-FALSE	-0.22	0.33	0.8	0.42	1.54	0.50

For any versus self, inclusion of different day surgery was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to different day surgery was illustrated in table 50 and showed no significant influence in the fully adjusted model of decision any versus

self despite the choice of the patients to have CPM the same day of the surgery or in a different day of the surgery.

Table 52

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Tumor Grade

Tumor Grade	Adj. Mean	SE	Probability	CI95Min	CI95Max
I	0.95	0.64	0.72	0.43	0.9
II	0.89	0.48	0.71	0.49	0.86
III	0.96	0.41	0.72	0.54	0.85

Decision Any Vs Self Fully Adjusted Model Differences due to Tumor Grade
The overall Type III p=0.97

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
II-I	-0.06	0.52	0.94	0.34	2.63	0.99
III-I	0	0.54	1	0.35	2.89	1
III-II	0.06	0.29	1.07	0.61	1.87	0.97

For any versus self, inclusion of tumor grade was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to tumor grade was illustrated in table 52 showed no significant influence in the fully adjusted model of decision any versus self despite the tumor grade.

Table 53

Decision Any Vs Self Fully Adjusted Model Logistic Regression for Path Stage

Path Stage	Adj. Mean	SE	Probability	CI95Min	CI95Max
0	1.87	0.57	0.87	0.68	0.95
I	0.9	0.46	0.71	0.5	0.86
II	0.64	0.48	0.65	0.42	0.83
III	0.33	0.53	0.58	0.33	0.8

Decision Any Vs Self Fully Adjusted Model Differences due to Path Stage
The overall Type III p=0.023

Contrast	Estimate	SE	OddsRatio	CI95Min	CI95Max	*p*-value
I-0	-0.98	0.41	0.38	0.17	0.85	0.08
II-0	-1.23	0.45	0.29	0.12	0.7	0.031
II-I	-0.26	0.3	0.77	0.42	1.4	0.83
III-0	-1.54	0.54	0.21	0.07	0.61	0.021
III-I	-0.57	0.41	0.57	0.25	1.27	0.51
III-II	-0.31	0.42	0.73	0.32	1.66	0.88

For any versus self, inclusion of pathological stage was assessed by adding it to the model and comparing it to the model without the covariate based upon the Akaike Information Criteria (AIC). The result of the logistic regression of decision any versus self, fully adjusted model differences due to pathological stage was illustrated in table 53 and showed significant influence in the fully adjusted model of decision any versus self when it came to the pathological stage of the tumor especially for patients with stage I-0; II-0 and III-0 .

Summary

Despite not being candidates for CPM, women with stage 0 to III early stage unilateral breast cancer ages 20-60 years old who underwent CPM at MD Anderson Cancer Center between January of 2010 and December of 2017 opted to have this irreversible surgery. 205 out of 345

patients reported some doctor influence on the CPM decision. Sixty percent of patients' decisions were influenced by doctors. The model also showed that patients with a family history of breast cancer had significantly higher odds of doctor-influence than those without (p=.029, .040 with Hommel adjustment). 54 out of 190 patients with partners reported some partner influence on the CPM decision. Twenty-eight percent of patients' decisions were influenced by partners. The model also showed that patients with a family history of breast cancer had significantly higher odds of partner-influence than those without (p=.023, .040 with Hommel adjustment). 36 out of 213 patients reported some level of media influence on the CPM decision. Seventeen percent of patients' decisions were influenced by media. 227 out of 35 patients reported some level of any influence on the CPM decision. Sixty-eight percent of patients' decisions were influenced by some combination of doctor, partner, or media. The model also showed that patients with a family history of breast cancer had significantly higher odds of any-influence than those without (p=.040, .040 with Hommel adjustment).

No matter how small their risk was to develop contralateral breast cancer CBC), these women chose developing CBC as their principal concern. The analysis demonstrates that partners, physicians, and media had significant influence on the decision-making process

of women with unilateral breast cancer to undergo CPM. In Chapter 5, I will discuss the interpretation of the findings, limitations, recommendations, and implications of this research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to assess the influence of the physician, partner, and media on women's decision making with regards to the utilization of CPM among women with early stage unilateral breast cancer and to determine to what extent their decision was influenced by their physician, partner, and media. Despite not being candidates for CPM, the results of this study indicated that women with stage 0 to III early stage unilateral breast cancer ages 20-60 years old who underwent CPM at MD Anderson Cancer Center between January of 2010 and December of 2017 who opted to have this irreversible surgery reported not making the decision alone. Key findings of this study are that partners, physicians, and media all had significant influence ($p < 0.005$) on the decision-making process of women with unilateral breast cancer to undergo CPM. Chapter 5 gives a final overview of the findings and its interpretation in the context of the theoretical shared decision-making theory, limitations to generalizability, implications of the study, recommendations for future research, and the impact of the study for positive social change.

Interpretation of the Findings

CPM is one of many decisions that involve a choice where the outcome is not certain. Patients should make an informed decision when it comes to this irreversible procedure. Shared decision-making theory was used in order to resolve the confliction between patient self-determination and practitioners' responsibility and to confirm that decisions are evidence-based and in patients' interests (Brown & Salmon, 2018). The shared model of decision making is the derivative of the normative decision theory and

was used in my research study as the theoretical framework. Breast cancer patients are consumers of medical care and have the right to actively participate in the decision-making process concerning treatment choices and risk reduction strategies. The normative decision theory includes an active attempt to engage patient values in the decision-making process. In order to accomplish this goal, patients should be provided with decision aids such as informative brochures, videos, computer programs, as well as physicians inputs.

Breast cancer patients should be provided with enough information and opportunity to decide among treatment options consistent with the informed consent process. Treatment options should be discussed with a patient in a culturally competent manner, including the option of no treatment at all. Discussion should include all current treatments a consumer may be undergoing and risks, benefits, and consequences to treatment or non-treatment. Patients should be given the opportunity to refuse treatment and to express preferences about future treatment decisions.

Achieving shared decision-making depends on building a good relationship between the physician and the patients in the clinical encounter in order for the information to be shared with breast cancer patients and allow patients to express and deliberate their preferences regarding their treatment options during the decision-making process (Elwyn et al., 2012). The patient decision may be influenced by their partner, physician, or the media, and patients should play an active role in making an informed decision regarding the treatment options. The SDM approach gives patients and physicians the opportunity to jointly decide which medical treatment option is best based

on current evidence and patient's needs and preferences (Elwyn et al., 2012). Patients' decision can be compromised and affected by the disease or the stressful situations such as the new diagnosis of breast cancer; for this reason, patients should be provided with tools and education that help them make an informed decision. The results of this study emphasize that despite not being candidates for CPM, women with stage 0 to III early stage unilateral breast cancer ages 20-60 years old who underwent CPM at MD Anderson Cancer Center between January of 2010 and December of 2017 opted to have this irreversible surgery. Two hundred five out of 345 patients reported some doctor influence on the CPM decision, Fifty four out of 190 patients with partners reported some partner influence on the CPM decision, this compares to 36 out of 213 patients who reported some level of media (television, newspapers, social media, magazines, and radio) influence on the CPM decision. When asked about the reason to have the CPM surgery, 50.5% (186) of the women cited breast cancer prevention as the main reason for choosing CPM.

The findings of the study correlated with the literatures that show that regardless of knowing that CPM does not improve survival rate, many women with unilateral breast cancer are choosing this procedure in order to ease their fear and potentially extend their lives (Rosenberg et al., 2013). Despite not being candidates for CPM, the result of the study demonstrated that women with stage 0 to III early stage unilateral breast cancer ages 20-60 years old who underwent CPM at MD Anderson Cancer Center between January of 2010 and December of 2017 opted to have this irreversible surgery. The analysis demonstrates that partners, physicians, and media had significant influence on

the decision-making process of women with unilateral breast cancer to undergo CPM. The findings could highlight the need for decision aid programs or tools that help breast cancer women increase their knowledge of their treatment options, reduce their decisional conflicts, and make informed decisions that align with their goals and values. It is important for women with unilateral breast cancer to fully understand the benefits versus the adverse effects of CPM and make an informed decision regarding this irreversible surgical procedure.

Limitations of the Study

The limitation to the study is that the patients that were evaluated for the research study are inherent to one single institution which might affect the external validity or the generalizability of the study findings. The response bias that might affect my research; the breast cancer patients can consciously or unconsciously give responses that they think that the person conducting the research might want to see. In order to address the response bias limitation, clear language was used in the survey to avoid any clarification to certain questions, the questions were not framed in a way that I was most likely to get the answer I wanted to hear, the amount of options were not confusing, and the reason for conducting the survey was communicated in the introduction part of the survey.

Women were selected from the surgical breast cancer database at MD Anderson Cancer Center. The alpha for the test of this model was set at 0.05. In order to achieve power of 0.80 and a medium effect size, a sample of 384 was required in order to detect differences in the research study.

The binary influence variables which formed the basis of these analyses were not independent. Most patients reporting influence from partners or media also report influence from doctors. Two-thirds of patients reported some form of influence; taken together, the results suggest that a patient with a family history of breast cancer appears more likely to consider external perspectives in her decision to have a CPM.

Recommendations

This study was needed because the findings of the study highlight the need for developing a decision quality tool that helps women with early stage unilateral breast cancer make informed decisions regarding their surgical choices. While researchers may know the factors that are influencing the decision-making process of women with unilateral breast cancer to undergo CPM, prospective research is needed in order to develop a decision quality tool that helps women with unilateral breast cancer make an informed decision regarding their surgical choice. The decision quality tool can be a brochure that includes but not limited to the indication for the CPM procedure, the necessity and the medically unnecessary indication of the procedure, doctor's recommendation, the pro and cons of the procedure, the complications, and frequently asked questions, as well as feedbacks from patients who did and did not choose CPM. The patient should have good knowledge regarding the irreversible procedure so they can make a shared informed decision about their treatment options. Future qualitative studies are needed in order to determine whether the decision to have a breast reconstruction was the main reason why patients opted to undergo prophylactic mastectomy, and whether the patients have knowledge of breast reconstruction surgery and complications.

Implications

The potential contribution of the study to advance practice and promote positive social change is that it could help in assessing the influence of the partner, physician, and media on the decision of women with unilateral breast cancer who decided to undergo CPM, and the findings could highlight the need of decision aids programs or tools that help breast cancer women increase their knowledge of their treatment options, reduce their decisional conflicts, and make informed decisions that align with their goals and values. It is important for women with unilateral breast cancer to fully understand the benefits versus the adverse effect of CPM and make an informed decision regarding the irreversible surgical procedure. Evidence driven models are needed to better inform women about their risk of contralateral breast cancer in order to empower them in their active decision-making process (Yi et al., 2009). No matter how small the risk was for study participants to develop contralateral breast cancer (CBC), these women choose developing CBC as their principal concern for having CPM. Women should understand their risk of local, contralateral and systemic recurrence and that opting to choose the irreversible CPM procedure will not affect these risks equally (Rosenberg et al., 2015).

The normative decision theory includes an active attempt in order to engage patient's values in the decision-making process. In order to accomplish this goal, patients are provided with decision aids such as informative brochures, videos, computer programs, as well as physician's inputs (Elwyn et al., 2012). This model is conceptualized as providing the patient with both objective medical information

incorporated with her subjective values and opinions (Elwyn et al., 2012). The shared model of decision-making is the derivative of the normative decision theory. SDM should not be confused by obtaining an informed consent from patient. Informed consent is mandated by ethical guidelines; while SDM is a process by which the physician and the patient consider valuable information regarding the medical problem in question which may include treatment options and consequences, which allows the patients to consider how the treatment plan can fit with their preferences for health states and outcomes. When faced with life threatening diseases like breast cancer, patients might make uninformed decisions regarding their treatment. Patients might also overestimate the benefits of CPM and others may underestimate the severity of some of the side effects associated with this procedure. It is important for women with unilateral breast cancer to fully understand the benefits as well as the side effects that are associated with CPM in order to make informed and supported decisions, based on accurate understanding of the pros versus the cons of the procedure.

Decision-making surrounding early diagnosis of breast cancer, with respect to CPM option, and by using a shared decision-making approach, gives patients and physicians the opportunity to jointly decide which medical treatment option is best based on current evidence and patient's needs and preferences (Rosenberg, & Partridge, 2014). A clinical educational instrument is important to help women with unilateral breast cancer make informed decision regarding CPM, and to improve the quality of life of breast cancer survivors. Providing patients with educational instrument will empower them to be effective advocate of their health and the treatment options and better

understand their health conditions. Many patients have limited health information which can be more complicated when combined with fear and decision-making providing vulnerable patients with an informational tool in a format that they can easily understand could improve the quality of their medical care and promote informed decision-making.

Conclusion

When faced with life threatening diseases like breast cancer, patients might make uninformed decisions regarding their treatment. They might also overestimate the benefits of CPM and others may underestimate the severity of some of the side effects associated with this procedure. It is important for women with unilateral breast cancer to fully understand the benefits as well as the side effects that are associated with CPM in order to make informed and supported decisions, based on accurate understanding of the benefits versus the risks of the procedure. Decision-making surrounding early diagnosis of breast cancer, with respect to CPM option, and by using a shared decision-making approach, gives patients and physicians the opportunity to jointly decide which medical treatment option is best based on current evidence. A clinical educational instrument would be important to help women with unilateral breast cancer make informed decision regarding CPM, and to improve the quality of life of breast cancer survivors.

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Appendix

Contralateral Prophylactic Mastectomy Survey

Living with Breast Cancer Risk: Survey of Experiences and Decision-Making Process

Please check the one best answer to each of the following questions, unless instructed otherwise.

Your Breast Cancer Experience and Thoughts

1. Before your contralateral prophylactic mastectomy, how would you have described your concern about developing breast cancer?

4☐ Very concerned
3☐ Concerned
2☐ Not very concerned
1☐ Not concerned at all

2. At the time of your prophylactic mastectomy, what was your marital status?

1☐ Married
2☐ Living together but unmarried
3☐ Separated or divorced
4☐ Widowed
5☐ Single, never married

3. What were your reasons for having a contralateral prophylactic mastectomy? Please check all that apply.

1☐ Uncomfortably large breasts
2☐ Concerns about appearance
3☐ Family history of breast cancer
4☐ Prevent breast cancer
5☐ Other, please specify: _____

4. Which statement (s) best describes the decision about your contalateral prophylactic mastectomy? Choose all that apply.

1☐ I made the final decision to have surgery.
2☐ I made the final decision to have surgery after seriously considering my doctor's opinion.
3☐ My doctor and I shared responsibility for the final decision to have surgery.

4☐ My doctor made the final decision about my surgery, but seriously considered my opinion.
5☐ My doctor made the final decision about my surgery.

6☐ I made the final decision to have surgery after seriously considering my partner's opinion.
7☐ My partner made the final decision about my surgery.

5. Media Influence: Please choose one number to indicate whether or not the media had influenced your decision making to undergo prophylactic mastectomy.

Not At All	A Little Bit	Some-what	Quite A Bit	Very Much
1	2	3	4	5

6. Thinking back to <u>six months after</u> your prophylactic mastectomy, how satisfied were you with your decision to have the surgery?

1☐ Very dissatisfied
2☐ Dissatisfied
3☐ Neither Satisfied or Dissatisfied
4☐ Satisfied
5☐ Very satisfied

7. Did you have breast reconstruction after your prophylactic mastectomy? Breast reconstruction is a surgical procedure in which the breasts are recreated using implants or tissue from the body.

0☐ No.

1☐ Yes, done in a separate surgery after the prophylactic mastectomy
2☐ Yes, done along with prophylactic mastectomy

8. I "yes" Have you had surgery to revise or repair your reconstruction?

0☐ No
1☐ Yes, one or two times
2☐ Yes, multiple times

Your Life Right Now

9. Below is a list of statements that describe aspects of women's lives, including thoughts about your body and sexuality.

Please choose one number to indicate how true each statement has been for you during the past 30 days.	FREQUENCY				
	Not At All	A Little Bit	Some-what	Quite A Bit	Very Much
a. I am able to enjoy life.	1	2	3	4	5
b. I am content with the quality of my life right now.	1	2	3	4	5
c. I feel self-conscious about my appearance.	1	2	3	4	5
d. I am happy with my current weight.	1	2	3	4	5
e. I am satisfied with my appearance when dressed.	1	2	3	4	5
f. I find it difficult to look at myself naked.	1	2	3	4	5
g. I am embarrassed for others to see my body.	1	2	3	4	5
h. I am able to feel like a woman.	1	2	3	4	5
i. I feel sexually attractive.	1	2	3	4	5
j. I am satisfied with my sex life.	1	2	3	4	5

A Few Details About You

10. What was your age at the time of prophylactic mastectomy?

1☐ 20 to 30 years old
2☐ 31 to 40 years old
3☐ 41 to 50 years old
4☐ 51 to 60 years old

11. To what race/ethnic group do you belong? Please check all that apply.

1☐ Asian or Pacific Islander, please specify: _____
2☐ Black or African American
3☐ Hispanic/Latino, please specify: _____
4☐ Native American or Alaskan Native
5☐ White or Caucasian
9☐ Other, please specify: _____

12. What is the highest level of education you have completed?

1☐ Less than or some high school
2☐ High school or GED
3☐ Trade or technical school
4☐ Junior college, or some college
5☐ College graduate
6☐ Postgraduate work or degree

13. On what date did you complete this questionnaire?

____/____/____ (month/day/year)

14. How long ago was your prophylactic mastectomy? (Please insert the number of years)

_____Years ago.

Final Questions

15. Overall, how satisfied are you <u>now</u> with your decision to have contralateral prophylactic mastectomy?

1☐ Very dissatisfied
2☐ Dissatisfied
3☐ Neither Satisfied or Dissatisfied
4☐ Satisfied
5☐ Very satisfied

16. What one thing do you wish you had known before your prophylactic mastectomy?

_____

_____

_____

Thank you very much for completing the survey!